A Comprehensive Study to Develop and Evaluate the Acquired Brain Injury Physiotherapy Documentation in an Inpatient Setting

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Declaration

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Abstract

Study Background and Aims

Specialist physiotherapy service processes for treating people with acquired brain injury (ABI) are poorly described and evaluated in the literature. The most important factor which limits the understanding of the physiotherapy service is the lack of a system to define, describe and record the interventions made by physiotherapists. The aim of this study was to develop and evaluate a physiotherapy documentation tool for use in inpatient ABI rehabilitation settings. To achieve this aim, it was imperative that the researcher consider all the different factors and identify all the key attributes of the documentation process followed in inpatient settings. It was therefore necessary to map the process of the physiotherapy rehabilitation service provided to patients with ABI. Mapping the process of the service helped the researcher to understand all aspects which make a large contribution to and have a great effect on the rehabilitation process so as to achieve the main aim of this study. It also helped to establish a theoretical basis for the documentation process and to develop a clear understanding of the specific attributes of rehabilitation services.

Research Method

The researcher used a wide range of data collection methods, including interviews, questionnaires and observational processes. Interviews were conducted with the heads of rehabilitation teams working in inpatient rehabilitation services in the UK. Thereafter, a national questionnaire was sent to physiotherapists with experience of treating patients with ABI in the UK so as to capture the breadth and scope of current physiotherapy practice. It was also designed to identify the physiotherapy treatment activities provided to people with ABI in an inpatient rehabilitation setting. The validity, reliability and acceptability of the questionnaire were tested before the questionnaire was sent out to physiotherapists.

Information gathered during the early phases was then used to design a physiotherapy treatment recording tool for use with people with ABI in an inpatient rehabilitation setting. The process of developing a new treatment recording tool went through many different stages, including considering all the reported advantages and disadvantages of the documentation methods currently used, as well as the policy, ethical and legal issues involved in physiotherapy documentation. Once the final draft of the treatment recording tool was developed, the reliability, validity and acceptability of the tool were evaluated. Six experienced physiotherapists working in one of the two rehabilitation centres treating ABI in Wales, UK were invited to take part in this stage of the study. Eighteen treatment sessions were observed and video recorded to evaluate the treatment recording tool. The piloting process included testing the treatment recording tool's comprehensiveness and its ability to describe physiotherapy treatment sessions.

Results

The information gathered in this research and the descriptions provided by the ICF framework were used in this study to guide the process of describing the pathway that patients follow if they have an ABI. Four themes, namely pre-rehabilitation, rehabilitation and post-rehabilitation stages and the documentation process, were identified. Each theme had different sub-themes. The feedback from the heads of the rehabilitation teams and physiotherapists helped the researcher to gather in-depth details of these themes and sub-themes.

A valid, reliable and acceptable treatment recording tool for use by physiotherapists with people with ABI in an inpatient rehabilitation setting was developed using the information gathered during the previous phases, including a literature review. The results show that the newly developed documentation tool has the ability to record comprehensive details of treatment sessions using a very simple coding process in a very quick way. The treatment recording tool offers a sufficiently structured method to collect information about treatment sessions, including treatment tasks, treatment positions, interventions provided, adjuncts used and the treatment duration of each treatment task. Treatment packages (combinations of physiotherapy interventions) were also investigated using a geometric coding process. The results showed that the treatment recording tool records more comprehensive and organised details about physiotherapy treatment sessions compared to SOAP notes completed by the same physiotherapists.

Conclusion

The main outcome of this current study was the development of a new, valid, acceptable and reliable treatment recording tool. This tool brought an order and rigour to the description of physiotherapy treatment activities provided for people with ABI in an inpatient setting. It helped to characterise the many treatments, procedures and interventions used in physiotherapy, taking into account their multidimensionality with respect to content, purpose, intensity, duration, sequence, frequency and other characteristics of care provided. The new treatment recording tool has been designed to improve patient care by facilitating accurate and appropriate communication between physiotherapists, and between physiotherapists and other specialists. Developing the documentation method in inpatient settings will help other professionals to better understand physiotherapy practice and the role that physiotherapists play in the multidisciplinary rehabilitation service.

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CHAPTER ONE

INTRODUCTION

Chapter 1. Introduction

1.1. Overview

This introductory chapter will describe the general aspects of acquired brain injury (ABI) including the prevalence and signs and symptoms of the condition. This will be followed by an overall description of the ABI rehabilitation process, including the physiotherapy service provided for people with ABI. This will then lead to an explanation of the aims and objectives of the research.

1.2. Acquired brain injury (ABI)

Acquired brain injury (ABI) is an inclusive category that embraces acute (rapid onset) brain injury of any cause, including: trauma due to head injury or post-surgical damage, vascular accidents such as stroke or subarachnoid haemorrhage, brain tumour, cerebral anoxia, infection and toxic-metabolic insult (Turner-Stokes et al., 2005).

ABI is an umbrella term which covers a wide range of conditions, in which brain damage occurs after birth. It includes traumatic brain injury (TBI) but also refers to other forms of non-congenital, non-progressive brain injury arising from a cerebral vascular accident or illness such as stroke, infection, toxins or anoxia/hypoxia. For practical purposes, ABI can be categorised into primary (focal) and secondary (non-focal) injuries. Primary injuries are those that occur at the moment of impact, such as TBI and stroke, whereas secondary injuries (such as hypoxia) begin after the trauma and continue indefinitely as a result of the injuring event (Elovic et al., 2004).

1.3. Prevalence of ABI

It is difficult to give an exact figure for the incidence of ABI in adults, since ABI can be caused by a wide range of conditions (Turner-Stokes et al., 2005). Traumatic Brain Injury (TBI) and Stroke are the most common conditions found among ABI patients. The incidence rate of TBI in the UK is estimated to be 275 per 100,000 of the population per year. Statistics show there is a considerable variation between age groups (Holmberg and Lindmark, 2008). Young adults and elderly people over the age of 75 years are the most frequent groups requiring hospitalisation in the UK due to TBI. Moderate to severe brain injury occurs in approximately 25/100,000 people per annum, of whom 10 to 20% are likely to have a severe disability or prolonged coma and 65% to 85% will experience good physical recovery (Turner-Stokes et al., 2005). In contrast, stroke affects 152,000 people each year in the UK, and a significant proportion of these are aged between 18 and 65 years. Statistics indicate that strokes occur in 317 per 100,000 of the population per year in England and 362 per 100,000 of the population per year in Scotland, UK (Turner-Stokes et al., 2005, Stroke Association, 2013).

1.4. Signs and Symptoms of ABI

Regardless of the aetiology of the brain injury, the majority of ABI patients share a similar clinical course which begins with a global impairment of brain function, followed by a functional recovery and then a stable level of functioning with no further deterioration (Semlyen et al., 1998). The functional deficits arising from ABI depend, to some extent, on the localisation and nature of the damage. Patients with ABI thus present with a wide range of problems, starting often with limited physical activity due to weakness or paralysis, abnormality of the muscle tone or a lack of muscle coordination, or sensory problems in one or more parts of the body. ABI also affects the patient's social participation as a result of

visual, hearing, communication, cognitive and/or behavioural problems. The variation in functional limitation depends, to some extent, on the severity of the injury, the combination of deficits and other injuries, and on the patient's background, environment and personal factors (Turner-Stokes et al., 2005).

1.5. ABI vs. Stroke and TBI

ABI is a broad category. Stroke, TBI and other brain injury conditions are sub-classifications of ABI. However, according to the Brain Injury Network, there is a conflict with regard to the duplication of the rehabilitation of one condition of brain injury with others (Brain Injury Australia, 2011, Brain Injury Network, 2011, The Brain Injury Association, 2011). Some researchers and organisations have reported that the TBI and stroke are also called ABI and many guiding principles that were developed for stroke are applicable to other forms of ABI (Medline Plus, 2013; Turner-Stokes, 2003). However, many other researchers state that although TBI and Stroke are technically a form of ABI, they are different conditions (Brain Injury Association of America, 2012; National Institute of Neurological Disorders and Stroke, 2013).

There is a general agreement that TBI and Stroke are both forms of ABI; however, the Brain Injury Association of America has reported that TBI and Stroke are different conditions as stroke damage occurs at a cellular level, unlike TBI. Therefore, injury from a stroke can affect cells throughout the brain, instead of just in specific areas. This makes a distinction between TBI and stroke. The Brain Injury Network also supports TBI not being similar to stroke. They argue that it refers to the cause of the injury, not the result; although many people feel traumatised because of a stroke, this does not make the stroke a form of TBI. They also report that stroke, TBI and ABI are not interchangeable terms since all TBI and/or

strokes are ABIs, but all ABIs are not TBIs and/or strokes. Therefore, there must be a distinction between TBI, stroke and all other ABI conditions.

Very often, ABI refers to a high level of condition complexity compared to stroke and TBI, although the effects of each of them are often very similar. There is a controversy between researchers with regard to whether what has been developed for one condition of brain injury is applicable to other forms of ABI. The researcher in this study believes that there are key differences between each condition, such as the cause of the problem and the damage that occurs to the brain which make coping with TBI quite different and difficult from stroke and other forms of brain injury. Therefore, what has been developed for one form of ABI, such as stroke and/or TBI, is not really applicable to another condition of ABI. The term 'ABI' in this study is used to describe all types of brain damage which occur after birth, including focal and non-focal injuries (Turner-Stokes et al., 2005).

1.6. ABI and rehabilitation

Neurological recovery following ABI occurs over an extended period of time and can range from months to years. Early rehabilitation is associated with a better outcome (Teasell et al., 2009). The ultimate aim of rehabilitation is to enable individuals, families and multidisciplinary carers to adjust to and cope with the disability (Turner-Stokes et al., 2005).

ABI rehabilitation is the whole process of managing the disability caused by the injury. The term 'rehabilitation' is used for a wide range of treatments and programmes including physical rehabilitation, recreational activities, vocational and interventions to help with any problems caused by any condition (Turner-Stokes et al., 2005).

It has been found that rehabilitation is most effectively delivered by a multidisciplinary team, which is a group of professionals who work alongside one another and who cooperate to meet

the patient's needs (Turner-Stokes, 2008). It should typically involve a range of professionals from essential disciplines such as Physiotherapists, Specialist Consultants, Occupational Therapists, Nurses, Psychologists, Speech and Language Therapists, Social Workers, Psychiatrists, and Community Rehabilitation Staff. Rehabilitation outcome is dependent on this group of people working together and focusing on the patient's disabilities and needs. Rehabilitation is likely to be delivered by at least two professional disciplines (Turner-Stokes, 2008).

1.7. ABI and Physiotherapy

Physiotherapy is a standard part and a key component of rehabilitation after ABI in most countries, with numerous studies recommending that all people with ABI should receive physiotherapy (De Wit et al., 2006, DeJong et al., 2005, Magasi and Post, 2010, Pomeroy and Tallis, 2000). However, the literature contains few studies which provide specific details about the physiotherapy activities used throughout the course of neurology rehabilitation. Specialist physiotherapy service processes for treating people with ABI are poorly described and evaluated in the literature (Jette et al., 2005, Putman and De Wit, 2009). According to Pomeroy et al. (2001), physiotherapy rehabilitation is often referred to as a "black box" (Pomeroy et al., 2001). Researchers and clinicians can characterise what goes into and comes out of the black box but little is known about the service provided for the patient during the rehabilitation process. The complexity, variability and multiplicity of physiotherapy rehabilitation processes provided for this population and the lack of written documentation are key issues which lead to the difficulties in specifying the nature and content of physiotherapy services (Ballinger et al., 1999, DeJong et al., 2005, Jette et al., 2005). Standardised protocols that exist in other areas of medical practice and research, such as drug trials, are not common in ABI physiotherapy rehabilitation, due to the complexity of the

conditions and the service (Gassaway et al., 2005). In ABI physiotherapy rehabilitation, physiotherapists must often customise their treatment to meet individual patients' needs, which results in variations in the physiotherapy provided from one patient to another and from one rehabilitation centre to another (Gassaway et al., 2005).

The Medical Research Council Framework for the Development and Evaluation of Complex Interventions (Craig et al., 2008) describes complex interventions as interventions which contain several interacting components. The dimensions of complexity may include, but are not limited to, the number and difficulty of behaviours required by those delivering the service (e.g. physiotherapist) or receiving the intervention (e.g. patient), the number of specialists or organisations targeted by the intervention, the number and variability of the rehabilitation outcomes and the degree of flexibility or tailoring of the intervention permitted (Craig et al., 2008).

The most important factor which limits the understanding of the physiotherapy treatments provided to people with ABI is the lack of a system to define, describe and record the interventions made by physiotherapists (Putman and De Wit, 2009, Tyson and Selley, 2006). This makes it difficult to determine which aspects of physiotherapy are the most effective and where the strengths and weakness of the system are (Kwakkel et al., 1997, Putman and De Wit, 2009, Tyson and Selley, 2006). It has been suggested that researchers should focus on developing and evaluating the physiotherapy documentation process which will consequently help to identify, describe and evaluate the physiotherapy interventions provided in ABI (DeJong et al., 2005). Such studies could help researchers and clinicians understand the services provided to people with ABI during inpatient rehabilitation and facilitate a better understanding of which activities benefit recovery for which types of patients (Bode et al., 2004).

1.8. Physiotherapy documentation in ABI

A fundamental part of physiotherapy rehabilitation is the documentation process, which should be viewed as a multi-factorial construct that includes several components. Documentation is important and a professional and legal obligation for physiotherapists' practice and all other health professionals (Phillips et al., 2006). Researchers have emphasised the importance of documentation because of the information it contains (Welsh Health Circulate, 2004). It has been reported that documentation is essential to the delivery of high quality healthcare services, in order to support patient care and the continuity of care, to assist clinical and other audits, and to facilitate multi-professional working. Effective records also help to support sound administrative and managerial decision-making, as part of the knowledge base for the National Health Service (NHS) (Welsh Health Circulate, 2004).

Despite the importance of medical record documentation, little research has been published which evaluates clinical documentation by allied health professionals, including physiotherapists (Phillips et al., 2006). It has been reported that the lack of documented detailed characteristics of physiotherapy interventions leads to difficulties in defining the content of physiotherapy practice (De Wit et al., 2006, Pomeroy and Tallis, 2000).

It has been reported that a good documentation process would bring order and rigour to the description of the physiotherapy interventions and help to characterise the treatments, procedures and interventions used in physiotherapy sessions, taking into account their multidimensionality with respect to content, purpose, intensity, duration, sequence, frequency and other characteristics of the treatment provided (DeJong et al., 2004). Good documentation has a potential to improve patient care by facilitating accurate and appropriate communication between physiotherapists and between physiotherapists and other specialists. According to Bodek (2010), standardised clinical documentation serves the important role of

helping assure quality patient care as it makes physiotherapists think about their patients, review and reflect on their interventions, consider the efficacy of their treatment and weigh alternative approaches to the care of their patients (Bodek, 2010). The appropriate use of documentation has been reported as a powerful method to facilitate clinical reasoning and to provide an adequate rehabilitation service (Sames, 2009).

A formal documentation method for physiotherapy interventions is important to standardise the data collection process, which enables researchers to compare results across studies and across sites (Phillips et al., 2006). It greatly strengthens researchers' abilities to make comparisons across a wide range of interventions and outcomes by enabling researchers to quantify what changes really occur in the clinical setting when structural changes are imposed from the outside. It helps researchers to eliminate their reliance on time and to know what happens in clinical settings (DeJong et al., 2004).

In fact, the information is only usable if it has been correctly recorded. The importance of using consistent terminology when documenting physiotherapy interventions has also been highlighted in the literature (Sames, 2009). Consistent documentation helps other professionals to better understand physiotherapy practice and the role that physiotherapists play in the multidisciplinary rehabilitation process(De Wit et al., 2006). According to the Chartered Society of Physiotherapy (2012), good practice in physiotherapy includes a well-designed and robust documentation method to ensure patient information in record keeping is captured, using templates, in a standardised way (Chartered Society of Physiotherapy, 2012). Standardised documentation will help to maintain a clear separation between the different interventions and to ensure that the patient receives the correct intervention.

The failure to identify and describe the physiotherapy practice limits the researchers and clinicians' ability to evaluate the effectiveness of the physiotherapy service. Several studies

have emphasised the need for a robust documentation tool to be able to evaluate the whole physiotherapy process (De Wit et al., 2007, Magasi and Post, 2010, McNaughton et al., 2005, Putman and De Wit, 2009). Physiotherapy rehabilitation for people with ABI is a very complex intervention, which integrates several perspectives including biological, psychological and social aspects (Turner-Stokes, 2008). Therefore it was imperative that the researcher consider all these aspects and identify all key attributes of the documentation process to develop a documentation method to be used by physiotherapists in an inpatient setting.

1.9. Physiotherapy documentation processes under the International Classification of Functioning, Disability and Health (ICF) framework

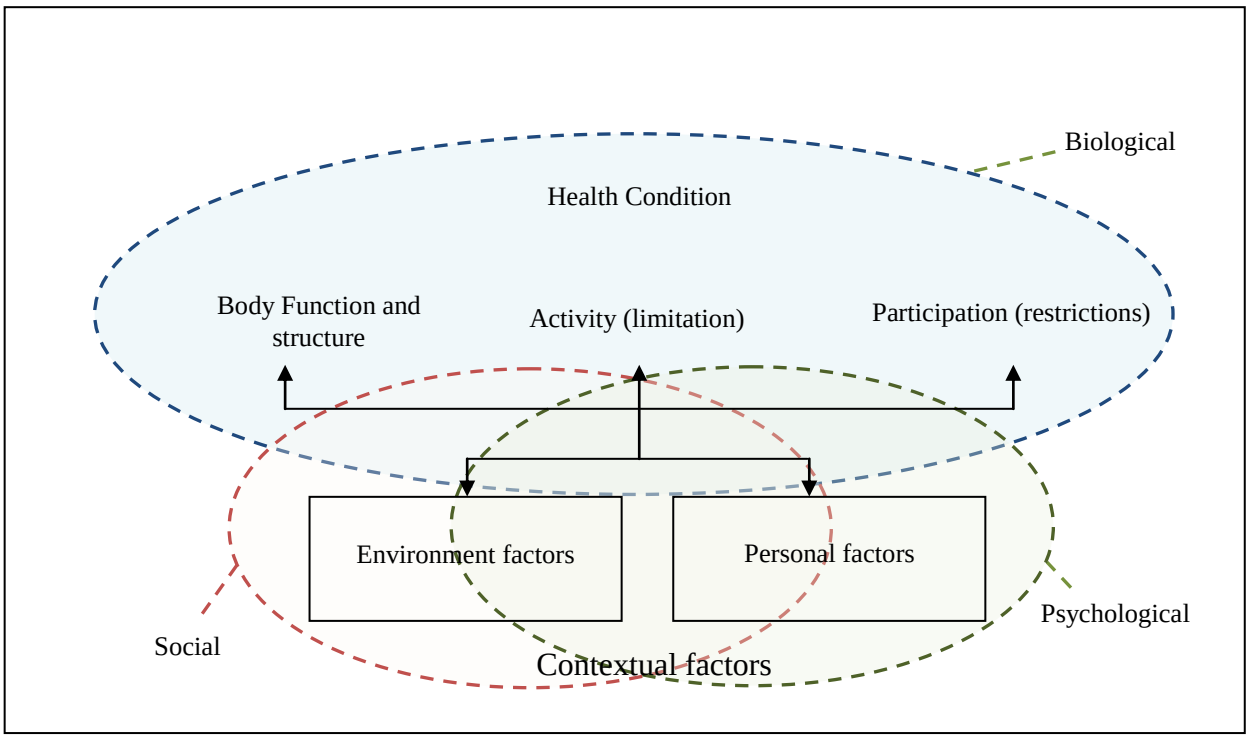
The International Classification of Functioning, Disability and Health (ICF) model of the World Health organisation (WHO, 2001) defines core concepts in disability, health and functioning that are increasingly embraced in ABI rehabilitation (See figure 1-1) (WHO, 2001). The ICF framework is a biopsychosocial model designed to provide a coherent view of various dimensions of health at biological, individual and social levels. (Davis et al., 1992, Post et al., 1999, Wade and de Jong, 2000). The ICF model categorises different aspects of the healthcare of the individual, from the health condition or disease state to contextual factors relating specifically to the individual, and integrates a dynamic interaction between components or categories. In practice, the ICF is a very useful framework to describe and evaluate health and health services. This study used the International Classification of Functioning, Disability and Health (ICF) model (WHO, 2001) as a conceptual framework, both during the design stage and in the interpretation and presentation of the results.

Üstün and his colleague (2003) reported that "the ICF is shown to be an essential tool for identifying and measuring efficacy and effectiveness of rehabilitation services, both through

functional profiling and intervention targeting" (Üstün et al., 2003)p. 565). The advantage of using the ICF is that it provides specific terminology that can be used to develop and evaluate a robust documentation tool for use by physiotherapists in an inpatient setting.

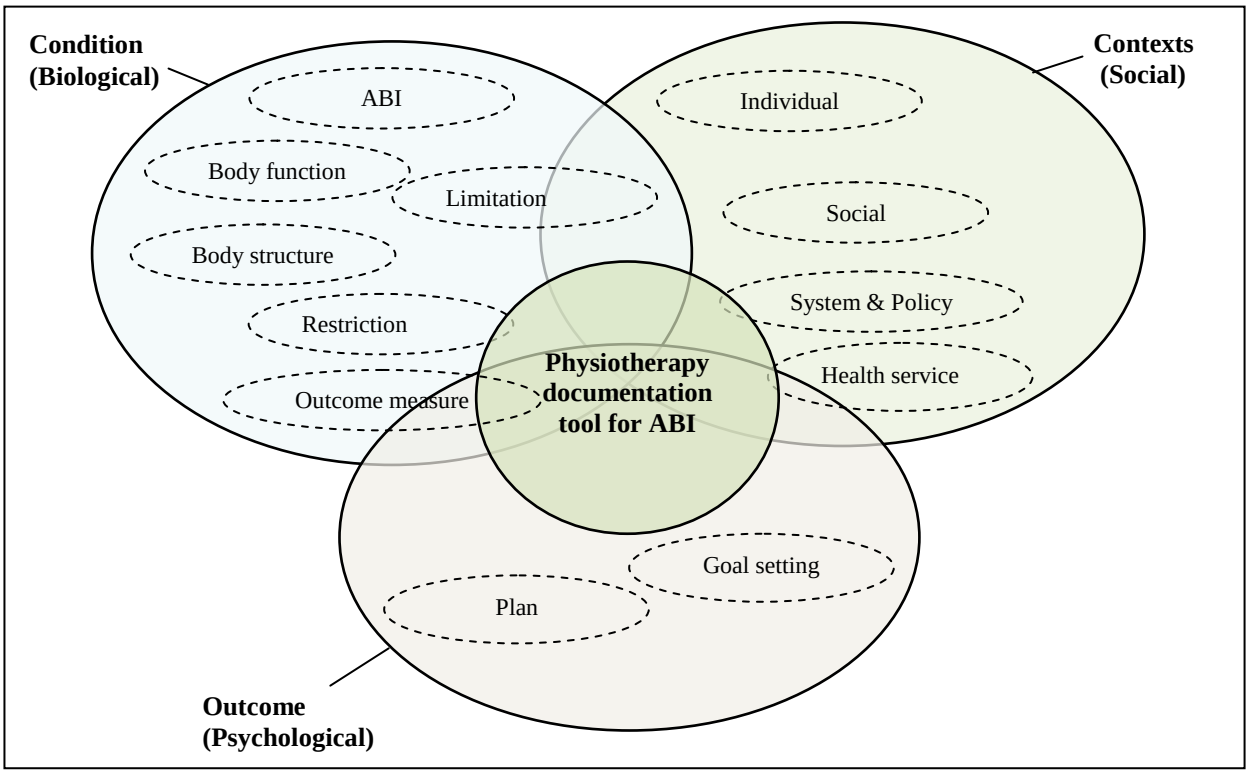
To meet the research aim, it was necessary initially to describe the physiotherapy rehabilitation process provided to people with ABI, considering all the factors which might attribute to the rehabilitation process and the documentation method. Using the ICF model, the physiotherapy documentation tool became the central point of the model. The biological or health condition factors cover the body's functional and structural deficits, activity limitations, participant restrictions and the process of assessing the health condition as well as the re-evaluation methods. The social or context factors cover the health services provided to these patients, including the pathway that the patient follows if they have an ABI and the process of moving the patient from one stage to another. It also covers all the other environmental and social factors which might affect the rehabilitation and documentation process. The last domain concerns the psychological or personal factors, which cover all personal factors such as the patient's age, gender, education etc. which have an effect on the rehabilitation process. It also covers the patient's involvement in the rehabilitation process, including the goal-setting and planning processes (See figure 1-2).

Figure 1-1: The International Classification of Functioning, Disability and Health (ICF) model of the World Health organisation



(WHO, 2001)

Figure 1-2: Key attributes of the new recording method based on the ICF domains



(WHO, 2001)

1.10. Aims of the thesis

This study aimed to develop and evaluate the physiotherapy documentation method used by physiotherapists who treat people with ABI in an inpatient rehabilitation setting by building a treatment recording tool which has sufficient precision to enable treatment activities to be recorded in a standardised way so that they can be communicated to clinicians and researchers

The new documentation tool should have the ability to quickly record comprehensive details relating to the treatment sessions using a very simple coding process. It should allow the recording of all policy, ethical and professional requirements. The process of building the new treatment recording tool was based on the literature review and on feedback from a large number of heads of rehabilitation teams and physiotherapists working in different rehabilitation services from all around the United Kingdom. The validity, acceptability and reliability of the new recording tool have been tested.

This study also aimed to evaluate the possibility of using the newly developed treatment recording tool to describe the physiotherapy service provided for people with ABI in an inpatient setting in the UK. Describing the service would help researchers and clinicians to evaluate the services provided to patients and facilitate a better understanding of which activities benefit recovery for which types of patients and how physiotherapy aids recovery

However, the limited number of studies available in the literature which provide specific details about the physiotherapy processes used throughout the course of rehabilitation, makes it difficult for the main researcher (PhD student) in this study to understand the service and identify its strengths and weaknesses (Jette et al., 2005, Putman and De Wit, 2009). Therefore it was initially necessary to describe the physiotherapy rehabilitation process

provided to people with ABI via a mapping process study. To map the process of the physiotherapy service, the literature was comprehensively and critically reviewed (see Chapter Two) in order to address each component of the service in depth. Reviewing the literature is recommended by the Medical Research Council (Craig et al., 2008) in order establish the theoretical basis of the service and explore all its relevant components. The feedback from the heads of rehabilitation teams and physiotherapists was also used to map the process of the service.

CHAPTER TWO

LITERATURE REVIEW

Chapter 2. Literature Review

2.1. Overview

In the process of this research, a review of the available literature was conducted to attain a better in-depth understanding of the inpatient physiotherapy rehabilitation process provided to people with ABI. The literature review also aimed to examine the documentation process followed to report physiotherapy practice in inpatient settings and to report on its strengths and weaknesses.

This research mainly focuses on ABI rehabilitation. ABI is an umbrella term that includes all traumatic brain injuries and non-traumatic brain injuries, such as stroke and meningitis. However, it has been reported that each condition is different from the next (Gendelman, 2011). There are many reasons why the treatment for each condition should be distinct. The literature has proved that in a traumatic injury such as TBI, damage to the nerve tissue is focused in one or more areas, compared to a non-traumatic injury such as a stroke where damage to the nerve tissue usually spreads throughout the brain. However, some non-traumatic injuries, such as an infection that remains localised, spread evenly from one starting point. This difference can make the functional deficits arising from each condition different and so the patient's recovery and rehabilitation process will consequently be different (Brain Injury Centre, 2008, Kimberley et al., 2010). Moreover, patients with ABI in the United Kingdom are admitted to one of a number of specialised rehabilitation centres that are different to those for stroke patients. Hence the rehabilitation processes in ABI rehabilitation centres will be different to those in stroke rehabilitation centres and the documentation method used in ABI rehabilitation centres should be broader and more comprehensive in order to cover all ABI conditions.

However, because of the very limited evidence available that is specific to ABI rehabilitation (Turner-Stokes, 2008), it was necessary to make inferences from the evidence for other neurological conditions; searches in this study therefore also included literature related to stroke rehabilitation.

The main aim of this expanded search of the literature was to identify a research method, mapping the rehabilitation service provided to people with ABI in an inpatient setting in the UK and to develop and evaluate the documentation method used by physiotherapists in an inpatient setting with ABI patients.

This chapter is divided into two main sections. The first section will focus on the rehabilitation process for patients with ABI and covers the most important areas of the rehabilitation process, including the admission criteria, assessment methods, goal-setting, treatment plan, follow-up schemes and discharge process. The second section will review the available literature to gain a better theoretical understanding of the documentation process followed by a multidisciplinary team including a physiotherapist in an inpatient setting.

2.2. Rehabilitation process (section one)

This part of the literature review sought a better in-depth understanding of the inpatient physiotherapy rehabilitation process provided for people with ABI, and to describe the physiotherapy rehabilitation process via a mapping process. This part of the literature review considered the whole process of inpatient physiotherapy practice, from the admission criteria to the assessment process, intervention and re-evaluation and discharge plan. Reviewing the whole process of physiotherapy helped the researcher to gain a good theoretical understanding of the service. Mapping the process of the whole patient journey helped the researcher to identify opportunities for improvement by visualising how the entire

rehabilitation service was working so as to highlight points of potential inefficiency. It supported the researcher in accurately capturing the reality of the rehabilitation process and identifying strengths, weaknesses, variations and unnecessary steps in the service.

2.2.1. **Literature Search Strategy:**

The search in this study included all policy documents, audit studies, conference procedures, books and service reception reports to ensure the comprehensiveness of the review. Specific inclusion criteria were:

1. The paper discussed the process and practice of the physiotherapy rehabilitation process including the assessment criteria, goal setting, outcome measures, intervention/treatment being delivered to treat ABI patients and the admission and discharge principles.
2. The study included human subjects only.
3. The study included either qualitative or quantitative research.
4. The study has been published in the English language.

An extensive systematic literature search was conducted using the following databases: Ovid MEDLINE (1990 to 21st of May 2014), EMBASE (1990 to 21st of May 2014), AMED (1990 to 21st of May 2014), PsycINFO (1990 to 21st of May 2014), CINAHL and all EBM reviews, including Cochrane. The search strategy also included hand searching of reference lists from selected articles. Each database was searched separately, as the Medical Subject Heading (MeSH) terms/thesaurus headings are unique to each database. All terms used for searching the electronic databases are shown in Table 2-1.

Table 2-1: Literature review search strategies (Part one: rehabilitation process)

Search strategies					
Acquired brain injury		OR	Traumatic brain injury	OR	Stroke
OR	ABI	OR	TBI	OR	Cerebrovascular accident
AND					
Rehabilitation		OR	Physiotherapy	OR	Physical therapy
AND					
admission criteria		OR	assessment criteria	OR	goal setting
OR	outcome measure	OR	intervention	OR	treatment
OR	discharge				

All keywords were explored within the databases in order to retrieve all specific references indexed to the selected keywords and any references indexed to any narrower subject terms or keywords. This process helped the researcher to ensure that the search findings were as comprehensive as possible and included all relevant articles. The researcher identified 414 articles in the Medline database, 687 articles in EMBASE, 800 articles in AMED, 261 in PsycINFO, 29 in CINAHL and 57 in the Cochrane Library and all other reviews. All of the identified titles were scanned and all articles whose title included one or more of the search keywords were included for further investigation. All articles not related to the search topic were excluded as either being unrelated to the rehabilitation process and/or designed to:

- Evaluate the effectiveness of a treatment activity;
- Integrate a treatment adjunct into treatment activity;
- Compare two or more treatment activities to treat certain activity limitations;
- Evaluate a treatment programme, technique and/or concept;
- Evaluate the patient's mental capacity and its effect on patient treatment;

- Describe the rehabilitation process in community service;
- Describe something not related to the multidisciplinary team documentation process;
- Describe something not related to the physiotherapy documentation process.

All articles published in a language other than English were also excluded.

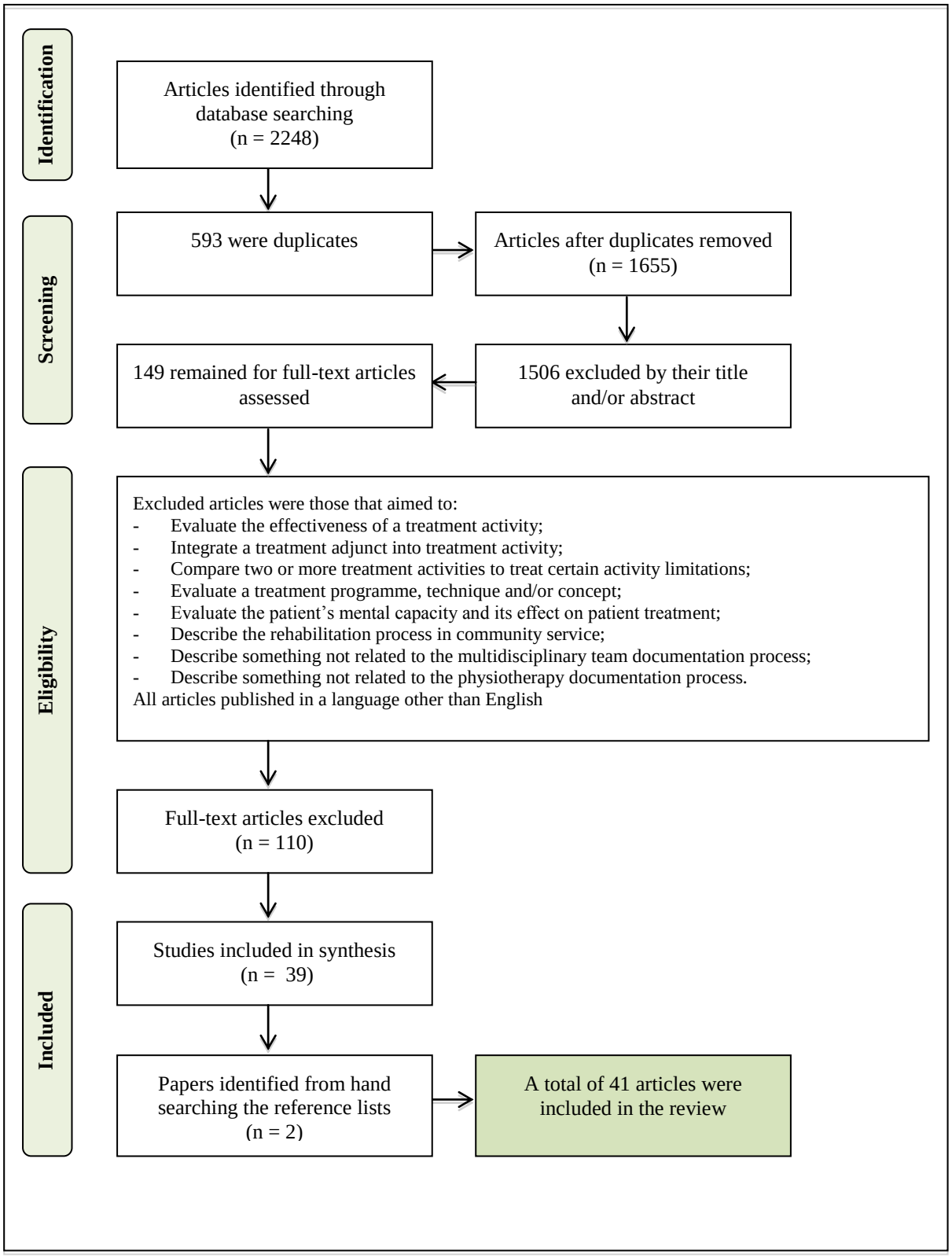
A total of two thousand, two hundred and forty-nine citations were identified from the search of databases, of which 593 were duplicates and subsequently removed, leaving 1,655 to be screened from titles and abstracts; of those, 1506 were excluded by their title and/or abstract. The remaining 149 were included to be screened by reading the full text, when a further 110 were excluded, leaving 39 articles, which were included in this study. Two additional papers were then identified from hand-searching the reference lists of those 39 articles.

A total of forty-one articles were included in the review: One article described the rehabilitation process, four articles described the rehabilitation framework and models, twelve discussed admission criteria, seven discussed the patient's initial assessment, eight concerned goal-setting, five focussed on rehabilitation intervention and four related to discharge criteria (see PRISMA chart in figure 2-1 for more details about included and excluded articles) (Moher et al., 2009).

Table 2-2: Literature search results- rehabilitation process

Source	Found	Included	Excluded
Ovid MEDLINE	414	11	403
EMBASE	687	12	675
AMED	800	9	791
PsycINFO	261	4	257
CINAHL	29	0	29
Cochrane Library and all other reviews	57	3	54
Total	2248	39	2209

Figure 2-1: PRISMA chart: number of articles included and excluded in the study



(Moher et al., 2009)

All included articles were critically appraised using the Critical Appraisal Skills Programme (CASP) appraisal tool. The CASP tool comprises three appraisal sections: an assessment of study validity, an evaluation of methodological quality and the presentation of results, and an assessment of external validity. The vast majority of included studies were conducted with good methodological quality (according to the CASP critical appraisal tool). Three different forms of the CASP critical appraisal tool were used: case control studies, qualitative research and review forms. According to the CASP, there are three broad issues that need to be considered when appraising a case control study. The three issues aim to answer the following questions; are the results of the study valid? What are the results?; And, will the result help locally? On other hand, the issues which need to be considered when appraising reports on qualitative research are divided into three parts aiming to answer the following questions; has a thoughtful and appropriate approach been applied to the research method?; Has credibility been considered when reviewing and presenting findings; and finally, what is the usefulness of the findings? (See Table 2-3 for a summary of all results).

Table 2-3: Critical appraisal of all included studies in rehabilitation process

	Author / year	Focused question	Clear statement of the aim	Include the right type of studies	Appropriate method	Identify all relevant studies	Assess the quality of the included studies	Acceptability of cases/cohort recruitment	Appropriate research design	Acceptability of control selection	Appropriate data collection method	Adequate relationship between researcher and participants	Appropriate outcome measures/ considered	Ethical issue consideration	Accounting for confounding factors	Appropriate data analysis measurement	Reasonable result combination	Appropriate follow up	Appropriate/ precise results/finding	Believing in the result	Can the results be applied to local population	Is the research valuable	Fitness of results with other available evidence	Policy changed as a result
Rehabilitation process	Turner-Stokes (2008)	Yes	NA	Yes	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	NA	NA	Yes	Yes	NA	NA
Frame-work & models	Strasser and Falconer (1997)	Yes	NA	Yes	NA	NC	Yes	NA	NA	NA	NA	NA	NC	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	Waddell and Burton (2004)	Yes	NA	Yes	NA	Yes	No	NA	NA	NA	NA	NA	NC	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	Donnelley (2007)	Yes	NA	Yes	NA	Yes	Yes	NA	NA	NA	NA	NA	NC	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	BC Stroke Strategy (2010)	Yes	NA	Yes	NA	Yes	No	NA	NA	NA	NA	NA	NC	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
Admission Criteria	Kalra et al., (1993)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Alexander (1994)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Ween et al., (1996)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Gresham et al., (1997)	Yes	NA	NC	NA	NC	NC	NA	NA	NA	NA	NA	Yes	NA	NA	NA	NA	NA	Yes	NA	Yes	NA	NA	NC
	Jorgenson et al., (2000)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	NC	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Bagg et al., (2002)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Kugler et al., (2003)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Kammersgaard et al., (2004)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	NC	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Salter et al., (2006)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Putman et al., (2007)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Turner-Stokes (2008)	Yes	NA	Yes	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	Hakkennes et al., (2013)	NA	Yes	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
Patient initial assessment	ACPIN (1995)	Yes	NA	NC	NA	Yes	NC	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	BSRM (2003)	Yes	NA	Yes	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	McMillan et al., (2003)	Yes	NA	Yes	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	NA	NA	Yes	Yes	NA	NA
	Rentsch et al., (2003)	Yes	NA	NC	NA	NC	No	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	CSP, (2005)	Yes	NA	Yes	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	Stucki (2005)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Rauch, et al., (2008)	Yes	NA	NA	Yes	NA	NA	NC	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	NC	NA	Yes	NA

*Items of critical appraisal are derived from the Critical Appraisal Skills Programme (CASP) appraisal tool [89]; NA, Not applicable; NC, Not clear
ACPIN : Association of Chartered Physiotherapists Interested in Neurology, BSRM: British Society of Rehabilitation Medicine, CSP: Chartered Society of Physiotherapy

Continue Table 2-3: Critical appraisal of all included studies in rehabilitation process

	Author / year	Focused question	Clear statement of the aim	Include the right type of studies	Appropriate method	Identify all relevant studies	Assess the quality of the included studies	Acceptability of cases/cohort recruitment	Appropriate research design	Acceptability of control selection	Appropriate data collection method	Adequate relationship between researcher and participants	Appropriate outcome measures/ considered	Ethical issue consideration	Accounting for confounding factors	Appropriate data analysis measurement	Reasonable result combination	Appropriate follow up	Appropriate/ precise results/finding	Believing in the result	Can the results be applied to local population	Is the research valuable	Fitness of results with other available evidence	Policy changed as a result
Goal-setting	Holliday, et al., (2007)	NA	Yes	NA	Yes	NA	NA	NC	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	Scobbie et al., (2009)	Yes	NA	Yes	NA	NA	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	Wade (2009)	Yes	NA	Yes	NA	NA	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	Playford et al., (2009)	NA	Yes	NA	Yes	NA	NA	Yes	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	Magasi and Post (2010)	Yes	NA	Yes	NA	NC	Yes	NA	NA	NA	NA	NA	NC	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	Leach et al., (2010)	NA	Yes	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	Rosewilliam et al., (2011)	Yes	NA	Yes	NA	NA	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	Dalton et al., (2012)	Yes	NA	NA	NC	NA	NA	Yes	NA	NC	Yes	NA	NA	NA	NA	NA	NA	NA	Yes	Yes	Yes	NA	Yes	NA
Intervention	Kwakkel et al., (1997)	Yes	NA	Yes	NA	NC	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	Waters (2000)	NA	Yes	NA	Yes	NA	NA	Yes	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	DeJong et al., (2004)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	De Wit et al., (2007)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Bovend'Eerdt, et al., (2009)	Yes	NA	Yes	NA	NC	Yes	NA	NA	NA	NA	NA	NC	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
Discharge Criteria	Ayana, et al., (1998)	NA	Yes	NA	Yes	NA	NA	NC	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	Shepperd (2004)	Yes	NA	Yes	NA	NC	Yes	NA	NA	NA	NA	NA	NC	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	SIGN, (2010)	Yes	NA	Yes	NA	CT	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	Yes	NA	Yes	NA	Yes	Yes	NA	NA
	Fearon and Langhorne, (2012)	Yes	NA	NC	NA	Yes	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	Yes	NA	NA
	*Items of critical appraisal are derived from the Critical Appraisal Skills Programme (CASP) appraisal tool [89]; NA, Not applicable; NC, Not clear SIGN : Scottish Intercollegiate Guidelines Network																							

2.2.2. **Physiotherapy processes and practice in ABI**

This part of the literature review aims to develop a better in-depth understanding of the physiotherapy service provided for people with ABI in an inpatient rehabilitation service in the UK.

2.2.3. **International Classification of Functioning, Disability and Health (ICF) Model and ABI rehabilitation process**

For people with ABI, physiotherapy is a complex intervention, which integrates several perspectives (Turner-Stokes, 2008). Although, symptoms and illness may originate from a health condition, there is broad agreement in the literature that illness and disability can only be fully understood if all other aspects, including biological, psychological and social dimensions, are considered (Waddell and Burton, 2004).

Therefore, it was imperative that the researcher considered all the different factors and identified all the key attributes of the rehabilitation process in order to gain in depth understanding of the physiotherapy rehabilitation service provided for people with ABI in an inpatient setting.

The International Classification of Functioning, Disability and Health (ICF) model of the World Health organisation (WHO, 2001) describes core concepts in disability, health and functioning that are increasingly embraced by ABI rehabilitation (WHO, 2001). It is a classification system, which aims to establish a common language for understanding and investigating health and health-related states (WHO, 2001). The ICF model categorises different aspects of healthcare of the individual, from the health condition or disease state to

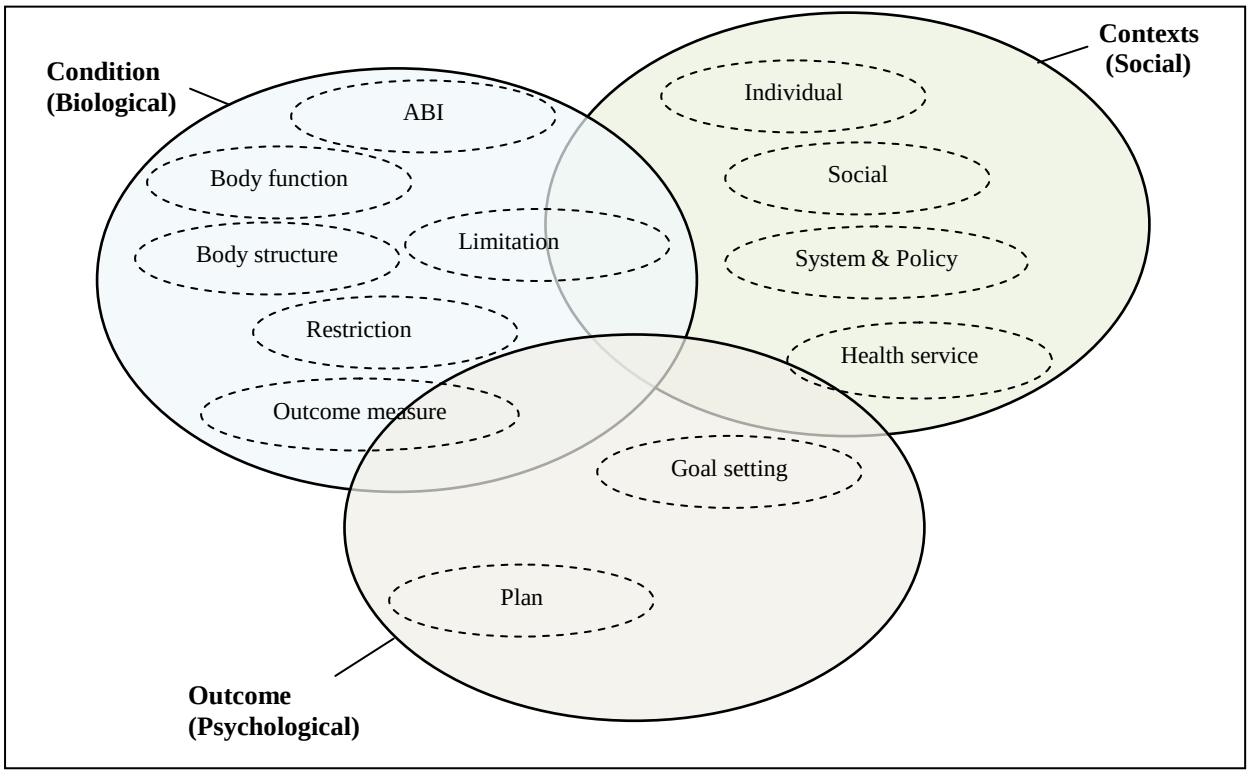
contextual factors relating specifically to the individual, and integrates dynamic interaction between components and categories.

The ICF framework is a biopsychosocial model designed to provide a coherent view of various dimensions of health at biological, individual and social levels (Davis et al., 1992, Post et al., 1999, Wade and de Jong, 2000).

The International Classification of Functioning, Disability and Health (ICF) model of the World Health organisation (WHO, 2001)was used as a theoretical framework and a basis for developing this literature review. Figure 2-1 shows the components, which need to be considered when describing the physiotherapy process. The key components were built based on the International Classification of Functioning, Disability and Health (ICF) model of the World Health Organisation (WHO, 2001).

The ICF model covers all elements of the rehabilitation process. It is divided into three categories: the biological or health condition domain covers the body's functional and structural deficits, activity limitations, participant restrictions and the process of assessing the health condition as well as re-evaluation methods. The social or context domain covers the health services provided to these patients, including the pathway that a patient follows if they have an ABI and the process of moving the patient from one stage to another. It also covers all the other environmental and social factors which might affect the rehabilitation process. The last domain is psychological or personal factors, which cover all the personal factors, such as the patient's age, gender, education, etc., which have an effect on the rehabilitation process. It also covers the patient's involvement in the rehabilitation process, including the goal-setting and planning processes (see Fig. 2-2).

Figure 2-2: Key attributes of the rehabilitation process based on the ICF model

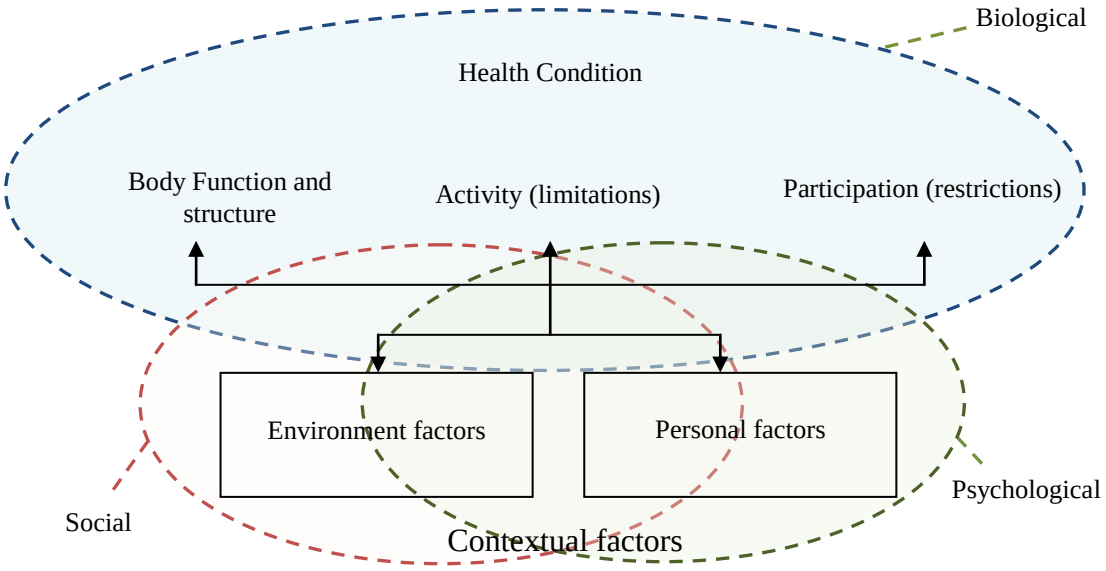


The advantage of using the ICF is that it provides a common international language for communication and research via its use of precise terminology that can be used to refer to a specific health condition. The literature suggested that using the ICF framework in neuro-rehabilitation research allowed the researcher to analyse health and health-related consequences comprehensively, especially regarding the neuro-rehabilitation of an ABI patient.

According to the ICF framework (see Figure 2-3) the disability and functioning can be viewed as the outcome of interactions between contextual factors and health conditions. Contextual factors are divided into two categories: external environmental factors (e.g. social attitudes, health services, systems, policies and/or social structures); internal personal factors, which include gender, age, social background, profession, education, past and current experience, character and other factors that influence how disability is experienced by the individual.

The figure also identifies three levels of human functioning classified by the ICF: functioning at the level of the body or body parts (body function and structure), the whole person (activity) and the whole person in a social context (participation). Disability therefore involves dysfunctioning at one or more of these levels (impairment, activity limitations and participation restrictions). In the context of the ICF, body structures are defined as the anatomical parts of the body, whereas body functions are defined as the physiologic functions of body systems and any disorder in the body's functions or structures, such as a significant deviation or loss referred to as impairment. The design of this literature review considered all categories of the ICF domains, including body functions and structures, activity and participation, as well as environmental and personal factors.

Figure 2-3: Factors might attribute to the physiotherapy rehabilitation process based on the ICF framework



Health condition:

- Traumatic brain injury
- Stroke
- Incident causing lack of oxygen to brain (e.g. drowning)
- Infection (e.g. meningitis, encephalitis)

Body Function

- Mobility of joint functions
- Muscle power functions
- Muscle tone functions
- Involuntary movement reaction functions
- Control of voluntary movement functions
- Involuntary movement functions
- Gait pattern functions

Body structure

- Structure of brain
- Structure of head and neck region

Activities and participation

- Undertaking a single task
- Undertaking multiple tasks
- Carrying out a daily routine
- Maintaining a body position
- Moving oneself
- Lifting and carrying objects
- Fine hand use
- Hand and arm use
- Walking
- Moving around
- Moving around using equipment
- Using transportation
- Driving

Environment factors

- Immediate family
- Health services, systems and policies
- Products and technology for personal use in daily living
- Friends
- Social security services, systems and policies
- Products and technology for personal indoor and outdoor mobility and transportation

Personal Factors

- Gender
- Age
- Social background
- Profession
- Education
- Past and current experience
- Character

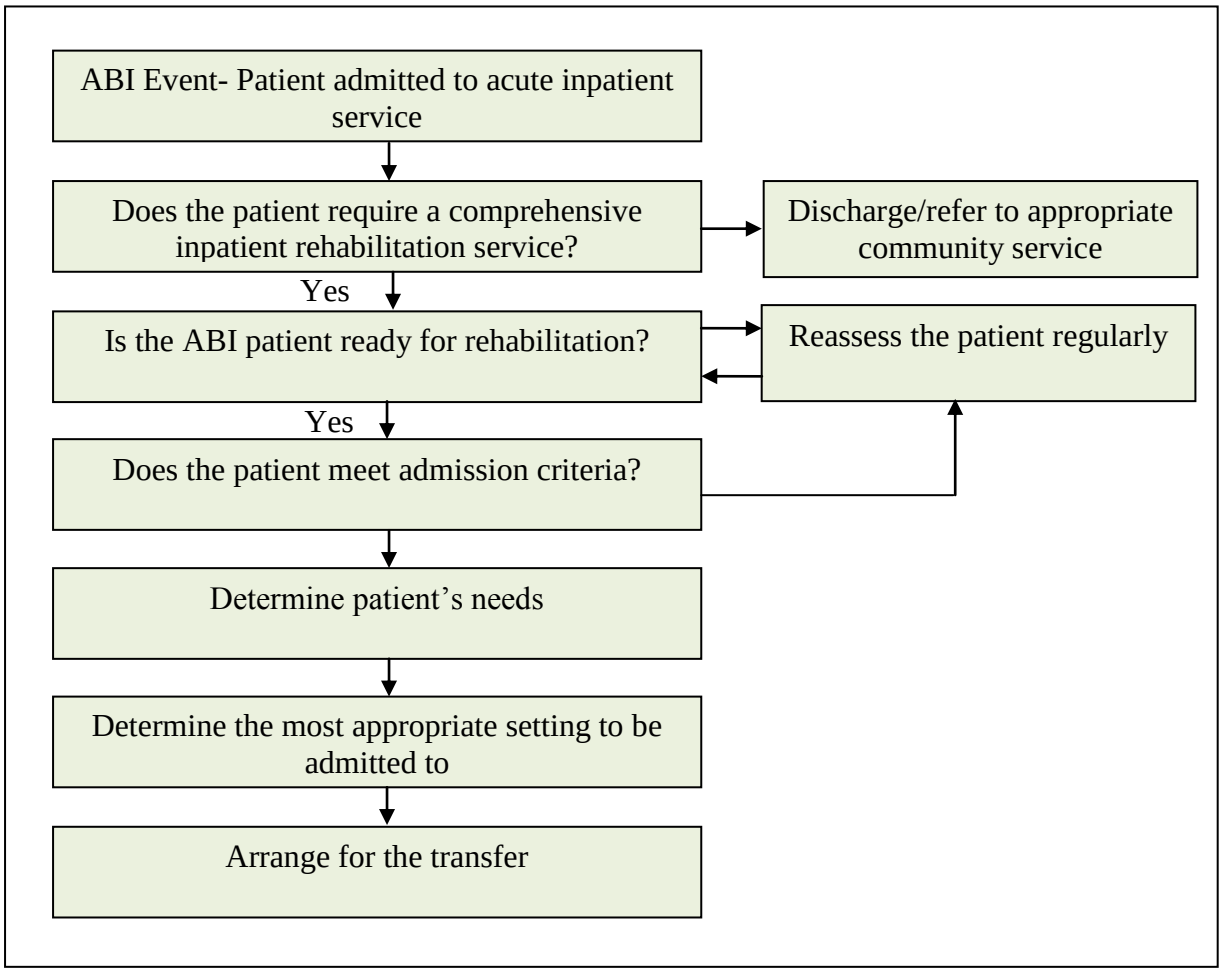
2.2.4. **Physiotherapy frameworks and models**

The physiotherapy process is a reiterative, active, educational and problem-solving process focused on a patient's disability (Turner-Stokes, 2008). The main goal of physiotherapy is to improve the quality of the patient's life and to help a disabled or hospitalised person readapt to his/her society (Turner-Stokes, 2008). The process is based on several critical key factors which have been reported in some frameworks and models of the rehabilitation service. Strasser and Falconer (1997) proposed a model for treatment effectiveness in stroke rehabilitation. Researchers have placed the team at the centre of the model, as they believe that patients with complex disability conditions are most likely to benefit from a team approach (Strasser and Falconer, 1997). The model relates the characteristics of treatment settings interventions and participants to each other and, more importantly, of patient outcomes. Researchers believe that a team process has the most influence on rehabilitation outcomes, through the dynamics of effective coordination of diverse staff activities in the context of functional evaluation and intervention. The importance of patient characteristics on outcomes has been acknowledged. Such a model can be considered when developing any rehabilitation process as it may prove useful to rehabilitation specialists in order to understand how inpatient rehabilitation works, and in devising strategies to improve treatment effectiveness.

According to the British Columbia Stroke Strategy (2010), the inpatient rehabilitation processes can be divided into two main stages: pre-admission and rehabilitation processes (BC Stroke Strategy, 2010). At the pre-admission stage, patients will be assessed to determine whether they might benefit from a comprehensive rehabilitation input and, if so, when they will be ready to begin their rehabilitation programme. Once the ABI patient is ready for rehabilitation, the rehabilitation team will work with the patient's family/caregivers to determine the patient's needs, based on his/her functional and cognitive status and his/her

ability to tolerate therapy. After that, and once the patient's needs have been defined, the rehabilitation team determines the most appropriate setting for the ABI survivor to be admitted and arranges for the transfer (see Figure 2-4) (BC Stroke Strategy, 2010).

Figure 2-4: Inpatient rehabilitation processes and pathway



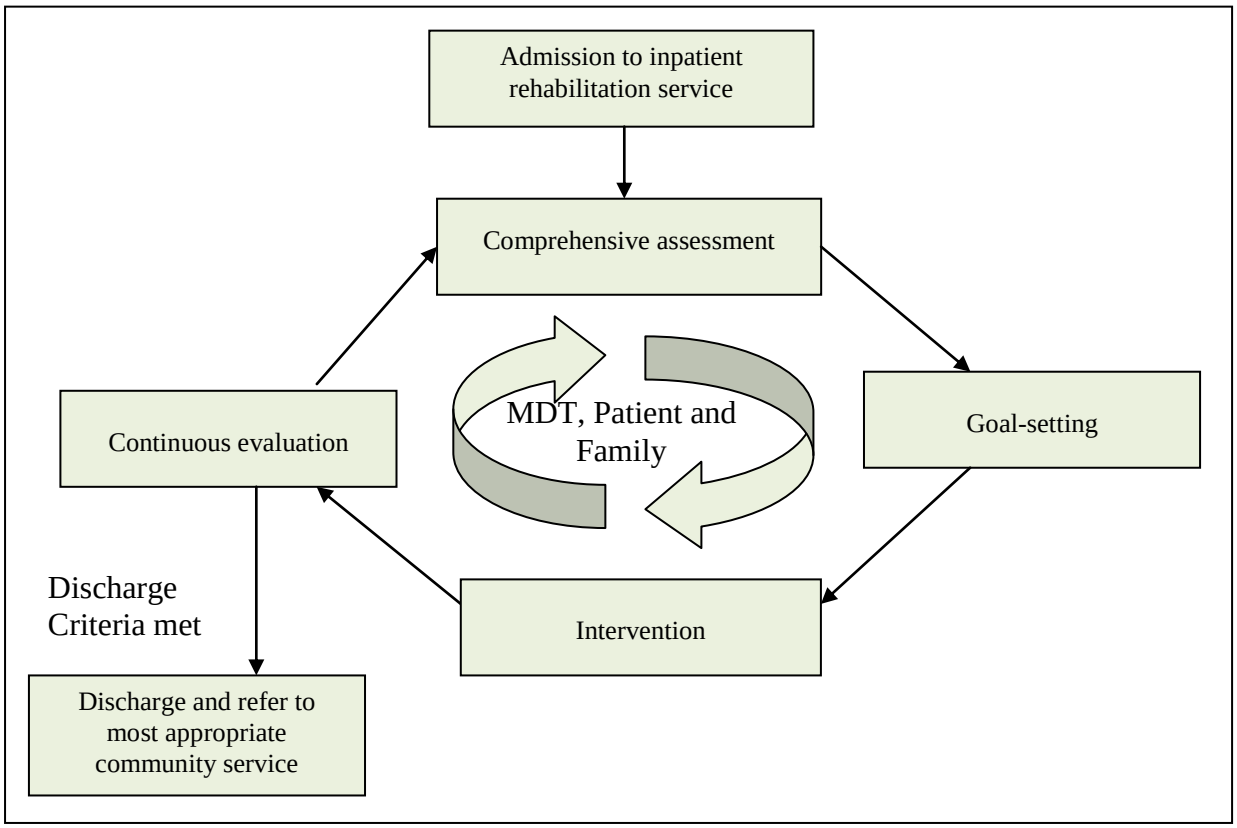
(BC Stroke Strategy, 2010)

It has been also broadly reported that any rehabilitation service comprises several critical key components which include: patient assessment; goal setting; intervention and continuous evaluation (Donnelley, 2007). The patient assessment helps therapists to identify the nature and extent of the patient's problems and the factors relevant to their resolution. The goal setting and intervention include treatment that affects the process of change, and support to improve and/or maintain the patient's quality of life and his or her safety. The continuous

evaluation helps to check on the effects of any intervention. Rehabilitation services also include: an admission criterion to ensure that the patient is quickly matched with the appropriate intensity of service and easily moved to different levels of rehabilitation intensity according to their needs; discharge criteria to guarantee a safe and appropriate discharge and the documentation of all these elements (see Figure 2-5) (Donnelley, 2007). According to Figure 2-5, which describes the inpatient rehabilitation process, the multidisciplinary team, patient and the patient's family play a very important role in the rehabilitation process. All the other key components contribute to helping the rehabilitation team and the patient achieve their goal(s). This model is based on a person-centred care approach. The National Health and Hospitals Reform Commission (2008) recommended person-centred care as a principle to guide the delivery of healthcare services. A person-centred care approach is defined as healthcare that is responsive to individual differences and the preferences of patients receiving care. It is recommended that, by using this approach, rehabilitation pathways should be easy to navigate and healthcare services should be provided in the most favourable environment (National Health and Hospitals Reform Commission, 2008). This approach simply places the patient at the centre of healthcare and considers all their needs.

Person-centred care is one of the most important approaches in rehabilitation as it promotes and facilitates patients engaging in treatment decisions, feeling supported and helping them to make behavioural changes. It is also reported that it helps clinicians to know their patients better and to provide care more specific to their needs, therefore better healthcare will be provided. The Department of Human Services (National Ageing Research Institute, 2006) reported that person-centred practice can improve patient satisfaction and makes a positive difference to health outcomes (National Ageing Research Institute, 2006).

Figure 2-5: Inpatient rehabilitation process



(Donnelley, 2007)

Given that the most important areas of the rehabilitation process are the admission criteria, assessment methods, goal-setting, treatment plan, follow-up schemes and discharge process, the next sections of the literature review will review the available literature to gain a better theoretical understanding of rehabilitation processes, and develop a representative process-map of the service.

2.2.4.1. Admission Criteria

ABI rehabilitation services are increasingly defined by patients' needs rather than the underlying problem's pathology. Specialist ABI rehabilitation services in the UK have been established to serve the needs of people with this condition(Turner-Stokes, 2009). However, due to the shortage of places in ABI rehabilitation units in the UK, admittance to a specialist

inpatient rehabilitation centre may be delayed (Beecham et al., 2009). The limited availability of ABI rehabilitation units means that not all patients who might benefit from such services can access such facilities. The timing of admission to an inpatient rehabilitation service is critical as it influences the functional rehabilitation outcome (Salter et al., 2006).

The benefits of early admission to rehabilitation services have been frequently reported in the literature (Biernaskie et al., 2004). There is evidence that a shorter time from injury onset to rehabilitation admission results in improved functional outcomes (Tepas et al., 2009). According to Salter and his colleagues (Salter et al., 2006), who conducted a retrospective review of 553 patients' charts who had been admitted to a single specialised inpatient stroke-rehabilitation programme at a regional rehabilitation facility in Ontario, Canada, they found that patients admitted to a specific stroke rehabilitation programme early had higher functional outcomes and shorter lengths of stay compared to those whose admission had been delayed.

An effective admission criterion allows the patient to be quickly matched with the appropriate intensity of service and easily moved to different levels of rehabilitation intensity, according to their needs. However, due to the shortage of available inpatient rehabilitation services for people with ABI and the importance of admitting patients to a rehabilitation service as soon as possible, admission criteria are required to ensure that only patients who require the intensity of inpatient rehabilitation facility are admitted to the service.

The main goal of the admission criteria is to identify the best possible match between patient needs and the capabilities of available rehabilitation facilities. The reasons why admission criteria should be clearly considered when discussing physiotherapy services for ABI is because it has been reported that admitting the patient to the most appropriate facility will help physiotherapists in their practice (Putman et al., 2007). It also encourages

physiotherapists to set out a rehabilitation plan that focuses on meeting patients' needs, and determining the intensity, level and types of intervention that patients need throughout their treatment. This will, in turn, help patients to benefit from the service and receive appropriate help, rather than prescribed lengths of treatment time. This will lead to a smoother and more cost-effective efficient service, which will help physiotherapists and healthcare providers to meet patients' needs (Putman et al., 2007).

Admission criteria help the researcher and clinician to understand the environmental factors, including the system and policy followed in the inpatient rehabilitation service and the healthcare service which might contribute to the patient rehabilitation progress and the rehabilitation pathway (Hornby, 1995). It is important that each individual patient receives the care they require in the lowest care-setting level that can meet those needs. Unnecessary admission to a care level higher than required will not only deprive the system of much needed financial resources but may also expose patients to unnecessary risks, such as depression and infection (Dobson et al., 2012). The admission criteria should be clearly described to ensure services admit patients who are appropriate for a given service.

It has been agreed that before a patient is accepted for admission to an inpatient rehabilitation service, he/she has to meet a set of admission criteria (Hornby, 1995). Each inpatient rehabilitation facility has to have very specific admission criteria to maximise the effectiveness of its services and to minimise any possible problems, such as admitting a patient who is not ready for an intensive rehabilitation programme (Salter et al., 2006). Setting up and standardising the admission criteria is very important for any rehabilitation service. The criteria should be designed to put the patient first and encourage therapists to focus on meeting patient needs, rather than fitting the patient to available services. They may comprise general criteria, which include the patient's age, diagnosis, functional and medical

status, need for the service provided and/or level of disability. According to Putman et al. (2007), admission criteria are based on several key principles, including one that states that a rehabilitation service system exists to meet a patient's individual needs, rather than trying to fit patients into predetermined services (Putman et al., 2007).

According to Alexander (1994) and Stineman et al. (1998), the most powerful predictors of functional recovery after disability are the severity of the disability followed by the patient's age (Alexander, 1994, Stineman et al., 1998). Numerous studies have supported the concept that the patient's age is a critical factor, which has a huge influence on rehabilitation outcomes and should be included in any admission criteria. Kalra et al., (1993) conducted a study on 245 patients with stroke who had been admitted to hospital for 2 weeks after a stroke. Patients were divided into two groups (75 years and over, and under 75 years) (Kalra et al., 1993). Patients were distributed equally between stroke units and general wards. According to the researcher, even though older patients were receiving more physiotherapy and occupational therapy in both settings, younger patients showed better outcomes on discharge. However, outcomes in younger patients managed on a general ward were worse than those in older patients with a similar problem. Kammersgaard et al. (2004) carried out a study on 1,197 patients. The study recruited 191 patients who were 85 years or older and 1006 patients who were less than 85 years old (Kammersgaard et al., 2004). According to the researchers, the patients' age was associated with patient outcomes. Stroke severity and pre-existing disability were also significant independent predictors of patient prognosis after injury.

Although age has been reported as being associated with poorer outcomes, its influence can be overestimated. A prospective study of 561 patients with stroke admitted to an inpatient stroke rehabilitation service found that age accounted for only 3% of the variance in

outcomes. It suggested that advanced age alone is not a justifiable reason not to grant patients access to a rehabilitation service, given the questionable clinical relevance of that factor (Bagg et al., 2002). A cohort study of 2,219 patients studied the effect of patient age on early stroke recovery. Even though the researchers stated that a patient's improvement decreases with increasing age, their conclusion was that, although age had a significant impact on patient outcomes, it was however a poor predictor of individual functional recovery after a stroke and should not be used as a limiting factor to deny any patient being admitted to a rehabilitation service (Kugler et al., 2003). The last two studies were conducted on inpatient rehabilitation services while the other two were in general hospital settings, which indicates that Bagg et al. (2002) and Kugler et al.'s (2003) study conclusions are more appropriate (Waddell and Burton, 2004).

Several studies have reported the influence of the severity of a patient's condition on the rehabilitation outcome. A prospective study of 536 stroke patients was carried out by Ween et al. (1996) to identify the influence of stroke severity on functional improvement and discharge destination (Ween et al., 1996). The researchers concluded that stroke severity has a great impact on patient progress and discharge destination. They found that patients with a FIM score above 80 on admission always went home after rehabilitation, while patients with a FIM score of less than 40 always required long-term nursing care after discharge. The researchers concluded that patients with medium FIM scores between 40 and 80 are likely to benefit most from an inpatient rehabilitation service. These patients are generally able to participate fully in the rehabilitation programme, show substantial improvement during rehabilitation and have a high probability of being discharged to go home (Alexander, 1994).

Jorgenson et al. (2000) conducted a prospective analysis of 1,197 patients admitted to a stroke unit (Salter et al., 2006). The researchers used the Scandinavian Neurological Stroke

Scale (SSS) to measure stroke severity on admission (Scandinavian Stroke Study Group, 1985). The scale's score ranges were from 0-58 points, where (0-14) refers to very severe, (15- 29) to severe, (30-44) to moderate and (45-58) to mild. A total of 41% of the patients admitted were of mild severity, 26% moderate, 14% severe and 19% very severe. All mild stroke severity patients were discharged and able to return home. The percentage of patients who had moderate stroke severity and were discharged and able to return home was 75%, 33% of severe stroke patients were discharged and able to go home, while only 14% of the most severe stroke sufferers returned to their home on discharge. Jorgensen et al. (2000) concluded that the severity of the stroke is the most powerful predictor of the ability to participate and benefit from stroke rehabilitation (Jorgenson et al., 2000).

It has also been reported that admission to an intensive inpatient rehabilitation service should be limited to patients who require two or more rehabilitation disciplines. Patients with a single disability do not usually require an interdisciplinary programme and their needs can be met by individual services (Gresham et al., 1997). The literature has also reported many other factors, which should be considered before accepting any patient to be admitted to an inpatient rehabilitation facility.

A study conducted by Putman et al. (2007) aimed to compare the admission criteria in 6 stroke rehabilitation units in four European centres (Putman et al., 2007). The study divided the admission criteria into 3 main categories, related to the patient, the network between facilities and the referring hospital. Despite the small number of rehabilitation units studied, the study used a multi-method approach, which offered a robust understanding of the conditions and processes of admission to these units. The factors that most commonly had an impact on decision-making, regarding admission to a UK site related to the patient. The study

reported that a patient's cognitive and behavioural aspects had a high effect on the admission decision (Putman et al., 2007)

Pulman et al. (2007) also conducted a study as part of the Collaborative Evaluation of Rehabilitation in Stroke across Europe (CERISE) studies, to explore the clinical and non-clinical factors involved in decision-making concerning admission to in-patient stroke rehabilitation units (Putman et al., 2007). The researchers used a questionnaire, which was sent to medical consultants in six different European stroke rehabilitation units. The questionnaire's aim was to record the impact of clinical and non-clinical factors on the admission of patients after a stroke. The questionnaire was constructed based on a search of the literature and documents from healthcare policy-makers regarding the factors which influence admission to a rehabilitation centre. Those factors were grouped into 3 categories: factors related to the patient, factors related to the network between facilities and factors related to the referring hospital. Medical consultants were asked to score the impact of each factor on their admission decision on a 4-point scale, ranging from no effect to a very high effect. Semi-structured interviews were conducted with the medical consultants to identify the dimensions of their admission policies, and to obtain more details about the factors which were identified in the questionnaire as having a high or very high effect on admission in order to gain a better understanding of the local context. The interviewees were asked if there were any other significant factors that affected the decision-making process but were not listed in the questionnaire. Table 2-4 shows the factors which were identified as having a high or very high effect on admission to a rehabilitation unit. The study used a multi-method approach, which allows a better understanding of the admission processes in inpatient stroke units.

Table 2-4: Factors with a high or very high effect on admission to a rehabilitation unit

Factors related to the patient	Physical condition	Patient's age > 70 years
		Presence of pre-morbid functional disabilities
		Severe functional disabilities post-stroke
	Cognitive ability/psychological condition	Presence of pre-morbid cognitive disabilities
		Presence of pre-morbid depression and/or fear
		Disorientation in time and place
	Behavioural aspects Patient's network	Severe behavioural problems
		Patient's high expectation
		No readiness on the home front to support the patient
		Existence of a large social network for the patient
Factors related to the network between facilities		Affiliations between centre and other healthcare settings
		The association of insurance type with rehabilitation centre
		Affiliations between doctors and hospitals
		There are many other centres in the neighbourhood where stroke patients are also treated
Factors related to the referring hospital		The presence of an emergency unit in the referring hospital
		The presence of an acute stroke unit in the referring hospital
		Early involvement in the decision-making process at the referring hospital to refer patients
		The absence of bed managers in the referring hospital

Hakkennes et al. (2013) conducted a study to identify the factors considered to be important in making decisions regarding the suitability of stroke patients to be admitted to hospital for inpatient rehabilitation. The researchers used a questionnaire, which was completed by the rehabilitation assessors immediately following a patient review regarding the suitability of the patient for rehabilitation. The assessors were asked to rate the importance of fifteen pre-set patient-related items which were derived from a comprehensive review of the literature and included age, pre-morbid mobility, pre-morbid communicative status, pre-morbid cognitive status, pre-morbid living situation, current cognitive status, current mobility, current communicative status, patient's mood, current continence status, patient's motivation, patient's insight, patient/ carer goals, social support, patient/ carer advocating rehabilitation, bed availability and funding source, on a 10-point visual analogue scale (0, not at all important; 10, very important). Assessors were also asked to indicate how much each item influenced their decision, and if this factor was positive.

Of the 75 patients included in the study, 61 (81%) were accepted for rehabilitation. The results of the study show that the three most important items for patients to be accepted for rehabilitation were the patient's pre-morbid cognition, pre-morbid mobility and pre-morbid communication. On other hand, for those patients not accepted for rehabilitation, the most important items were the patient's current mobility, social support and current cognition. However, there were additional items identified by the assessors as being important but not included in the questionnaire, these were: co-morbidities, multidisciplinary team assessment, patient's fatigability, rehabilitation potential and medical stability. The results of this study indicate that, for some patients, social attributes are also important in the rehabilitation decision-making process, while age and continence are among items ranked lower in terms of importance. Table 2-5 shows all the factors which were reported by the assessors as having an important influence on a patient being accepted for admission to a rehabilitation setting.

Table 2-5: Factors considered to have an influence on patient admission to a rehabilitation setting

	Factor	Score
Post-stroke status	Age	0.41
	Current mobility	0.64
	Current cognition	0.82
	Current communication	0.73
	Current continence	0.68
	Mood	0.66
	Motivation	0.75
	Insight	0.82
Pre-morbid status	Pre-morbid mobility	0.81
	Pre-morbid cognition	0.87
	Pre-morbid communication	0.86
	Pre-morbid living situation	0.63
Social attributes	Patient/carer goals	0.68
	Social support	0.69
	Patient/carer advocating for rehabilitation	0.78

Given that the researchers used a structured questionnaire and asked the assessors to rate the importance of a present list of factors in decision-making which were extracted from a

comprehensive review of the literature, there is a possibility that other important items might have been excluded from the questionnaire. Finally, although this was a multi-centre study, it was conducted in a single state (Victoria) in Australia, and since the models for the provision of rehabilitation vary widely between different states in Australia and other countries, caution should be used when generalising the results of this study to other countries.

In the UK, ABI patients are admitted to a different rehabilitation centre than stroke patients. Although stroke rehabilitation centres are widely spread across the UK, the ABI rehabilitation service attracts little attention from the Health Commission. Taking the example of Wales, UK, which represents a large geographical location in the UK, there are about thirty stroke rehabilitation centres (Stroke Association, 2012) compared to only two ABI rehabilitation centres providing the service to all ABI patients in Wales. The waiting list is longer for ABI patients compared to stroke patients and this is simply because of the limitations of the ABI rehabilitation service. This may make the admission criteria for these rehabilitation centres different and sometimes difficult (Wade, 2003).

The performance and activity of the neuro-rehabilitation services provided for ABI in Wales, UK is monitored by the Health Commission Wales, which has signed Service Level Agreements (SLAs) with Cardiff and Vale NHS Trust and Swansea NHS to provide specialised rehabilitative care. The Health Commission, Wales has set up access criteria to rehabilitation services in Wales, which list all conditions to be met before being admitted to a facility, and also the exclusion criteria. According to the Health Commission, Wales, a patient should be medically stable and not need to be mechanically ventilated in order to be admitted to a neuro-rehabilitation service, the patient needs should be met by the MDT input, and the patient should be able to participate actively and tolerate an intensive rehabilitation programme. Any patient who has significant premorbid dementia and/or has been sectioned

under the Mental Health Act will not be accepted for admittance to one of Wales' neuro-rehabilitation services.

It has been reported that the admission criteria used to admit an ABI patient to an inpatient rehabilitation facility vary from centre to centre (Wade, 2003). As far as the researcher knows, there is no study that has been conducted to define the admission criteria followed to accept any patient with ABI to an intensive inpatient rehabilitation facility in the UK including Wales's rehabilitation centres. However, although stroke is an ABI, ABI patients are admitted to a different rehabilitation service than stroke patients. Due to this difference and the fact that the number of ABI rehabilitation services is lower than that for stroke patients, identifying admission criteria and comparing them with what is recommended in the literature for stroke rehabilitation are needed. This will ensure that all patients who are admitted to these rehabilitation settings are placed in the most appropriate facility which will match their needs. Consequently, this will help therapists to implement best practice and patients to receive the appropriate input.

2.2.4.2. Patient initial assessment

The first step in the physiotherapy process and practice in rehabilitating a person with a neurology condition is the patient assessment, which aims to understand a patient's functional ability and tries to identify his or her needs from rehabilitation intervention (McMillan et al., 2003). Assessment is the process of collecting data from the patient, his or her family, the patient's medical file, as well as a clinical examination to identify and understand the patient's problems, prognostic factors, wishes and expectations. The ICF provides specific descriptions that can be used to refer to a specific assessment domain. In health conditions relating to ABI, in line with the physiotherapy service, the assessment process helps to

identify the body's function and structure deficit, activity limitation and participation restriction. According to Turner-Stokes, (2008) that assessment process of the body's functions and structures covers the mobility of joints, muscle power and tone, involuntary movement reaction functions, control of voluntary movement functions, involuntary movement functions and gait pattern functions. Difficulties in undertaking a single task, undertaking multiple tasks, carrying out a daily routine, maintaining a body position, moving oneself, lifting and carrying objects, hand and arm use, walking, moving around with/without equipment, using transportation and/or driving are considered impairments to body functions and/or structures. The next section of the literature review seeks to identify and review most of the assessment methods which physiotherapists can use in their practice.

It has been reported that people with ABI can experience a wide range of complex sensory, physical, cognitive, psychological, behavioural, emotional, and social difficulties, and have a broad range of needs (Turner-Stokes, 2009). A comprehensive method to assess patient problems and needs is key to improving the quality of the rehabilitation services provided for people with ABI. Assessment is important to establish baseline data with which to compare subsequent assessment findings. It should cover all critical areas, be valid and sensitive to any change in the patient's condition, and be clinically feasible (Association of Chartered Physiotherapists Interested in Neurology, 1995). It has been reported that the assessment process involves three steps: the first is describing the patient's problems and service resources available; the second is setting the rehabilitation goals and the third is determining the intervention target (Rauch et al., 2008). A description of the patient's problems and service resources focuses on picturing the extent of the patient's functional ability, based on both the patient's and the health professional's perspectives. Information from the patient's perspective can be gathered directly from the patient, his or her family, and the patient's medical notes, while information from the health professional's perspective can be collected

from clinical examinations and sometimes from laboratory and/or other technical investigations performed by a member of the multidisciplinary team (Rauch et al., 2008). The process of identifying the patient's problems and limitations is the most critical step in the physiotherapy process, since this provides the raw material from which goals and a treatment plan can be derived (McMillan et al., 2003). However, the complexity of ABI conditions make it difficult to describe an optimum method for evaluating and assessing patients with ABI. The literature reports few guidelines and tools which help and guide the physiotherapists' assessment (Association of Chartered Physiotherapists Interested in Neurology, 1995, Chartered Society of Physiotherapy, 2005, Rentsch et al., 2003).

In 1995, The Association of Chartered Physiotherapists Interested in Neurology (ACPIN) developed a neurological assessment tool to standardise physiotherapy assessment in neurology. The assessment tool is divided into three main categories, which include: general information, subjective and objective assessment. The ACPIN tool is a problem-oriented medical record that offers a structured and systematic method of physiotherapy assessment. The restricted format of the ACPIN tool provides better organisation of physiotherapy assessment. ACPIN's assessment tool is one of the most comprehensive physiotherapy assessments. The assessment tool contains most of the assessment elements which should be evaluated (see Table 2-6 for the whole list) (Association of Chartered Physiotherapists Interested in Neurology, 1995).

Table 2-6: Recommended assessment process from the Association of Chartered Physiotherapists Interested in Neurology (ACPIN)

General Assessment		
	• History of present condition • Medication history • Results of specific investigations (X-rays, CT scans, blood tests)	• Past medical history
Subjective Assessment		
	• Social situation -family support -accommodation -employment -leisure activities -social service support • Normal daily routine • Continence • Hearing	• Fatigue • Other on-going treatment • Expectations of treatment • Indoor and outdoor mobility • Vision • Swallowing • Pain • Perceptions of own problems
Objective Assessment		
Function	***Assessment***	
Posture and Balance	• Alignment • Sitting Balance • Romberg Test	• Neglect • Standing Balance
Voluntary Movement	• Range of Movement • Strength • Endurance	• Coordination - finger to nose test - heel to shin test - rapidly alternating movement
Involuntary Movement	• Tremor • Chorea	• Clonus • Associated reactions
Tone	• Increased spasticity (clasp-knife) • Increased rigidity (cogwheel)	• Decreased/flaccid
Reflexes	• Deep tendon reflexes -biceps (C5/6) -triceps (C7/8) -knee (L3/4) -ankle (S1/2)	• Plantar response (Babinski's sign)
Muscle and joint range of movement	Passive range of movement	
Sensory	• Light touch • Pin Prick • Two point discrimination • Vision and hearing	• Vibration sense • Joint position sense • Temperature
Functional activities	• Bed mobility • Sitting balance • Transfers	• Upper limb function • Mobility • Stairs
Gait	• Pattern • Distance • Velocity • Use of walking aids • Orthoses	• Assistance • *Cognitive Status* • Attention • Orientation • Memory

According to the National Clinical Guidelines for Rehabilitation (British Society of Rehabilitation Medicine, 2003), the initial assessment should ideally be completed in one session, although in practice the initial assessment may sometimes take more than one session, and should include data obtained from the patient's medical history, clinical tests and measurements. It may also include an evaluation of the data collected during the clinical assessment and identification of problems relevant to the patient's physiotherapy rehabilitation. It should indicate the level of patient impairment, limitations on activity, and any restriction on participation as determined by the physiotherapist. The initial assessment documentation should also provide some details about the predicted level of improvement that might be achieved through physiotherapy intervention and the time required to reach that level (British Society of Rehabilitation Medicine, 2003). It can be seen that the National Clinical Guidelines for Rehabilitation provide a clear framework for the process of patient initial assessment.

The Core Standards of Physiotherapy Practice which have been developed by the Chartered Society of Physiotherapy provide a framework within which all physiotherapists and associate members are required to practise and describe different aspects of physiotherapy practice, including patient assessment (Chartered Society of Physiotherapy, 2005). Standard 5 was designed to describe physiotherapy assessment. They provide guidelines on the information which should be documented relating to the patient and the problem he or she presents. The criteria consist of four sub-criteria of which each describes a different aspect of the documentation process. Criterion 5.1 emphasises the importance of documenting the patient's perceptions of need, the patient's general expectations, the patient's demographic details, the patient's condition and problems, past medical history, current medication/ treatment, contraindications and allergies, social and family history/ lifestyle and relevant investigations. Criterion 5.2 suggests the importance of reporting the physical examination

carried out to obtain measurable data to analyse and assess the patient's physiotherapy needs. Criteria 5.3 and 5.4 report the need for documenting the findings of a clinical assessment and the importance of reporting the reasons why any previous information was not reported in the medical file (see Table 2-7 for more details).

Table 2-7: Standard 5 of the Core Standards of Physiotherapy Practice

	Criterion		Guidance
5.1	There is written evidence compiled as data consisting of:		This is dependent on the health status of the patient, for example, it would not be relevant for unconscious patients.
	5.1.1	the patient's perception of their needs	Perception of need relates to what the patient feels is their main problem.
	5.1.2	the patient's expectations	The patient's expectations may be expressed as the gain anticipated from physiotherapy.
	5.1.3	patient's demographic details	
	5.1.4	presenting condition/problem	This will include the effects of impaired activity and participation and the patient's psychological well-being.
	5.1.5	past medical history	
	5.1.6	current medication/treatment	
	5.1.7	contra-indications/ precautions/allergies	
	5.1.8	social and family history/lifestyle	
	5.1.9	relevant investigations	
5.2	There is written evidence of a physical examination carried out to obtain measurable data with which to analyse the patient's physiotherapeutic needs. This includes:		
	5.2.1	observation	
	5.2.2	use of specific assessment tools/techniques	
	5.2.3	palpation/handling	
5.3	The findings of the clinical assessment are explained to the patient.		The extent of the physical examination may be determined by the clinical specialty or by the patient's presenting condition at the time of examination.
5.4	If any of the required information is missing or unavailable, reasons for this are documented.		Reasons for discontinuing assessment, e.g. patient distress, withdrawal of consent, risk to the safety of the patient or therapist or cultural inappropriateness, are documented. It must be clear if missing clinical information is either not available or does not exist. Unnecessary duplication of investigations must be avoided.

(Chartered Society of Physiotherapy, 2005)

In addition to the CSP and ACPIN frameworks which guide physiotherapists in patient assessment, the World Health Organization's (WHO) International Classification of

Functioning, Disability and Health (ICF) offers a further framework for evaluating the sequence of the patient's assessment. The ICF framework can be used to evaluate the patient's problem and guide and standardise the physiotherapy assessment (Koskinen et al., 2007). The ICF domains are classified for bodily, individual and societal perspectives by means of two lists: body functions and structures, and activity and participation. The ICF also includes a list of environmental and personal factors. Body structures are the anatomical parts of the body, such as organs, limbs and their components, while body functions are the physiological functions of the body's systems. Any abnormalities, deviations or losses of body functions and/or body structures are referred to as impairments (Rentsch et al., 2003). Activity is the implementation of a task or action by an individual. Any difficulties at the activity level are referred to as activity limitations (e.g. limitations in mobility while walking). Participation represents the societal perspective of functioning and refers to the involvement of an individual in everyday situations.

Participation restriction refers to any problem that prevents an individual from being fully involved in such everyday situations (Rentsch et al., 2003). Environmental (contextual) factors represent the whole background of an individual's life and living situation. They make up the social, physical and attitudinal environments in which people live their lives. Personal factors are influenced by the background of an individual and his or her living situation, and include features that are not part of a health condition, i.e. age, gender, race, lifestyle and social background. Environmental and personal factors can have a positive or negative impact on disability and functioning.

The ICF is not an assessment or documentation tool and does not contain a specific protocol or assessment measures for evaluating patients with a neurological condition, but it can be used as a framework for evaluating a patient's problems (Koskinen et al., 2007). The use of

the ICF as a framework provides a comprehensive scientific basis for understanding patients' problems and creates a robust documentation tool. Several studies have described the implementation of the ICF framework in daily rehabilitation practice. Rentsch et al. (2003) studied the implementation of the ICF in stroke and traumatic brain injury neuro-rehabilitation (Rentsch et al., 2003). They pointed out the difficulties in using the original ICF list, which contains more than 1,400 categories, in clinical practice. Therefore, Rentsch and his colleagues stressed the need for a shorter ICF checklist in order to increase its visibility to be used in a clinical setting. They worked toward developing such a checklist to simplify the list of original ICF domains for everyday use in inpatient neurological rehabilitation. The developed checklist is a twelve-page long version of the original ICF list and consists of 49 terms for body function components, 64 terms for activities and participation, and six terms for environmental contextual factors.

However, Stucki (2005) reported that Rentsch's checklist is still difficult to use in clinical practice since it is too long and sometimes takes about an hour to complete (Stucki, 2005). He has emphasised the need for a more concise list which can be used in practice. Stucki (2005) has thought about developing what he calls a "comprehensive ICF core set" (Stucki, 2005). This is a shorter special list for each specific condition, designed to take less time to complete, and includes as many data as are necessary, sufficient and comprehensive to describe the problem (Stucki, 2005). Comprehensive core sets for twelve different conditions, including stroke, have already been developed (see Table 2-8).

Table 2-8: The Comprehensive ICF Core Set for Stroke

ICF component	ICF category title
Body functions	Consciousness functions
	Orientation functions
	Muscle power functions
	Mental functions of language
	Attention functions
	Memory functions
Body structures	Structure of brain
	Structure of upper extremity
Activities and participation	Walking
	Speaking
	Toileting
	Eating
	Washing oneself
	Dressing
	Communicating with – receiving – spoken messages
Environmental factors	Immediate family
	Health professionals
	Health services, systems and policies

(Geyh et al., 2004)

A collaboration project between the Guttmann Institute (Spain), the ICF Research Branch, the World Health Organisation (WHO) and the International Society of Physical Medicine and Rehabilitation (ISPRM) took place to develop a comprehensive ICF core set for Traumatic Brain Injury (TBI) (Bernabeu et al., 2009). The preparatory phase of the project included: a systematic literature review to identify the parameters and outcomes reported in studies involving persons with TBI. It was also included a qualitative study to identify concepts of functioning and health important to persons with TBI and their caregivers, using the ICF as a reference (14 focus groups with persons with TBI, 14 focus groups with caregivers and 4 interviews). The researcher used an online survey to gather the opinions of expert practitioners, including physicians, nurses, social workers, physiotherapists, occupational therapists, speech therapists and neuropsychologists (n=107) about the most relevant and typical areas to be considered in persons with TBI; and a multicentre cross-sectional study with 500 patients to describe the functioning and health of persons with TBI using standardised questionnaires at four different centres in Australia, Italy, Norway and Spain. As a result of this study, 139 ICF categories were selected for inclusion in the Comprehensive

ICF Core for TBI. These categories can be taken into account when conducting a comprehensive, multidisciplinary assessment of a TBI patient. Of the 139 comprehensive ICF core set categories, 23 were selected for the brief ICF core for TBI (see Table 2-9). The brief ICF core set can be used in settings in which a brief description and assessment of the functioning of a person with TBI are sufficient (Bernabeu et al., 2009).

Table 2-9: Brief ICF Core Set for Traumatic Brain Injury (Bernabeu et al., 2009)

ICF component	ICF Code/ ICF Category Title
Body Functions	Higher-level cognitive functions
	Emotional functions
	Energy and drive functions
	Control of voluntary movement functions
	Memory functions
	Sensation of pain
	Attention functions
	Consciousness functions
Body Structures	Structure of brain
Activities & Participation	Carrying out daily routine
	Conversation
	Walking
	Complex interpersonal interactions
	Acquiring, keeping and terminating a job
	Self-care
	Recreation and leisure
	Family relationships
Environmental Factors	Immediate family
	Health services, systems and policies
	Products and technology for personal use in daily living
	Friends
	Social security services, systems and policies
	Products and technology for personal indoor and outdoor mobility and transportation

Both stroke and TBI comprehensive core sets can be used as guidelines for ABI patient assessment in an inpatient rehabilitation setting. These provide general guidelines of the patient assessment process in a patient setting.

Several guidelines have discussed physiotherapy assessment in inpatient settings (Association of Chartered Physiotherapists Interested in Neurology, 1995, British Society of Rehabilitation Medicine, 2003, Chartered Society of Physiotherapy, 2005, Rentsch et al., 2003). Although these guidelines provide a good structure for physiotherapy assessment, a literature search reveals a lack of evidence for what guidelines physiotherapists follow in their assessments. Consequently, further research is needed to investigate whether physiotherapists are following any of these guidelines in their practice and which guidelines they are using. This will help the researcher in the process of mapping the service to describe the current physiotherapy practice.

2.2.4.3. Goal-setting and patient reassessment

Goal setting is widely reported to be a fundamental and effective element of the rehabilitation process. According to Wade (2009), goal-setting in rehabilitation has two characteristics: setting goals and planning for the patient's future state; and planning the rehabilitation team's future actions to treat the patient (Wade, 2009). The goal setting process is used by the multidisciplinary team to guide treatment, to motivate patients, and to measure patients' progress during the rehabilitation process (Magasi and Post, 2010).

The benefits of the goal-setting process in inpatient rehabilitation have been extensively investigated (Wade, 2009). Setting patient goals has been reported as improving patients' behaviour by increasing their motivation (Wade, 2009). It has been reported that the time and effort that therapists spend on a detailed and formal goal-setting process is very important and considered better than simply setting goals (McPherson et al., 2009).

It has been reported that the goal setting should be a collaborative process, in which the patient, therapist and multidisciplinary rehabilitation team agree on a set of goals (Wade, 2009). Good cooperative goal-setting should ensure that all actions undertaken by each individual therapist in the multidisciplinary rehabilitation team are contributing towards the overall goal. It has been reported that teamwork, when setting goals for inpatient rehabilitation, should facilitate both the efficiency and effectiveness of rehabilitation through cooperative activity which helps to avoid omitting any important actions (Wade, 2009). Despite the importance of collaborative goal-setting, full involvement of the patient in the process of goal-setting was reported to be applied in only 40% of the patients who were admitted to be treatment in an inpatient and community rehabilitation setting in the UK (Dalton et al 2012).

Goal-setting is also reported as allowing clinicians to monitor the rehabilitation process. This is particularly important since it helps clinicians and researchers to know which of several interventions help to achieve treatment goals and consequently helps to stop and change any ineffective treatment and plans as an alternative way of achieving the overall goal (Wade, 2009). Accurate reporting of the goals set in the medical report will help to monitor the goal-setting and rehabilitation process. Goal-setting has also been reported as reducing patient anxiety and may increase the patient's acceptance of a limited recovery (McPherson et al., 2009, Playford et al., 2009).

The setting and use of goals is a complex process. There is a strong relationship between each component of the rehabilitation process, including how the assessment process helps clinicians to set goals and how goal-setting helps to choose the intervention provided and monitor the treatment outcome. However, the literature reports that it is very common for

goal-setting and eventual outcomes to be non-linear since rehabilitation outcomes are unpredictable (Wade, 2009).

The theoretical underpinning of goal-setting in rehabilitation has not been well researched (Playford, 2009). However, Scobbie and Wyke (2009) reported that social cognitive theory, goal-setting theory and the health-action process approach are theories which can inform clinicians' behaviour in the process of setting and achieving goals in a rehabilitation setting (Scobbie and Wyke, 2009).

The goal setting is a process of discussion and negotiation in which the individual patient and staff determine the key priorities for the rehabilitation of the patient, and agree the performance level to be attained by the patient for the defined activities within a specified time (Holliday et al., 2007).

The first step in setting goals is to establish what goals are most important to the patient, since it has been reported that goals are only effective if they are considered desirable by the patient (Wade, 2009). However, although the patient plays an active role in the goal setting process, researchers identified a number of possible problems with goal setting in ABI rehabilitation services (Holliday et al., 2007). Some patients with ABI lack the ability to contribute formally to the goal-setting process due to the injury and their mental capacity after the incidence. Holliday, Ballinger and Playford (2007) conducted a study to explore patients' perceptions of goal setting in an in-patient neurological rehabilitation service and to identify the factors that influenced their perceptions (Holliday et al., 2007). The study was conducted in a Neurological Rehabilitation Unit in London using a qualitative method (focus group) to generate data. The researchers found that four themes emerged from the data collected: the rehabilitation process, personal response to goal setting, previous experience, and disease limitations. The rehabilitation process comprises the method whereby the neuro-

rehabilitation process is delivered, including the organisational structure and resources. The researcher reported that a clear understanding of the rehabilitation process is necessary to enable the patient's active participation in the goal setting process. The personal response to goal setting focuses on participants' specific experience of goal setting. It often includes personal evaluations, which sometimes allow participants to either involve or dissociate themselves from the goal setting. The researchers found that the patients' understanding of the neurological impairment mechanisms and recovery process can impact on the goal-setting process, and consequently the degree to which the patient desires involvement in it. The past experiences theme refers to patients' previous experiences and knowledge about their condition, which might influence the ways in which they set their goals. Finally the disease limitations theme comprises the consequences of the impairments which have a large effect on goals and the goal setting process. Holliday and his colleagues' (2007) study revealed the complexity of the goal setting process in neuro-rehabilitation services and patients' understanding of it. Although patient involvement in the goal setting process is important, it is considered to be a very challenging process in neuro-rehabilitation clinical practice. The researchers found that patient identification of future goals was more difficult if the impairments caused by injuries or diseases were unexpected or unpredictable. However, the researchers in this study used a qualitative approach and a cross sectional design which made it difficult for them to investigate whether the factors they identified in their study had any association with the successful outcomes of the goal-setting process. Moreover, since they generated their findings from a focus group in one rehabilitation unit, the results of their study should be considered with caution before they can be generalised to other similar populations.

Leach et al. (2010) published a study which focused on understanding the experiences of therapists in the goal-setting process. The aim of their study was to examine the current

clinical approaches to goal-setting used in physiotherapy, occupational therapy and speech pathology, as well as to identify the degree and quality of patient input into the goal-setting process. A total of eight therapists, two speech pathologists, three occupational therapists and three physiotherapists, completed a semi-structured email interview comprising seven open-ended questions which allowed the therapists to discuss what they perceived as being relevant to the goal-setting process.

The researchers identified three separate categories of goal-setting which were commonly used by therapists. Of the 15 interviews completed, 10 approaches were found to be therapist-led, four were therapist-controlled and one response represented a patient-focused approach. The first category of the goal-setting process that emerged from the interview responses appeared to be largely controlled by the therapists. The therapists set their goals based on an assessment as this formed the foundation of a therapist-controlled approach from which impairments were identified. Little or no consideration was given to the patient and/or their family members in the goal-setting process. The second category of goal-setting was therapist-led and based on collaboration between patient and therapist in the goal-setting process. According to the researchers, the process of goal-setting in this approach was commonly initiated by the completion of an initial assessment and informal interaction between therapist and patient to set goals. The final category of goal-setting process that appeared in Leach et al.'s (2010) study was a patient-focused approach. This approach largely focused on the patient and their family to form treatment goals. In the initial stages of this approach, the therapist explains the process of goal-setting to the patient and then completes a formal tool used for patient centred goal-setting (Canadian Occupational Performance Measure) and then considers this measurement in conjunction with goals negotiated between therapist and patient following formal assessment.

However, the findings of this study came from a small number of therapists working in one rehabilitation centre and so generalizing the findings is difficult.

On the other hand, Dalton et al., (2012) conducted a case-controlled retrospective study to investigate the effect of patient participation on multidisciplinary goal-setting during early inpatient rehabilitation after ABI (Dalton et al., 2012). A retrospective study compared the multidisciplinary goals set for one hundred and five patients with ABI who were discharged during the 12 months before the intervention with patients who were admitted after the introduction of the new collaborative goal-setting process. The researchers found that collaborative goal-setting with brain injury was effective. They concluded that including the patient in the goal-setting process increases the number of goals set, especially in functional areas.

The next reported step in setting goals in an inpatient rehabilitation setting is to establish what changes to the patient's activity limitations and functional participation are possible and which are not. It is also important to know what will be required to achieve each goal and what the feasibility is of achieving them. Answering these questions is reported as often being very difficult due to the complexity of a situation in which a whole rehabilitation team is involved (Wade, 2009).

It is important to report that goals are hierarchical in two ways: time and conceptual axes. In terms of the time axis, therapists often set different goals depending on the time he/she spends to achieve these goals which often include long-, medium- and short-term goals (Wade, 2009). It has been reported that it is very important to link goals to each other so that the patient can see the connection between longer and short-term goals (Wade, 2009). With regard to the conceptual level, the goal-setting process should consider different levels where

goals might concern social participation, activities, impairments or well-being (Wade, 2009, WHO, 2001).

Most importantly, Wade (2009) reported that there should be a process of documenting or recording the goals set, so that progress can be evaluated and all therapists as well as the patient and the patient's family know what is expected of them.

It has been generally agreed that an appropriate goal is specific, measurable, achievable, realistic/ relevant and timed (SMART) (Holliday et al., 2007). The goal setting process should be used to ensure that the patient, their family and carers agree on the rehabilitation goals and the methods to be used to achieve these goals. Goal setting has been found to have a positive impact on patient behaviour change (Holliday et al., 2007). The goals should be relevant to the person concerned and specific enough to be measured. They have to be challenging but realistic and achievable. However, some researchers have reported that it is not necessary for every written goal to be SMART and to satisfy all five criteria. They report that therapists should be less rigid in their adherence to being SMART (Bovend'Eerdt et al., 2009).

Goal-attainment scaling is a potential approach for quantifying outcomes by using patient-centred goals. Several papers have discussed the use of goal-attainment scaling in rehabilitation (Bouwens et al., 2009, McPherson et al., 2009, Turner-Stokes, 2009, Wade, 2009). Turner-Stoke (2009) designed a scoring system for use with a goal-attainment scale in inpatient rehabilitation (Turner-Stokes, 2009). The theoretical basis and related practical problems have been widely discussed in the literature (Wade, 2009). Wade (2009) has reviewed the literature relating to the goal-setting process in rehabilitation and this researcher believes that the use of a goal-attainment scale is useful for research purposes but not as a routine measure of outcomes in daily clinical practice (Wade, 2009).

However, for mapping the processes of the service in this current study, it remains necessary to identify and describe the physiotherapists' goal-setting process currently used since the mapping process aims to describe what exactly happens during patient rehabilitation, rather than what should happen, and report it in the literature.

2.2.4.4. Intervention

It has been reported that the ABI treatment process should start as soon as possible (McMillan et al., 2003). Each member of the MDT provides a range of specific interventions which will be subject to evaluation by the rehabilitation team as a whole (McMillan et al., 2003). Physiotherapy is a major component of the multidisciplinary rehabilitation team in the ABI unit (Kwakkel et al., 1997). Researchers have reported that physiotherapy has a statistically positive effect on patient recovery outcomes (Kwakkel et al., 1997, Langhorne et al., 1996, Wade, 1992). However, the complexity and variability of the physiotherapy intervention approaches used in ABI rehabilitation derives from the fact that physiotherapists often rely on their clinical experience rather than on theoretical frameworks for their treatment plans (Bovend'Eerdt et al., 2009). Furthermore, the substantial clinical variation that exists between people with ABI, and the lack of written documentation make it difficult to specify the nature and content of this complex area of healthcare intervention (Bovend'Eerdt et al., 2009). Physiotherapists' input has been generally reported to dramatically influence patients' recovery (Wade, 1992). Researchers have reported that physiotherapy for the ABI patient should start as soon as possible. The primary benefit from early physiotherapy intervention is a reduction in the incidence of any secondary complications, which might occur due to the patient's immobilisation for a period of time. Physiotherapy in ABI rehabilitation services is administered at the level of impairment and disability, and focuses on body function in order to improve the patient's functional

movement ability and posture (Waters, 2000). The physiotherapists' role is to help patients to improve and reduce the impact of the problems caused by their injury. Physiotherapy treatment can be tailored to meet each patient's needs and can include therapy to improve joint alignment, increase muscle length, facilitate movement, strengthen muscles, balance re-education, exercise to improve functional ability, gait re-education, and/or sensory stimulation (Wade, 1992). What is better, how are outcomes influenced?

Researchers are still unable to identify those interventions which truly contribute to rehabilitation outcomes. Most studies have examined the physiotherapy on aggregate, as a whole, such as comparing the outcomes of patients treated in inpatient rehabilitation centres with those treated in outpatient clinics. It has been reported that individual interventions are rarely examined in the context of the entire array of physiotherapy interventions (DeJong et al., 2004). Some researchers (De Wit et al., 2007, DeJong et al., 2004) have mentioned that accurate and detailed descriptions of physiotherapy interventions reported using a robust method to document the physiotherapy provided will bring systemisation, greater clarity and more precision to describing, evaluating and quantifying what happens in physiotherapy practice, and thus serve as the basis for measuring interventions used in conjunction with outcomes (De Wit et al., 2006, DeJong et al., 2004).

Hart et al. (2014) published an article as part of a bigger project aimed at developing a rehabilitation treatment taxonomy (RTT) and testing a standard method for characterising the important components of rehabilitation treatments. The aim of Hart et al.'s (2014) article was to describe and define the content of rehabilitation provided for people with traumatic brain injury at an early stage of recovery, and in both inpatient and outpatient settings. The researchers used a primarily bottom-up, inductive approach to create definitions of treatment activity. However, the researchers mention that the purpose of their article was not to present

a complete and validated treatment classification, but rather to discuss and demonstrate the difficulties in developing such a classification.

A multidisciplinary team comprising two physiotherapists, two occupational therapists, one speech-language pathologist, one recreational therapist, one neuropsychologist and one who served as a team leader created detailed and exclusive definitions for the content of treatment activities provided to patients in a brain injury unit. The researchers used the function and activity levels of the International Classification of Functioning, Disability and Health to organise content definitions. The researchers also evaluated the reliability of the coding system developed by videotaping treatment sessions provided to patients with TBI. Fifty-three participants with TBI were recruited from both inpatient and outpatient services of the brain injury centre. A set of 128 videotapes was coded: 44 physiotherapy sessions, 46 occupational therapy sessions and 38 speech therapy sessions. Two coders independently identified the treatment activities provided to the patients in each minute of the 128 videotapes to determine the interrater agreement between two coders. The final list of treatment content in Hart et al's (2014) study is shown in table 2.10.

Table 2-10: Rehabilitation activities provided for patient with TBI

I. Function codes	A. Physical function	Balance and posture
		Muscle function (strength, flexibility, control)
		Cardiopulmonary endurance
		Vestibular habituation
	B. Cognitive/behavioral function	Attention
		Orientation and episodic memory
		Executive function
		Behavioral regulation
II. Activity codes	A. Mobility	Bed/mat mobility
		Transfers
		Wheelchair management
		Wheelchair locomotion
		Ambulation
		Elevations
	B. Intake and elimination	Swallowing/eating/drinking
		Feeding
		Toileting/time voiding
	C. Self-care	Bathing/showering
		Dressing
		Grooming
		Health/safety
	D. Home and community	Meal preparation
		Home management
		Shopping
		Leisure skill development
		Leisure education/activity pattern development
		Transportation and travel
		Benefits and entitlements management
		Work/school skill development
	E. Communication	Basic expression and comprehension
		Conversational communication
		Speech articulation and voicing
		Reading
		Writing
		Math and money management
III. Supplemental	A. Brain injury education	
	B. Community setting	
	C. Significant other	
	D. Devices (eg, cane, walker, transfer board, tub bench, adapted computer mouse, augmentative/assistive communication device, prosthetic/orthotic device, rocker knife, memory book, personal digital assistant)	

Although there are some studies in the literature which explain the physiotherapy treatment provided for stroke patients in an inpatient setting and the fact that a stroke is an ABI, there are still key differences that make treating and comparing what has been done with stroke with other ABI conditions quite different and difficult as has been described earlier in this chapter. Generally, generalising what has been published on stroke in relation to ABI would be inappropriate, since the literature has proved that the functional deficits arising from each condition are different and the patient's recovery and rehabilitation process will consequently be different (Brain Injury Centre, 2008, Kimberley et al., 2010). Also, due to the limitations of the literature with regard to identifying the nature of the physiotherapy interventions provided for people with ABI, this part of the physiotherapy process requires more attention and focus. A comprehensive study to identify what interventions physiotherapists are using to treat patients with ABI in an inpatient setting are necessary.

2.2.4.5. Discharge Criteria

Discharge planning is an essential part of the patient's rehabilitation process. The discharge process begins at/or before the time of admission for inpatient rehabilitation and is evaluated concurrently throughout the inpatient rehabilitation service. In 2012, a Cochrane review of seven completed trials conducted to reduce the duration of hospital care for acute stroke patients indicated that the length of hospital stay for stroke patients can be reduced by an early supported discharge plan (Fearon and Langhorne, 2012). Discharge from the inpatient rehabilitation service is appropriate when the patient's goals have been achieved and an intensive multidisciplinary rehabilitation service is no longer needed. Other reasons for discharging persons with ABI from the inpatient rehabilitation service is that further progress is unlikely and/or the patient is unwilling or unable to cooperate with the rehabilitation

programme or the patient is medically unstable and requires further intensive medical care. The patient should be discharged to an appropriate setting (Fearon and Langhorne, 2012).

According to the Scottish Intercollegiate Guidelines Network (2010), discharge planning should be divided into three parts: pre-discharge, actual discharge, and post-discharge (Scottish Intercollegiate Guidelines Network, 2010). The pre-discharge process should involve the patient and his/her carer, social services, the primary care team, and all other multidisciplinary team members. It should take account of the patient's domestic circumstances and the facilities available in the discharge destination. According to the guidelines, the pre-discharge process should contain a pre-discharge home visit since this is considered a vital part of the discharge planning process. The pre-discharge home visits should be conducted by different members of the multidisciplinary team. The aim of the pre-discharge home visits is to give the patient and the multidisciplinary team the opportunity to identify all possible problems that are likely to appear when the patient is discharged, as well as to address any other needs that the patient and/or carer may have.

The discharge plan should be documented in a discharge report. According to the Scottish Intercollegiate Guidelines Network (2010), all diagnoses, investigations and results, medication and duration of treatment if applicable, levels of achievement, ability and recovery, team care plan, further investigations needed at primary care level with dates, further investigations needed at hospital and dates, further hospital attendance with dates and the transport arrangements should be accurately and legibly displayed in the discharge documents (Scottish Intercollegiate Guidelines Network, 2010)**.** In fact, consideration should be given to such information being retained by the patient since it has been shown that when a patient holds a record of their discharge plan, this can enhance their understanding of and involvement in their rehabilitation treatment and increase their satisfaction (Ayana et al.,

1998, Shepperd et al., 2004). The rehabilitation team with the local authority and the patient and/or the family, should continue to assess the progress of the patient after discharge. In the event that there is any concern after discharge, the patient should be referred to the correct team member or agency for assessment, treatment and follow up, and, if necessary, referred for re-admittance to the inpatient rehabilitation service. To the best of the researcher's knowledge to date, there is no study that has discussed what physiotherapists and healthcare providers consider when they discharge patients from an ABI rehabilitation setting. Hence, this rehabilitation stage needs more attention in future research.

2.2.5. **Conclusion**

A mapping process is a method to summarise the whole rehabilitation process as a picture in a model format which helps the researcher and clinicians to know what exactly happens on the patient's rehabilitation journey. This helps the researcher and clinician to evaluate the service and capture the reality of the rehabilitation process and identify strengths, weaknesses, variations and unnecessary steps in the service (Institute for Innovation and Improvement, 2008). To be able to map the processes of physiotherapy provided for people with ABI, a good theoretical understanding was needed of the whole service process (Craig et al., 2008). Reporting and understanding the pathways that patients will follow if they have ABI will lead to a better understanding of the service by confirming which of the rehabilitation models reported in the literature are followed.

The literature has reported a few rehabilitation models which describe the rehabilitation process that patients go through if they have ABI (BC Stroke Strategy, 2010, Scottish Executive, 2007, Strasser and Falconer, 1997). Although the literature has revealed the importance of admission criteria to the inpatient rehabilitation service (Beecham et al., 2009,

Turner-Stokes, 2009) and provided in-depth information about the admission criteria followed in some rehabilitation centres (Putman et al., 2007, Salter et al., 2006), it remains necessary to identify what admission criteria the heads of rehabilitation teams in the United Kingdom's rehabilitation service were applying in their practice in order to process map the service and compare the admission criteria followed to those reported in the literature.

Despite the various guidelines which have been discussed for the physiotherapy assessment process in inpatient settings (Association of Chartered Physiotherapists Interested in Neurology, 1995, British Society of Rehabilitation Medicine, 2003, Chartered Society of Physiotherapy, 2005, Rentsch et al., 2003), identifying what guidelines physiotherapists actually follow in their practice and what the process of patient assessment is still need to mapped to form a picture of the process of rehabilitation

Additionally, the process of goal-setting has been reported as a key component of the rehabilitation process. However, the available literature does not give sufficient information about actual practice, thus understanding the currently used goal-setting methods which are used in inpatient rehabilitation services is still required for mapping the process of the service

In addition, due to the limitations of the literature with regard to identifying the content of the physiotherapy interventions provided for people with ABI, identifying what physiotherapy techniques, treatment adjuncts and treatment tasks and positions physiotherapists were using with their patients was needed. Finally, reporting what discharge criteria are followed to discharge a patient from a rehabilitation centre and the inpatient service is necessary for mapping the process of the physiotherapy service.

2.3. Physiotherapy documentation process (Section Two)

This review of the literature aims to examine the documentation process followed to report physiotherapy practice in inpatient settings. It will consider multidisciplinary team documentation in general and physiotherapy documentation in particular, based on the available literature. To be able to devise a vigorous search strategy, it was necessary to know the exact definitions of the medical documentation and medical records. According to the Chartered Society of Physiotherapy (2000) the Health Service Circular has defined documentation as

> "*anything that contains information (in any media) which has been created or gathered as a result of any aspect of the (physiotherapy) work of NHS employees*" (Health Service Circular 1999/053, p. 12 from (Chartered Society of Physiotherapy, 2000)) .

According to the Data Protection Act 1998, any record consists of information relating to the physical or mental health or condition of the patient, which has been written by, or on behalf of, a health professional in connection with the care of that individual and considered to be part of the patient's medical record (Data Protection Act, 1998). This review of the literature, considered any report which has been written by physiotherapists and/or any other member of the multidisciplinary team to describe the physical or mental health state of any patient with ABI.

2.3.1. **Literature Search Strategy**

To ensure that all elements of the documentation process has been covered in this review, all articles which mention, describe or evaluate the physiotherapy documentation process in inpatient rehabilitation services or have developed any potential new physiotherapy documentation method were reviewed in this study. Policy documents, audit studies,

conference procedures, books and service reception reports have also been included to ensure the comprehensiveness of the review. Specific inclusion criteria were:

1. The paper mentions, discusses or evaluates the physiotherapy documentation process in an inpatient rehabilitation setting.
2. An article or report discusses the policy and/or legal obligations of the documentation process in an inpatient rehabilitation setting in the United Kingdom.
3. The study included either qualitative or quantitative studies.
4. The study is on human beings.
5. The study has been published in the English language.

Exclusion criteria

1. Any study conducted before 1990.

The literature search was limited to articles published on the research topic after 1990, since it was considered important that policy documentation, such as the Core Standards of Physiotherapy practice (CSP) and the Health Professions Council (HPC), which emphasise the importance of the documentation and regulate the documentation process in the physiotherapy practice, was current. Hand searching of reference lists enabled the researcher to find any article published prior to 1990 that made a useful contribution to the topic under study.

An extensive systematic literature search was made of the following databases: Ovid MEDLINE (1990 to 21st of May 2014), EMBASE (1990 to 21st of May 2014), AMED (1990 to 21st of May 2014), PsycINFO (1990 to 21st of May 2014), CINAHL and all EBM reviews, including Cochrane. The search strategy also included hand searching of reference lists from selected articles. Each database was searched separately, as MeSH terms/thesaurus headings

are unique to each database. The terms used for searching the electronic databases were divided in to two groups shown in Table 2-11, below.

Table 2-11: Literature review search strategy

Group One Searching strategy					
Acquired brain injury		OR	Traumatic brain injury	OR	Stroke
OR	ABI	OR	TBI	OR	Cerebrovascular accident
AND					
Rehabilitation		OR	Physiotherapy	OR	Physical therapy
AND					
Documentation		OR	Medical record	OR	Legal obligation
OR	Policy	OR	Educational	OR	Dataset
OR	Modern record	OR	Clinical governance		
Group Two Searching strategy					
Acquired brain injury		OR	Traumatic brain injury	OR	Stroke
ABI		OR	TBI	OR	Cerebrovascular accident
AND					
Rehabilitation		OR	Physiotherapy	OR	Physical therapy
AND					
Recording tool		OR	Treatment schedule	OR	Recording form
OR	Rehabilitation taxonomy				

The researcher identified 361 articles in the Medline database, 530 articles in EMBASE, 321 articles in AMED, 139 in PsycINFO, 51 in CINAHL review and 86 in the Cochrane Library in the first phase of database searching and ten articles in Medline database, 24 articles in

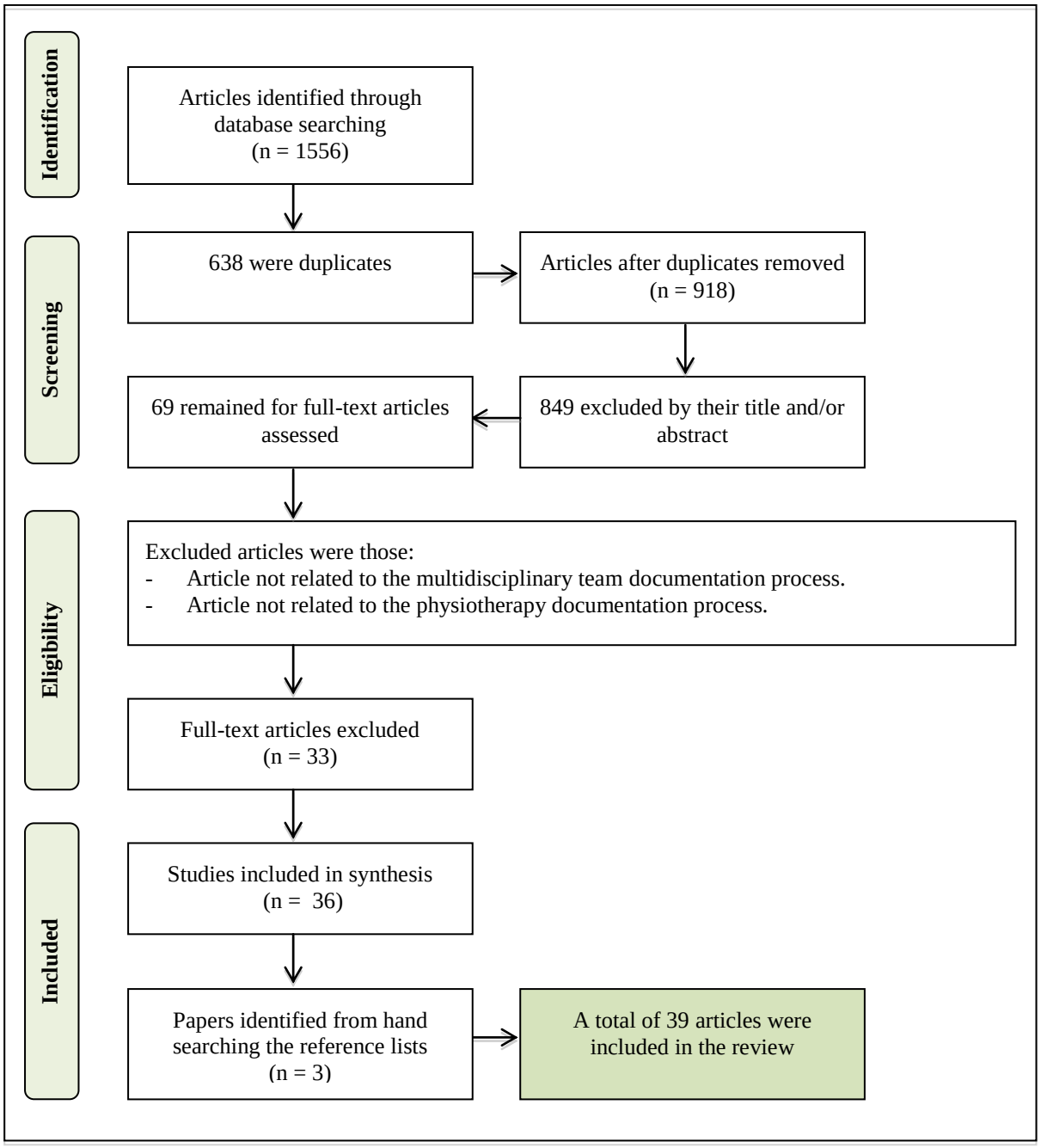
EMBASE, eight articles in AMED, 13 in PsycINFO, one in CINAHL review and 12 in the Cochrane Library in the second phase of database searching. All titles were scanned and all articles whose title matched one or more of our search keywords were included for further investigation, including scanning of their abstract. All articles not related to the search topic were excluded. Most excluded articles were not related to the documentation process.

A total of 1556 citations were identified from the search of databases, of which 638 were duplicates and subsequently removed, leaving 918 to be screened from titles and abstracts; of those, 849 were excluded by their title and/or abstract. The remaining 69 were included to be screened by reading the full text, when a further 33 were excluded, leaving 36 articles, which were included in this study. Three additional papers were then identified from hand-searching the reference lists of those 36 articles (see table 2-12 and figure 2-6).

Table 2-12: Literature search results

Source	**Found**	**Title scanning**		**Excluded by full text**	**Included in the review**
		Included	**Excluded**		
Ovid MEDLINE	371	30	341	33	36
EMBASE	554	23	531		
AMED	329	5	324		
PsycINFO	152	5	147		
CINAHL	52	3	49		
Cochrane Library and all other reviews	98	3	95		
Total	1556	69	1487		

Figure 2-6: PRISMA chart, number of articles included and excluded in the study



Three of the included articles related to the multidisciplinary documentation process and 24 articles related to physiotherapy documentation. Five of the included articles related to a multi-centre project called the Post-Stroke Rehabilitation Outcomes Project (PSROP) which aimed to provide extensive in-depth data about the specific rehabilitation interventions made

for stroke patients (DeJong, 2004; Gassaway et al., 2005; Jette et al., 2005; DeJong et al., 2005; Horn et al., 2005). Five studies were related to another multi-centre project called the Collaboration Evaluation of Rehabilitation in Stroke Across Europe (CERISE) (de Wit et al., 2006; Putman et al., 2006; Putman et al., 2007; de Wit et al., 2007; Putman et al., 2009).

The project aimed to define and compare the content of rehabilitation for stroke patients between four European rehabilitation centres: University Hospital, Leuven, Belgium; City Hospital and Queen's Medical Centre, Nottingham, United Kingdom; Reha Clinic, Bad Zurzach, Switzerland; and Fachklinik, Herzogenaurach, Germany. Clinical guidelines for medical records were found to be very limited with only two studies identified and eight articles related to the policy and legal obligations of physiotherapy practice. Twelve articles related to documentation in the field of rehabilitation were also included. All included articles, except policy and legal obligation documents, were critically appraised using the Critical Appraisal Skills Programme (CASP) appraisal tool (for more details, see Literature Search Strategy paragraph on the Rehabilitation Process (Section one) (See table 2-13)

Reviewing the policy and legal obligations of medical documentation was a critical part of this literature review, so as to help the researcher to understand the legal requirements of medical records and to identify to what extent physiotherapists follow policy and legal obligations in practice.

Table 2-13: Critical appraisal of all included articles using the CASP checklist

Author / year		Focused question	Clear statement of the aim	Include the right type of studies	Appropriate method	Identify all relevant studies	Assess the quality of the included studies	Acceptability of cases/cohort recruitment	Appropriate research design	Acceptability of control selection	Appropriate data collection method	Adequate relationship between researcher and participants	Appropriate outcome measures/ considered	Ethical issue consideration	Accounting for confounding factors	Appropriate data analysis measurement	Reasonable result combination	Appropriate follow up	Appropriate/ precise results/finding	Believing in the result	Can the results be applied to local population	Is the research valuable	Fitness of results with other available evidence	Policy changed as a result
Documentation process	Byrne (2012)	NC	NA	NC	NA	NC	NC	NA	NA	NA	NA	NA	No	NA	NA	NA	Yes	NA	NA	NA	Yes	Yes	NA	NA
	Wyatt and Wright (1998)	Yes	NA	Yes	NA	NC	NC	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	NA	NA	Yes	Yes	NA	NA
	Turner-Stokes et al., (2001)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	NA	NA	NA
Physiotherapy Documentation	Edwards et al., (1990)	Yes	NA	NA	Yes	NA	NA	NC	Yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mickelborough et al., (1997)	NA	Yes	NA	NC	NA	NA	NC	NA	NA	NC	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA
	Ayana, et al., (1998)	NA	Yes	NA	Yes	NA	NA	NC	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	Ballinger et al., (1999)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Wittwer et al., (2000)	Yes	NA	NA	Yes	NA	NA	Yes	No	NA	No	NA	NA	NA	No	NA	NA	NC	Yes	NC	NC	NA	Yes	NA
	Pomeroy & Tallis (2000)	Yes	NA	Yes	NC	No	No	NA	NA	NA	NA	NA	NC	NA	NA	NA	NA	NA	NC	NA	Yes	NA	NA	NC
	Pomeroy et al., (2001)	NA	Yes	NA	Yes	NA	NA	Yes	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	Sumner, et al., (2000)	Yes	NA	NA	Yes	NA	NA	Yes	NA	Yes	NA	NA	Yes	NA	Yes	Yes	NA	NA	Yes	NA	Yes	NA	Yes	NA
	Van Vliet et al., (2001)	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA	NA	NA	NA	NA	NA	Yes	Yes	Yes	Yes	NA	NA
	Lennon (2001)	NA	Yes	NA	Yes	NA	NA	NC	NA	NC	Yes	NA	NA	NA	NA	NA	NA	NA	Yes	Yes	Yes	NA	Yes	NA
	Mann & Williams (2003)	Yes	NA	Yes	NA	Yes	NO	NA	NA	NA	NA	NA	Yes	NA	NA	NA	NA	NA	Yes	NA	Yes	NA	NA	Yes
	Wottrich et al., (2004)	NA	Yes	NA	Yes	NA	NA	Yes	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	yes	NA	NA	Yes	NA	NA
	Bode et al., (2004)	Yes	NA	Yes	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	NA	NA	Yes	NA	Yes	NA	Yes	NA	NA	NA
	Tyson and Selley (2004)	NA	Yes	NA	Yes	NA	NA	Yes	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	Pomeroy et al., (2005)	NA	Yes	NA	Yes	NA	NA	NA	Yes	Yes	Yes	NC	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	NA	NA	NA
	Hunter et al., (2006)	Yes	Yes	Yes	Yes	Yes	Yes	NA	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	Yes	Yes	Yes	NA
	Phillips, et al, (2006)	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA	NA	NA	Yes	NA	Yes	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA
	Tyson & Selley (2006)	NA	Yes	NA	Yes	NA	NA	Yes	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	Tyson et al., (2008)	NA	Yes	NA	Yes	NA	NA	Yes	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	Bagley et al., (2009)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	NC	Yes	Yes	Yes	NA	Yes	NA
	Tyson et al., (2009)	NA	Yes	NA	Yes	NA	NA	Yes	Yes	NA	Yes	Yes	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	Yes	NA	NA
	Donaldson et al., (2009)	NA	Yes	NA	Yes	NA	NA	NA	Yes	Yes	Yes	NC	NA	Yes	NA	Yes	NA	NA	Yes	NA	NA	NA	NA	NA
	Putman and De Wit., (2009)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Hart et al., (2014)	Yes	NA	NA	NA	NA	NA	Yes	NA	Yes	NA	NA	Yes	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA

*Items of critical appraisal are derived from the Critical Appraisal Skills Programme (CASP) appraisal tool [89]; NA, Not applicable; NC, Not clear

Continue table 2 13: Critical appraisal of all included articles using the CASP checklist

Author / year		Focused question	Clear statement of the aim	Include the right type of studies	Appropriate method	Identify all relevant studies	Assess the quality of the included studies	Acceptability of cases/cohort recruitment	Appropriate research design	Acceptability of control selection	Appropriate data collection method	Adequate relationship between researcher and participants	Appropriate outcome measures/ considered	Ethical issue consideration	Accounting for confounding factors	Appropriate data analysis measurement	Reasonable result combination	Appropriate follow up	Appropriate/ precise results/finding	Believing in the result	Can the results be applied to local population	Is the research valuable	Fitness of results with other available evidence	Policy changed as a result
CERISE	de Wit et al., (2006)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Putman et al., (2006)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Putman et al., (2007)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	de Wit et al., (2007)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Putman et al., (2009)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
(PSROP)	DeJong (2004)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Gassaway et al., (2005)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Jette et al., (2005)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	DeJong et al., (2005)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	Yes	Yes	NA	Yes	NA
	Horn et al., (2005)	Yes	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	NA	NA	Yes	NA	NA	Yes	Yes	NA	Yes	NA	Yes	NA
Clinical Guidelines	WHO, (2007)	Yes	NA	Yes	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes
	Bodek (2010)	Yes	NA	Yes	NA	Yes	Yes	NA	NA	NA	NA	NA	Yes	NA	NA	NA	Yes	NA	Yes	Yes	Yes	NA	NA	Yes

*Items of critical appraisal are derived from the Critical Appraisal Skills Programme (CASP) appraisal tool [89]; NA, Not applicable; NC, Not clear

2.3.2. **Overview**

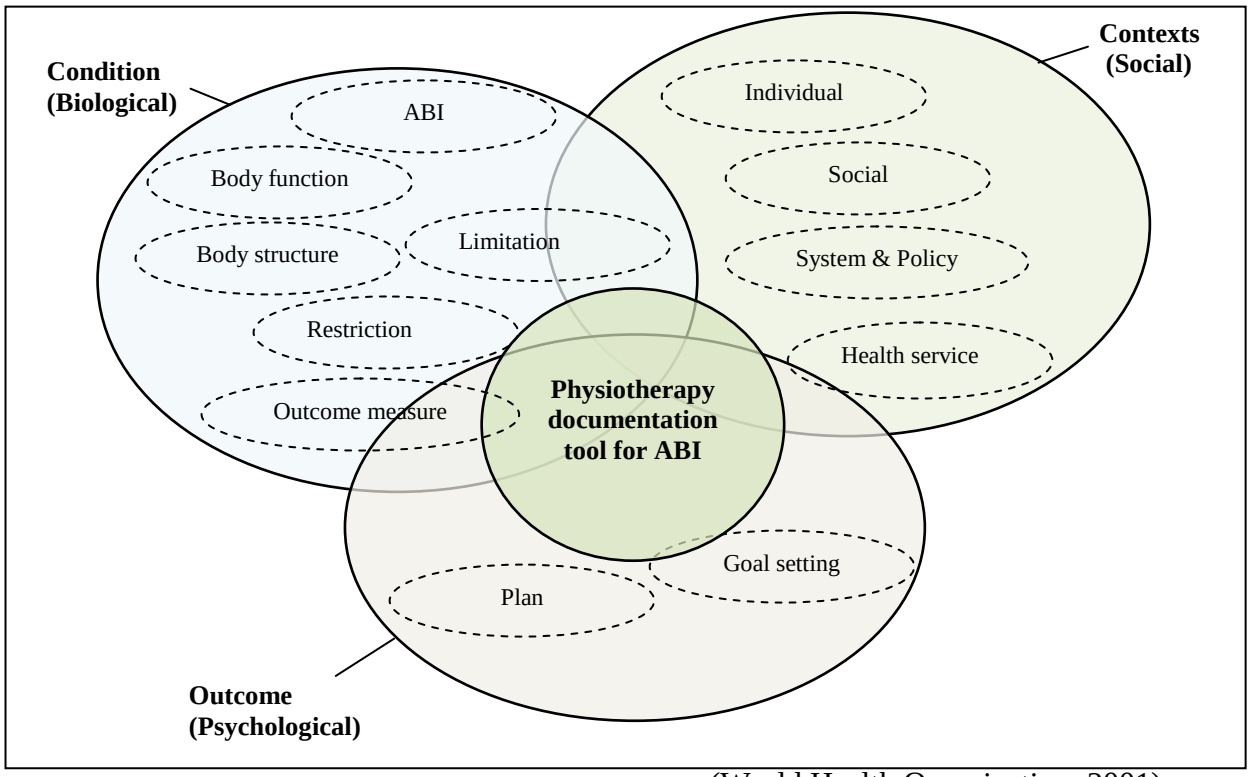
The importance of documentation can be divided into three categories: ethical, legal and professional. Ethically, the patient has the right to know what is being done in an intervention and why (Sherry and Carol, 2002). Legally, documentation serves as a legal purpose that establishes and verifies intervention (Sames, 2009, Sherry and Carol, 2002) and professionally, documentation is important to the intervention process and to research needs.

The next sections of this literature review will describe and discuss in detail these three categories.

2.3.3. **International Classification of Functioning, Disability and Health (ICF) Model and documentation process**

In considering all necessary features of the documentation process, the ICF framework provides a coherent model which can be used to make sure that the documentation process is up to the required provisional level. The coherent view of various dimensions of the health service is that the ICF help to make sure that the documentation method is sufficient to satisfy all legal and ethical requirements. The ICF comprehensive core set, which is currently being developed for ABI conditions, will also help to make sure that the documentation method is comprehensive, accurate and relevant. Using the ICF model, documentation could be located in the centre of the model. All the factors which might contribute to the physiotherapy documentation method are described in Figure 2-7.

Figure 2-7: Key attributes of the developed recording tool based on the ICF model



(World Health Organization, 2001)

2.3.4. **Policy, ethical and legal issues in physiotherapy documentation**

Documentation is a legal requirement of all professional physiotherapy practice and considered to be an integral part of the physiotherapy process (Health Professions Council, 2008). It is the primary source of information and the only robust defence against any claim, omission, error, act and/or negligence in the course of physiotherapy practice. To anticipate possible future difficulties, physiotherapists must ensure that notes are accurate and conducted in a careful legal manner at all times, as it can be called upon for a range of legal purposes (Brunetti et al., 2007). This part of the study will review the following policy documentation: Health Professions Council, 2008; Health Professions Council, 2007; European Region of the World Confederation for Physical Therapy, 2002; Data Protection Act (DPA) Subject Access Modification, Health Order, 2000; Human Rights Act, 1998; Data Protection Act, 1998; Access to Health Records (Northern Ireland) Order, 1993; and Health Records Act, 1990 (The Access to Health Records

(Northern Ireland), 1993, Data Protection (Subject Access Modification) (Health), 2000, Data Protection Act, 1998, European Region of the World Confederation for Physical Therapy, 2002, Health Professions Council, 2007, Health Professions Council, 2008, Health Records Act, 1990, Human Rights Act, 1998).

Most policy documents emphasise that physiotherapists must be aware of the legal framework within their workplace and also comply with regulatory, professional body and local commissioner guidance on record keeping (Health Professions Council, 2008). The Health Professions Council (HPC) is one of the regulation systems which control all Allied Health Professionals, including physiotherapists, in the United Kingdom. The HPC has published two documents which highlight the responsibility of physiotherapists to maintain their record keeping. These documents are: the *Standards of Conduct, Performance and Ethics* and *Standards of Proficiency – Physiotherapists* (Health Professions Council, 2008). Standard 10 of the standards of conduct, performance and ethics, entitled *You must keep accurate records*, states that:

> *Making and keeping records is an essential part of care and you must keep records for everyone you treat or who asks for your advice or services. You must complete all records promptly. If you are using paper-based records, they must be clearly written and easy to read, and you should write, sign and date all entries.*

This standard shows that physiotherapists have a professional and legal obligation to keep an accurate record of their interaction with patients. The *Standards of Proficiency – Physiotherapists* emphasised the legal importance of the medical records. The document sets out the minimum standards which are considered necessary to protect the safety of the public (Health Professions Council, 2007). Paragraph 2b.5 of this document, entitled "*Be able to maintain records appropriately*", confirms that it is the responsibility of each physiotherapist to improve their

skills with regard to keeping accurate and legible medical records. Such records should be written up to the standard required by legislation, protocols and guidelines.

The European Region of the World Confederation for Physical Therapy (WCPT) (2002) also stressed the importance of medical record documentation in physiotherapy (The European Region of the World Confederation for Physical Therapy, 2002). According to the WCPT, in Standard 14 of the European Core Standards of Physiotherapy Practice, every patient who receives physiotherapy should have a medical record which must include all necessary information which is associated with each stage of the physiotherapy process. This medical record should start with the first contact and be written immediately after a physiotherapy session or at the end of the day's treatment.

Confidentiality of record keeping is another important ethical issue which has been reported in most policy documents, standard 2 of *Standards of Conduct, Performance and Ethics* states that physiotherapists must treat all information about the patient as confidential and use it only for the purposes which have been provided for; they must not release any of this personal information to anyone who is not entitled to it (Health Professions Council, 2008). The HPC registration process states that physiotherapists' responsibility is to protect the information held in records from being damaged and/or lost (Health Professions Council, 2008). The Data Protection Act 1998 also mentions the importance of data protection and data confidentiality in record-keeping (Data Protection Act, 1998). It states that medical records need to be kept secure and not transferred to countries without adequate protection, and all recorded information, including the patient's personal demographic information, medical assessments, health status, diagnoses, interventions and any other information, must remain confidential. In addition, the Human Rights Act (HRA, 1998) sets out the "right to respect for private and family life". The contents of health records are classed as private and so are covered by the act. The HRA identifies 18 human rights in Schedule

1 and requires 'public authorities' to ensure that their activities do not violate these rights. Individuals working within the NHS are almost certainly public authorities under the HRA and are therefore required to observe the convention rights in their practice (Human Rights Act, 1998).

The Chartered Society of Physiotherapy has published guidelines for manual handling; these were launched at the Disabled Living Foundation's Moving and Handling People conference (2008) and explain how legislation requires physiotherapists to make and report risk assessments for manual handling, and suggests strategies for reducing risks if there are any (Chartered Society of Physiotherapy, 2008). The Quality Assurance Standard for Physiotherapy Service Delivery (Chartered Society of Physiotherapy, 2012) also emphasises the importance of the physiotherapist to obtain and document the patient's consent before any advice is given or beginning any assessment, examination, intervention, treatment or procedure.

Some policy documents have described some general characteristics of good medical records. According to the Health Professions Council (2008), it is physiotherapists' responsibility to keep records up to date, to ensure they are easy to read and to an appropriate standard (Health Professions Council, 2008). However, the policy document does not give enough details of what is considered appropriate. It has also been reported by the HPC that all physiotherapists must sign a declaration to confirm that they have read and will uphold these standards in practice. The WCPT (2002) reported that patient records should be contemporaneous, concise, legible, logically sequenced, dated and accurate, and provide adequate details of the interventions made, with these signed after each entry/attendance (The European Region of the World Confederation for Physical Therapy, 2002).

The Data Protection Act 1998 set eight principles, which should be considered by physiotherapists and all other disciplines when keeping their medical records if they are to be up

to a standard which is legally acceptable (Data Protection Act, 1998). The eight principles include the following roles: medical records should be adequate, relevant and not excessive; they need to be accurate, fairly and lawfully processed, and processed for limited purposes. Clinicians should not keep medical records for any longer than is necessary and they must be processed in line with subjects' rights. They need to be kept secure and not transferred to countries without adequate protection.

Ethically, the patient is allowed access to records of which he/she is the subject and to have communicated to him/her, in intelligible form, what that information is. The Data Protection Act 1998 states that the data subject (i.e. the patient, or the patient's nominated representative) is entitled to obtain a copy of his/her medical records, in permanent form, when he/she so requests, unless the supply of such a copy is not possible or would involve disproportionate effort, as set out in the Data Protection Act (DPA) (Subject Access Modification) Health Order, 2000). Also, information need not be provided to the patient if it would be likely to cause serious harm to the physical or mental health of the patient or any other person (Data Protection (Subject Access Modification) (Health), 2000, Data Protection Act, 1998). The importance attached to the information contained in inpatient health records often results in patients requesting access to those records. The Data Protection Act 1998 regulates the use of information about a patient in relation to his/her treatment and sets out the patient's right to be informed that information is being held about them and for what purposes the information may be used (Data Protection Act, 1998).

It is not only the Data Protection Act 1998 which emphasises the patient's right of access to his/her medical record; there are other acts which describe this patient's right. The Access to Health Records Act 1990 and the Access to Health Records (Northern Ireland) Order 1993 give the right to specified persons to access a patient's health records (Health Records Act, 1990, The

Access to Health Records (Northern Ireland), 1993). These individuals are defined as: "*the patient's personal representative and any person who may have a claim arising out of the patient's death*" (Access to Health Records Act 1990 Chapter 23; Access to Health Records (Northern Ireland) Order 1993). The Access to Medical Records Act 1988 gives the patient the right to see the report, veto its release and append comments on matters they feel are inaccurate (Access to Medical Reports Act 1988 Chapter 28). Both the Freedom of Information Act 2000 and the Freedom of Information (Scotland) Act 2002 give people permission to access official information held by public health/medical organisations, including health records (Freedom of Information (Scotland) Act, 2002, Freedom of Information Act, 2000).

The core standards of physiotherapy practice (CSP) play a central role in the delivery of safe and effective physiotherapy to patients within the legal requirements (Chartered Society of Physiotherapy, 2000). The requirements of the Health Professions Council (HPC) and the CSP are in harmony. According to the Department of Health (2003), by adhering to both HPC and CSP rules, physiotherapists will be discharging their statutory obligations (Department of Health, 2003). The third edition of the Core Standards of Physiotherapy Practice (Chartered Society of Physiotherapy, 2000) sets out the requirements for physiotherapy records. The Core Standards of Physiotherapy Practice are designed to bring together the profession's expectation of all practising members in one document, with the focus being on taking a more patient-centred approach to care. The core standards 4, 14, and 15 describe physiotherapy documentation (Chartered Society of Physiotherapy, 2005).

Standard 4 has different criteria including: written evidence compiled as data and any physical examination which has been carried out to obtain measurable data; explaining the findings of the clinical assessment to the patient; and documenting any missing or unavailable information and the reason why it has not been documented (Chartered Society of Physiotherapy, 2005).

Core 14 states that keeping patient records is an essential part of a physiotherapist's duty of patient rehabilitation. Records should include information related to each stage of physiotherapy. The core states that physiotherapists have a legal responsibility to keep an adequate record of patient treatment as this might be required to demonstrate to a third party what physiotherapists did, why they did it and when they did it. The CSP's core standard 14 also describes the components of a written record that will satisfy this legal requirement. Whatever the documentation method, it is physiotherapists' responsibility to ensure their records conform to the standards required. However, each healthcare provider has the flexibility to choose which style of record keeping is to be followed. The literature does not report any guide or role for how the style will be chosen and it has been left to physiotherapists and their institute to choose, based on their preferences (Chartered Society of Physiotherapy, 2005).

Core 14 has 6 criteria, most of which focus on the fact that a patient's record should be written up as soon as possible after contact and no later than on the same day as the contact. It has also reported that patient records should be concise, legible, in a logical sequence, dated, accurate, provide adequate details of the intervention given and include the physiotherapist's name and signature, which should be printed after each entry/attendance. It also states that physiotherapists should not use correction fluid and that reports should be written in permanent ink which will remain legible after photocopying. The patient's name and either date of birth, hospital number or NHS number should be recorded on each page of the record. Core standard 15 of the Core Standards of Physiotherapy Practice (Chartered Society of Physiotherapy, 2000) states that the patient's record should include information associated with each stage of the rehabilitation process in any documentation format, which might be electronic or paper-based, audio tape, emails, faxes, videotape, photographs or any other electronic media.

All the above mentioned standards and acts stress the importance of the physiotherapy documentation as a legal and ethical obligation for all professional practitioners. The documentation process is considered to be an integral part of the physiotherapy process. It has been reported that patient records should be adequate, relevant, accurate, fairly and lawfully processed and not excessive. However, none of these legal and ethical standards give specific details about what information should be reported in the medical record to meet the legal and ethical obligation standards.

2.3.5. **Professional issues in medical records**

Good record keeping is considered a vital and integral part of clinical and professional practice. Physiotherapists and all other multidisciplinary staff have a professional obligation to maintain complete, clear, concise, accurate and comprehensive patient medical documentation (Navuluri, 2001). Physiotherapy, allied health and nursing professionals are usually charged with the same clinical requirements for record keeping (Richoz et al., 2011). The Nursing and Midwifery Council (The Nursing and Midwifery Council, 2007) stresses that the record keeping is:

> *"a tool of professional practice and one that should help the care process. It is not separate from this process and is not an optional extra to be fitted in if circumstances allow…"*

Good record keeping protects the welfare of patients by promoting continuity of care. Physiotherapists' documentation is important professionally as it has the ability to facilitate the clinical care of individual patients by assisting physiotherapists to structure their thoughts, make appropriate plans and progress, and justify treatment (Micheletti, 2005). It can be used to evaluate professional practice as part of a quality assurance process, e.g. audits, performance reviews and accreditation processes. It has been reported that documentation enables physiotherapists and other care providers to use current consistent data and care goals to facilitate the continuity of

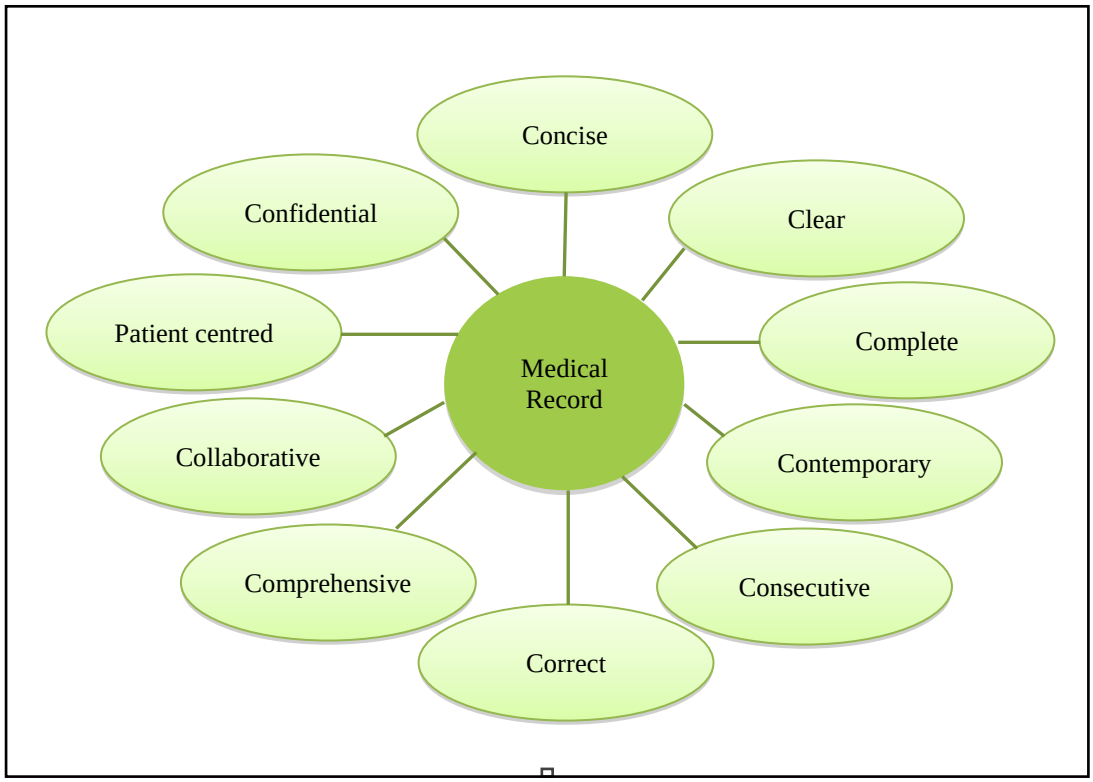
patient care by serving as a vehicle of communication for other physiotherapists and caregivers to evaluate, plan and monitor patients' care plans (Navuluri, 2001). However, according to the Chartered Society of Physiotherapy, physiotherapists have the flexibility to use any method of communication to share information with other members of the multidisciplinary team. This was reported in criterion 7.2.6 of the Quality Assurance Standard for Physiotherapy Service Delivery (2012), which states that the methods of communication can be modified to meet the needs of the service user (Chartered Society of Physiotherapy, 2012). According to the Quality Assurance Standard for Physiotherapy Service Delivery (2012), communication includes the sharing of information, advice and ideas with a range of people, using a variety of media (including spoken, non-verbal, written and e-based), and modifying these to meet the service user's preferences and needs. However, effective communication requires consideration of the context and nature of the information to be communicated and engagement with technology, particularly the effective and efficient use of information and communication technology (ICT).

Physiotherapists can also use the information in record keeping to reflect on their practice and implement changes based on evidence (Richmond, 2001). Documentation shows the clinician's accountability and provides information to patients about their health and healthcare and assists in the clinical care of the practice population by monitoring the progress of health promotion initiatives (see Figure 2-8) (Richmond, 2001, WHO, 2007). The ICF framework provides a comprehensive description and details of the different domains which need to be considered during the documentation process. Following the ICF framework in the documentation process will help to ensure that all necessary information which reflects on practice is covered.

It has been reported that record keeping is providing a full account of a patient's health condition and service provided and a base line record against which improvements in the patient can be measured, supply accurate information about the patient's condition and enabling other

physiotherapists and professionals to be aware of the treatment programme and, where appropriate, contribute to, continue or supplement care safely. It has been also reported that the documentation should allow physiotherapists to record any clinical or other biological, psychological and social factors which may affect the patient's progress or therapy. Furthermore, it helps to record the rationale and measures taken in response to the patient's needs or subsequent to the planned evaluation, support evidence-based clinical practice and help to record any advice or recommendations given to the patient and/or carer (Medway, 2010).

Figure 2-8: Medical record features



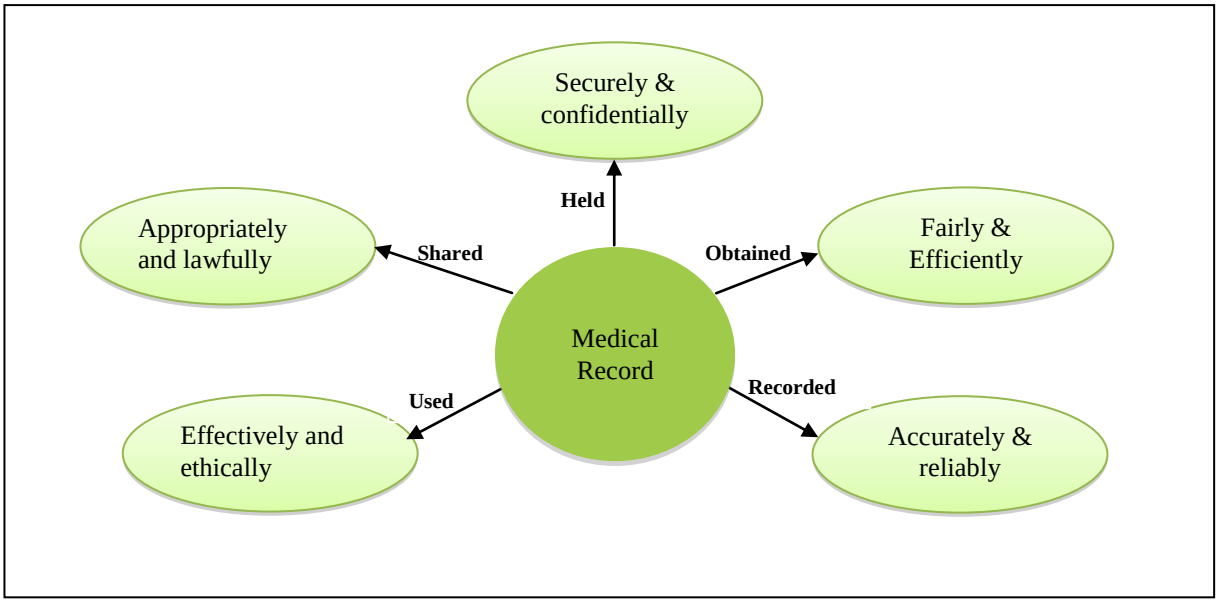
(Medway, 2010, World Health Organization, 2007)

Despite the importance of medical records in inpatient settings, most published articles emphasise the importance of having complete, clear, concise, accurate and comprehensive patient medical documentation. However, it is not clearly and comprehensively described what constitutes complete, clear, concise, accurate and comprehensive documentation, hence it was necessary to

search for clinical guidelines which might help to identify what exactly should be written in medical records.

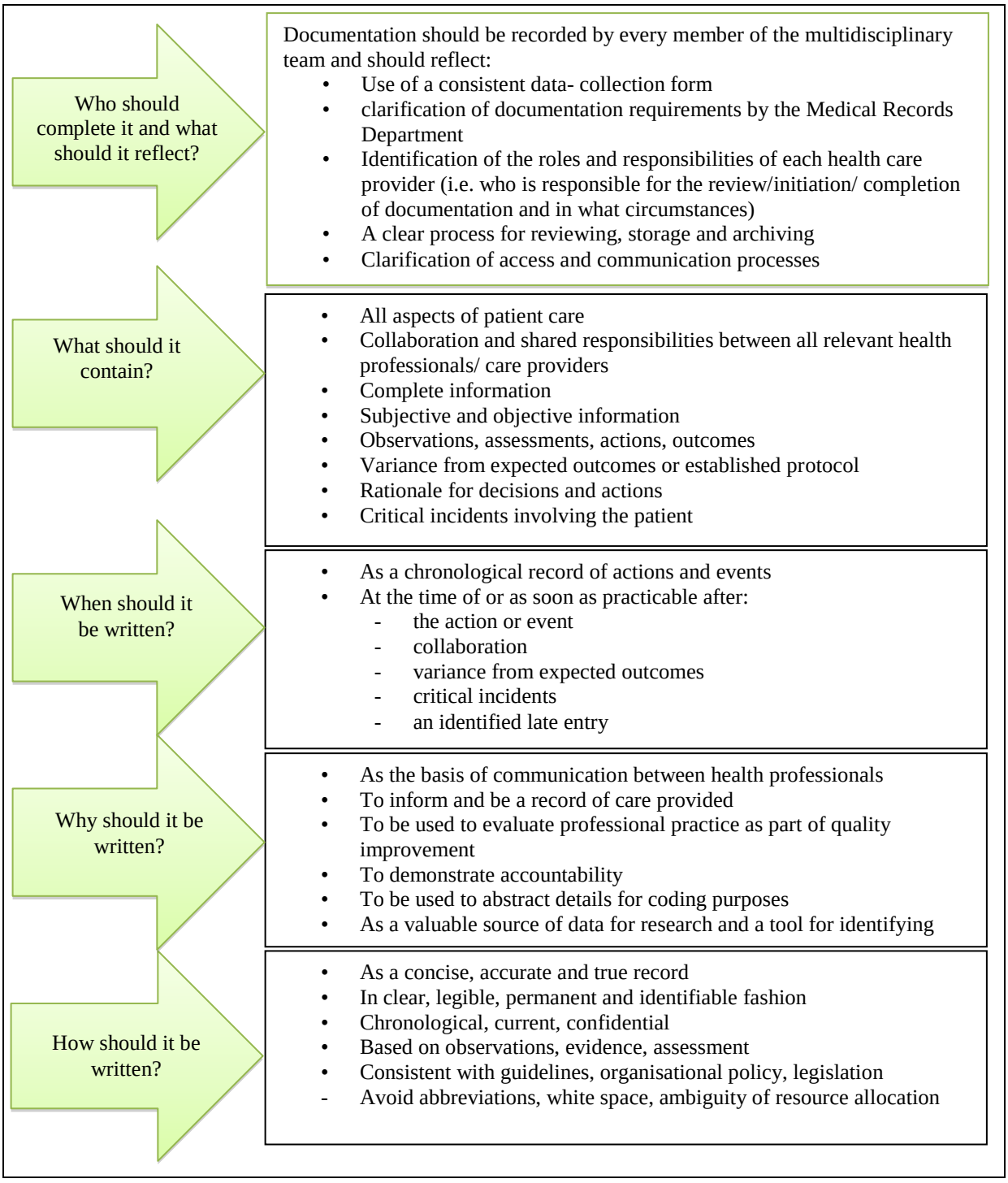
Medway Community Healthcare (MCH) is an institute located in the UK and provides a wide range of both planned and unscheduled care in local settings such as healthy living centres, inpatient units and people's homes. The MCH has developed a set of guidelines which identify the principles for the development and maintenance of patient records (Medway, 2010). The guidelines describe the professional importance and purpose of medical records. Medway Community Healthcare (2007) in its *Health Record Keeping Policy* stressed that medical records should include full and relevant information about the patient, including full forename(s), surname, NHS number and any other relevant information. A detailed current medical history, relevant earlier medical history, clinical findings, base line observations, decisions made and any information given to the patient should be sufficiently recorded on the medical record. All forms should be signed, dated and timed. The MCH has also emphasised that the medical record should be factual, unambiguous, objective, relevant and accurate. It should be written in a user-friendly format so that patients or advocates can read and understand it. All records are to be kept in files that are efficiently maintained in the service agreed order of filing (Health Professions Council, 2007) (see Figure 2-9).

Figure 2-9: Medical record characteristics



The World Health Organization (2007) published guidelines for medical records and clinical documentation (WHO, 2007). They state that a medical record should contain enough data to describe all aspects of patient care, including both objective and subjective information. The World Health Organization's guidelines (see Figure 2-10) include five important questions about medical documentation, including: Who should complete the documentation? What should it contain? When should it be written? Why should it be written? How should it be written? Although the guidelines provide general information about how to write good medical records, as with most other guidelines, they do not give in-depth details of what exactly should be written in the medical records. It has been reported in the guidelines that the medical records should be accurate, concise, truly recorded, clear, legible, permanent, identifiable, chronological, current and confidential, based on observations, evidence and assessment. According to the World Health Organization's guidelines, the documentation process should reflect consistent data using a data collection form. The use of a data collection form for documentation has been reported in the literature, as it helps in developing and standardising the method of producing medical records (Whiddett et al., 2006).

Figure 2-10: World Health Organization guidelines for a medical record



(WHO, 2007)

Bodek (2010) published clinical guidelines for documentation and record-keeping (Bodek, 2010).

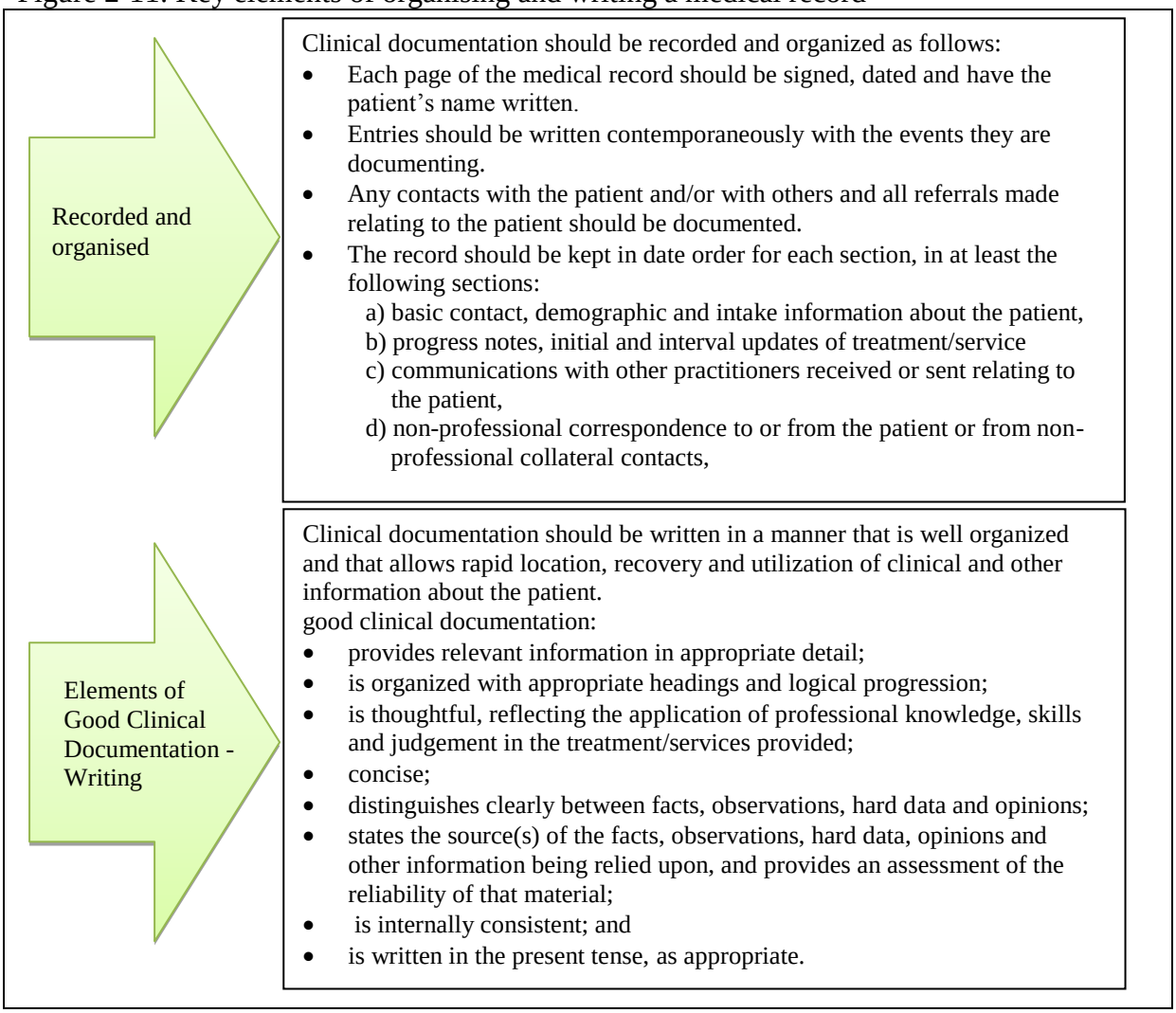
Despite the fact that Bodek published his guidelines based on the United States system, the

guidelines describe the key features of good documentation. According to Bodek, proper documentation of a treatment session should include:

1) the date and length of the treatment session;
2) the exact services provided;
3) description of the type of contact with the patient (i.e. in person, telephone, mail);
4) details of the therapist providing the service (i.e. physiotherapist, physiotherapy assistant):;
5) indication of who, besides the patient, was involved in the contact (i.e. patient, family, other practitioner, friend);
6) information about where the treatment took place (i.e. clinic, gym);
7) description of any symptoms, feelings, thoughts, beliefs or behaviours (i.e. pain, anxiety, dysphoria, etc.);
8) an assessment of the patient's mental status during the session;
9) a record of any complaints that may indicate a physical health problem;
10) description of any new significant history obtained;
11) description of relevant problems newly identified;
12) description of relevant significant new events (i.e. changes in medication, results of tests);
13) description of therapeutic interventions with clinical justification and reasoning to support these in relation to the treatment plan and clinical circumstances, particularly in response to crisis situations or special/markedly changed circumstances;
14) details of what was accomplished in the session;
15) details of what was not accomplished in the session that needs to be followed up on;
16) a record of any obstacles to progress in treatment, if any; and
17) a description of a future plan.

Figure 2-11 summarises the key elements of organising and effecting record-keeping from Bodek's guidelines for documentation and record-keeping.

Figure 2-11: Key elements of organising and writing a medical record



(Bodek, 2010)

The General Medical Council's (General Medical Council, 2013)guidance on record keeping emphasises best practice to all health professionals and advises all clinicians to:

"*…keep clear, accurate and legible records, reporting the relevant clinical findings, the decisions made, the information given to patients, and any other investigation or treatment…* [and] *…make records at the same time as the events you are recording or as soon as possible afterwards… ."* (General Medical Council, 2013).

In conclusion, record-keeping standards can be divided into two categories: generic and specific. Generic documentation standards apply to all medical records and are broad requirements for clinical note-keeping. Several specialist societies and networks have published their own reiteration of the generic medical standards' requirement for good medical practice. To provide good clinical practice, therapists should make sure that they keep clear, accurate and legible records, report relevant clinical findings, decisions made, information given to patients, and any other investigations or treatment. On the other hand, standards for medical records are also needed so that records are structured appropriately and clinical information is recorded in the right place.

2.3.6. **Medical Record Format**

Medical record format refers to the organisation of forms within the medical record. Medical records have been kept in a variety of ways since the beginning of modern medicine. Physicians in the 1880s kept all their patients' records in a personal leather-bound ledger. In 1907, this was replaced by patient-based records. Documentation can take many forms, including: source-oriented medical records, narrative charting, problem-oriented medical records, progress notes, focus charting, charting by exception (CBE), graphs, photographs, videotapes, audio tapes, drawings and physical specimens (International Federation of Health Information Management Association, 2012, Quinn and Gordon, 2010). Each rehabilitation service may have its own method of maintaining patient records. These documentation systems can be implemented using traditional paper forms or electronic medical records. The next sections of this part of the literature review will discuss the most commonly used documentation formats in detail. These will include: source-oriented medical records, narrative charting, problem-oriented medical records and progress notes.

2.3.6.1. Source-Oriented Medical Records

Source-oriented records are considered to be traditional client records where the record is organised into sections according to the patient's care departments which provide the care. Each therapist makes notes in a separate section or sections of the patient's medical record. Within each section, the forms are arranged according to date. On discharge, the information in each section is normally filed in strict chronological order. In this type of record, information about a particular patient problem is distributed throughout the medical records. For example, if a person had right hemiplegia (paralysis of the right side of the body), this information can be found in different sections of the medical record

Narrative charting is a traditional part of source-oriented records. It is one of the most commonly used approaches in healthcare professions including physiotherapy documentation, resulting in the chronological ordering of the healthcare provided. This method consists of straightforward documentation consisting of written notes that include regular daily care, normal findings, the patient's problems, interventions performed, and the patient's response to those interventions. There is no right or wrong order to the information, although a chronological order is frequently used.

However, it remains questionable how effective narrative charting and source-oriented records are as a communication tool, and whether the information stored is easily and readily retrievable. Although the narrative notes format gives the therapist the freedom to describe or explain the rehabilitation process and activity in as much depth and detail as they desire, the challenges to and disadvantages of narrative documentation are numerous (Byrne, 2012). The challenges include issues such as ambiguity of expression, lack of structure in the data entered in the medical record, redundancy in care capture, a host of transcription and cognitive errors, and limited opportunities for aggregation or reuse in databases or by clinical decision-support systems.

Narrative charting often becomes bulky, disorganised and scattered during the rehabilitation process without making reference to the condition or problem to which it refers, thus hampering communication between healthcare providers and making the retrieval of vital information very difficult (International Federation of Health Information Management Association, 2012). It has also been reported that narrative notes introduce a great deal of opportunity for confusion about what is being expressed. Human expression can increase the risk of error and miscommunication in a healthcare setting, where concise and timely communication between therapists is very important (Byrne, 2012). The use of structured or standardised terms in a flow sheet or template can mitigate some of these problems (Byrne, 2012).

Nurses have recently replaced the narrative recording by other more structured systems, called focus charting. Focus charting is another method of documentation which is based on open text notes whereby all information is typically organised by keywords listed in columns. Therapists have the flexibility to choose the keywords, which may be a patient's problems, signs or symptoms, a specific patient behaviour and/or the patient's progress. In one column the therapist writes a keyword and in the next column there is a detailed note about this topic. Although this method is sometimes very complex, it has been reported that it requires less written notation than other methods. Some therapists believe this method of charting makes it easier to document the true rehabilitation process (Manning, 1997) as, to some extent, it has a structured format since the data are organised in the chart according to focus and it is flexible enough to adapt to any clinical practice setting and promotes interdisciplinary documentation. However, the documentation style in focus charting is not monitored and the therapist can easily revert to narrative documentation (Hafernick, 2007).

In conclusion, source-oriented records offer a convenient method for keeping medical records since healthcare providers from each discipline can easily locate the sections in which to record

data and it is easy to trace the information specific to one's own discipline. However, the disadvantages of this method are that the medical record becomes bulky, disorganised and unstructured and information about a particular patient problem is scattered throughout the file, so it is difficult to find chronological information about a patient's problems and progress. This has been reported as potentially affecting both communication and coordination among therapists (LaTour and Eichenwald, 2002).

2.3.6.2. Problem-Oriented Medical Records (POMR)

According to Sames (2009) the problem-oriented medical record (POMR) was introduced in the 1968s by Prof. L Lawrence (Sames, 2009). Weed (Weed, 1969) was trying to improve the structure and incompleteness of patient records. Weed proposed separating a patient's record into problems, to give a number and name to each problem, and to record progress notes and care plans under the same problem number and name. A POMR documents the data in an easily accessible way that promotes the on-going assessment and revision of the healthcare plan by all members of the healthcare team. It provides a systematic method of documentation in the medical field which reflects the logical thinking of healthcare providers. Compared to the source-oriented record, the POMR is more structured and less scattered (Sames, 2009). The restricted format of the POMR offers better organisation of medical records which makes this method of documentation useful as a management tool for patient care and to evaluate the service. The POMR has gained acceptance in most rehabilitation centres. It has been suggested that this method could become the standard type of record keeping in most hospitals. The POMR formats used vary from place to place, but the components of the method are similar. It begins by building a database about the patient's problem which can be collected from either the patient or his/her carer, or via health assessment and/or physical examination, and all other possible resources of information (Borcherding and Kappel, 2006). Once all the information is collected, a

problem list will be created. Each identified problem represents a conclusion or a decision resulting from examination, investigation and analysis of the database. This step is followed by a treatment plan, in which each separate problem is named and described, usually in the progress notes via a method which focuses on providing a structured format such as the SOAP format, where: S, subjective data describe what the patients complains of from his/her point of view; O, objective data describe what the physiotherapist or other therapists actually see, touch or feel by inspection, percussion, auscultation and palpation; A, assessment of the problem that is an analysis of the subjective and objective data; and P, plan of action, including the proposed interventions to solve the problem (Borcherding and Kappel, 2006, Sames, 2009). The level of ability & consistency of SOAP formats may however vary between the therapists and maintaining a well-ordered up to date problem list takes time to review (Borcherding and Kappel, 2006). Although the POMR offers simplicity of progression through the data, which makes it quicker and easier to find the information needed from the medical record, it forms a bulky medical record system in use. For example, each problem requires a separate SOAP entry even though there may be an overlap between problems. Moreover, to consider a single problem in a consultation is rare. Many different issues may be discussed within a single consultation and sometimes information may legitimately belong under more than one problem heading, so either data will be recorded twice or missed between headings (Badia et al., 1999).

2.3.6.3. Progress Notes

The documentation of an individual physiotherapy session is often called a progress note. Producing a progress note is the process of documenting the sequential implementation of the treatment plan established by the physiotherapist, including changes in patient status and the progress in any interventions made. The progress note might also contain specific plans for the next treatment session or visit (British Society of Rehabilitation Medicine, 2003).

According to Mann & Williams (2003), Tunbridge, in 1965. took the first major step to standardise medical records in the UK (Mann and Williams, 2003). This publication resulted in some of the standard hospital medical records forms that we use today. Since then, researchers and commissioners have emphasised service to improve the standardisation of medical records (Mann and Williams, 2003).

There is currently a major drive to develop and improve the documentation process across the UK (NHS Information Authority and Welsh Assembly Government). Wyatt and Wright (1998) argued that structured records are easier and quicker to search and can therefore improve decision-making, but they have the disadvantage of being more difficult to write (Wyatt and Wright, 1998). However, some have found no significant difference in the time taken to complete structured proformas and free-text history sheets (Belmin et al., 1998). Structured medical records have been reported to improve the continuity of care and make it easier to extract and summarise information (Brazy et al., 1993).

The British Society of Rehabilitation medicine has emphasised the importance of having a standardised, single and collaborative recording system in all in-patient rehabilitation settings in which all members of the team record their interventions (British Society of Rehabilitation Medicine, 2003). It has been reported that collaborative notes help to facilitate the continuity of patient care by serving as a vehicle for communication between the therapy team and help to evaluate, plan and monitor patients' care plans (Salter et al., 2006). Although the British Society of Rehabilitation medicine (2003) has recommended the use of multidisciplinary notes within the inpatient rehabilitation service, not all rehabilitation services are actually using collaborative notes. Turner-Stokes et al. (2001) conducted a study on behalf of the British Society of Rehabilitation medicine (BSRM) amongst its consultant members who were providing a rehabilitation service for ABI patients in the UK. Consultants were asked to assess their service in

relation to the BSRM standards. The result showed that only twenty-three consultants out of fifty (46%) used a multidisciplinary record system in their rehabilitation centres (Turner-Stokes et al., 2001).

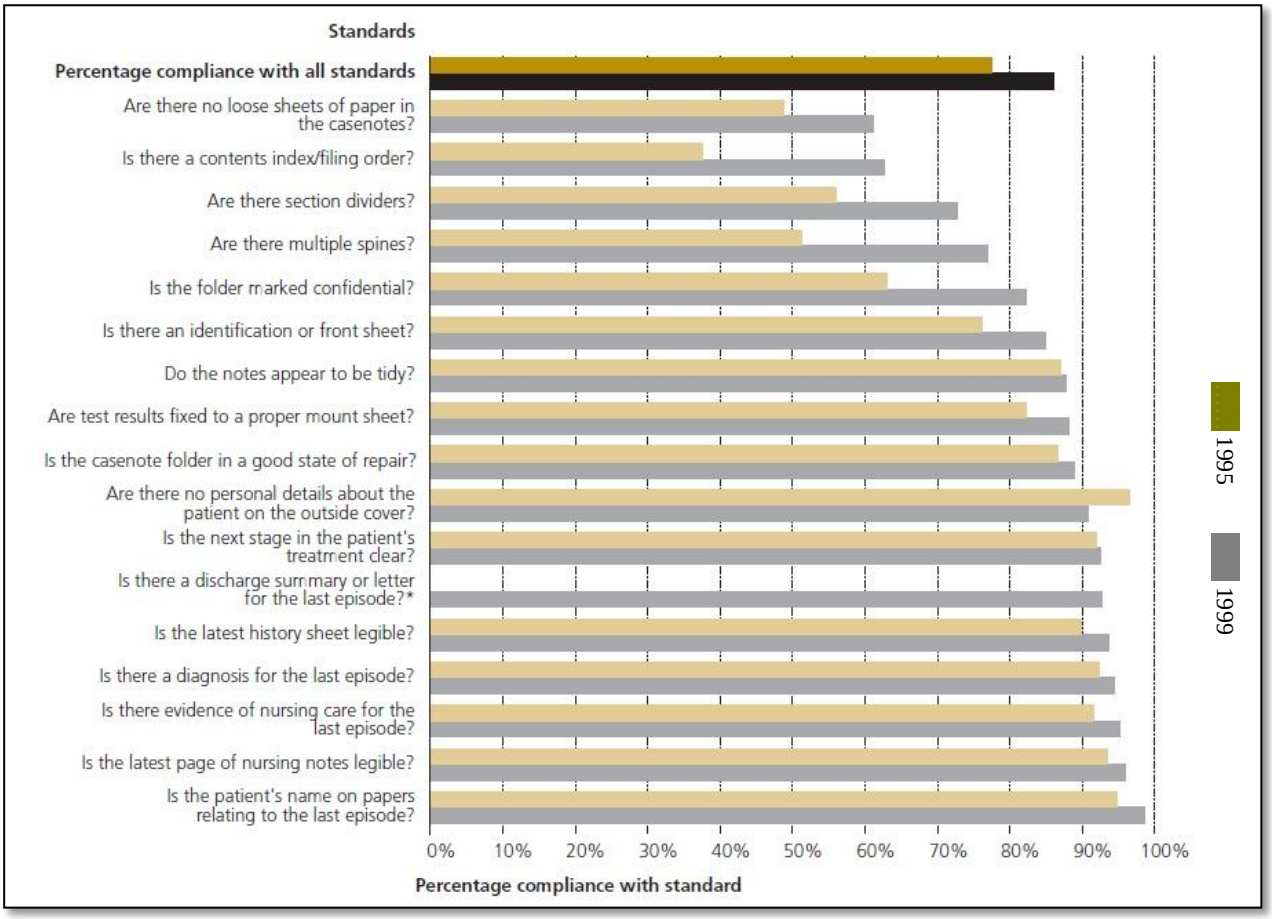
2.3.7. **Documentation in ABI physiotherapy rehabilitation**

A systematic search of the literature revealed an absence of research and information regarding the standard of physiotherapy record-keeping for ABI in inpatient settings. None of the 994 articles which were found in this study's literature search related to the documentation process for people with ABI. To the best of the researcher knowledge, there is no evidence about the current conditions of record keeping, the use of records or the content of records kept by physiotherapists for ABI patient in inpatient settings in the United Kingdom. The main researcher (PhD student) has found only two audit studies screening for the quality of records, but no reference to participants' knowledge of legal requirements (Phillips et al., 2006, Sumner et al., 2000). The researcher reviewed these audit studies to gain more information about the documentation process for ABI in inpatient settings.

In 1999, the Audit Commission conducted an audit study to examine the changes that had taken place in the organisation and effectiveness of medical records, and the structure and content of record-keeping in eight different hospitals in England and Wales (Audit Commission report, 1999). The researchers referred in their comparison to a previous audit study that they had conducted in 1995. In the original study (1995), the researchers reviewed 200 sets of medical notes and found differences in medical record structures between hospitals; in some medical records there was no structure at all (the original study could not been found). In 1999, the researchers found some improvements in medical record structures (see Figure 2-12 for full details of their results). Despite the considerable improvement in medical records over the four

years from 1995 to 1999, the researchers believed that the medical record area still had great potential for further development. The researchers found that there was still considerable variation between trusts in terms of their improvements to the structure and contents of patient records, and in some cases standards had become worse. According to the Audit Commission's report in 1999, 63 per cent of trusts in the UK were concerned about the quality of medical record contents. The result of this audit study pointed out the need for medical records to be improved and developed (Audit Commission report, 1999).

Figure 2-12: The Audit Commission's 1999 study results



(Audit Commission report, 1999)

Sumner, Mead & Hove (2000) conducted an audit study to assess conformity with the CSP standards at both individual and service levels. An audit and re-audit study was conducted of eight sites in the United Kingdom (Sumner et al., 2000). They report the results of an audit and re-audit, using a patient record audit, where the evidence for conformity should be found in the patient record. The first audit was conducted to assess a baseline level before the standards were distributed in 2000. The re-audit was carried out three months after the first audit to allow time for reflection and dissemination of the core standards. The researchers found that there was an important measurable improvement in the quality of patient medical records which could be directly attributed to the implementation of the CSP standards. Although the researchers concluded that the CSP standards provide robust guidelines for local use, to improve the quality and contribute to physiotherapy medical record-keeping, CSP standards do not provide enough details of what should be written in physiotherapy records, rather they offer general guidelines. Also, the researchers do not include full details of the data collection form and only present some examples of their results, which make it very difficult to know exactly what the researchers were evaluating.

The quality of medical records in the UK is highly variable across the NHS (Carpenter et al., 2007). It has been reported that the layout of medical records is very different between hospitals and clinical departments (Carpenter et al., 2007). The Clinical Standards Department of the Royal College of Physicians in London hosts the Health Informatics Unit (HIU) which aims to develop standards for recording and communicating information about patients and to structure medical records. The problems with the structure and content of medical records and record-keeping were reported by an audit study conducted by the Health Informatics Unit (HIU) in 2002. The study examined the completeness and specific features of individual entries in medical records. They reviewed 149 sets of case notes in five hospitals in England and Wales. The researchers found that: 35% had no problem list; 29% had pages without patient identification and/or name;

9% were not fully legible; 11% were undated; 10% were unsigned; and 83% of entries did not identify the clinician. They reported widespread inconsistencies in the content and structure of medical records. The researchers also examined inter-auditor variability and found that there were significant differences in the opinions of senior and junior staff. However, improving medical record structure and content is important and it has been reported that it has a potential to improve the quality of the health service (Pullen and Loudon, 2006).

Phillips, Stiller and Williams (2006) conducted a study to evaluate the standard of physiotherapy medical record documentation in Australia (Phillips et al., 2006). A total of 224 physiotherapy medical notes, within 100 randomly selected medical records for different patients' conditions, were reviewed using a special audit tool adapted from the RAH physiotherapy department's guidelines for documentation. The toolkit has five sections: basic requirements, mandatory requirements, minimal requirements, other items as appropriate and on-going or discharge entry requirements. The basic and mandatory requirements of the audit tool contain items that are considered compulsory for medical records in physiotherapy (Table 2-14 shows these items in detail). The remaining three sections of the toolkit contain items comprising some details about the patient's assessment and treatment, though such information is not compulsory according to the guidelines. However, this item may help the researcher to gain more information about what is considered important to report in medical records. It may also be considered and used as an interesting approach when evaluating or reviewing the physiotherapy inpatient documentation process.

Table 2-14: Components audit toolkit

Audit tool items	**Item components**		
Basic requirements	Legibility	Date of consultation	Time of consultation
	Professional discipline	Physiotherapist's signature	Printed surname
	Patient's name	Medical record number	
Minimal Requirements	After the first attendance	Whenever the patient's condition or PT treatment changes or weekly for long term patient	On noting any other factor which you thinks warrants documentation (e.g. missed injury, patient dissatisfaction, delay in routine progression of treatment
	On D/C or T/F to another PTs care	Physiotherapy written on Casemix Summary Sheet	
Mandatory requirements	Age	Reason for referral for physiotherapy	General appearance
	Conscious/ cognitive state	Physiotherapy related attachments	Baseline objective assessment
	Description of intervention	Plan for on-going intervention	
Other Items	Smoking history	Usual sputum production	Previous level of mobility
	Home community support/occupation	Pain level	Temperature
	Resent relevant medication	Resting position and activity	Mode of ventilation
	Breathing pattern	Auscultation	Cough
	Active/ active ass/ pass range ans access range/ muscle strength of affected limbs (inc face/neck)	Mobility	Neural assessment e.g. m tone, reflexes. Sensation.
	Vision	Response to sensation	Warnings
	Other information acc to specialist area.		
On-going or discharge entry	Details of how patient's conditions has changed as relevant to PT involvement	Updated treatment plan	Discharge plan as relevant

(Phillips et al., 2006)

The study found that more than an 80% completion rate was achieved for all the basic requirements except the time of consultation, which was only completed on 40% of the

physiotherapy medical records. Five out of the nine compulsory requirements were completed to 80% or more. However, the item which related to the patient's overall general appearance was the most poorly documented by physiotherapists. In general, researchers in previous studies found variations in the standard of physiotherapy record keeping in inpatient medical records. However, in conclusion, the researchers reported that the standard of physiotherapy inpatient medical records was found to be acceptable but with improvements required in a number of items, such as the time of consultation, patient's general appearance, objective assessment and range of motion, and the strength of affected and unaffected limb(s).

2.3.8. **What should the physiotherapy record contain?**

Organisations have spent a lot of time and effort to design record keeping templates which aim to standardise what information is necessary to be captured within a patient consultation to comply with legal, national and local guidelines. However, standardised record keeping for physiotherapy practice is still under consideration (Chartered Society of Physiotherapy, 2012). The Chartered Society of Physiotherapy has called on all physiotherapy staff, including researchers, to engage in standardising the documentation process in a single format to ensure it meets their needs in terms of the individual components required to capture relevant information (for clinical, research, management and audit reporting purposes). The Chartered Society of Physiotherapy has recently been involved in a discussion with the Royal College of Physicians' Health Informatics Unit to design and seek agreement on the content and structure of health records across all disciplines. However, common elements that are needed in record keeping across all disciplines, still need to be standardised (Chartered Society of Physiotherapy, 2012). According to the Chartered Society of Physiotherapy, the physiotherapist's opinion on what should be included in record keeping is very important and so physiotherapy staff may be called upon to comment on what to include in a

record keeping template, and how to ensure a professional approach is adhered to within the organisation's record keeping practice.

The British Society of Rehabilitation Medicine (2003), in their National Clinical Guidelines for Rehabilitation, state that the patient's documentation should integrate a minimum dataset, which should include a reliable and valid recording tool (British Society of Rehabilitation Medicine, 2003). Documenting the data from repeated or new assessment elements refers to assessment/re-evaluation documentation. According to the British Society of Rehabilitation Medicine (2003), it is employed to evaluate progress and to modify or redirect intervention. Documentation of the assessment component helps to update the patient's functional ability and/or disability status. Documentation of assessment can also be used for the interpretation of findings, revising the care plan, and/or setting goals. Standard 6 of the Core Standards of Physiotherapy Practice considers the evaluation of patient change during the physiotherapy service process by using published, standardised, valid, reliable and responsive outcome measures. The Standard has seven criteria, including: selecting the most appropriate outcome measure, ensuring that the patient accepts this outcome measure, ensuring that the physiotherapist has the necessary skills and experience to implement the outcome measure, considering the patient's welfare during administration of the measure, following the appropriate guidelines, recording the results of the measure, and the same measure being used at the end of or during the rehabilitation input (see Table 2-15 for more details) (Chartered Society of Physiotherapy, 2005).

Table 2-15: Standard 6 of the Core Standards of Physiotherapy Practice

	Criteria	Guidance
6.1	The physiotherapist selects an outcome measure that is most relevant to the patient's problems.	The physiotherapist should consider the aim of treatment i.e. management of deterioration or promotion of recovery. The outcome measure selected should capture information related to the aims of treatment.
6.2	The physiotherapist ensures the outcome measure is acceptable to the patient.	The outcome measure should be explained to the patient.
6.3	The physiotherapist selects an outcome measure that he/she has the necessary skill and experience to use, administer and interpret.	To maximise reliability the outcome measure must be administered by someone with the skills and experience to undertake the task.
6.4	The physiotherapist takes account of the patient's welfare during the administration of the measure.	How the score is interpreted and what the score means should be known and understood.
6.5	Written instructions in the manufacturer's manual, test designer's manual or service guidelines are followed during the administration and scoring of the measure if applicable.	This will ensure that outcome measures are available to demonstrate changes in status. Any change in score is reviewed against the aims of treatment.
6.6	The result of the measurement is recorded.	
6.7	The same measure is used at the end of the episode of care and at periods during the episode of care if applicable to the clinical setting.	

Physiotherapy intervention is often referred to as a "black box" of therapy (Pomeroy et al., 2001). Researchers and clinicians can characterise what goes into and comes out of the black box but little is known about what goes on inside the black box, mainly the intervention provided. The complexity, variability and multiplicity of the physiotherapy rehabilitation processes provided for this population and the lack and weaknesses of the written documentation have been reported as the key issues which lead to the difficulties in specifying the nature and content of physiotherapy services (Ballinger et al., 1999, DeJong et al., 2005, Horn et al., 2005). For a better understanding of the structure of medical records and content to describe the physiotherapy practice in inpatient settings, it was necessary to review the literature and try to describe and discuss what has been

reported about the physiotherapy intervention documentation process in an inpatient setting. The next section of the literature review will describe in detail the physiotherapy intervention documentation method in an inpatient setting.

2.3.9. **Physiotherapy Intervention documentation methods**

According to DeJong and his colleagues (2004), an enduring question in rehabilitation is whether, and to what extent, the interventions are effective and efficient (DeJong et al., 2004). The failure to identify and describe the physiotherapy practice limits the ability to evaluate the effectiveness of the physiotherapy service. Another factor which limits the development of the understanding of the physiotherapy provided to people with ABI is the lack of information in the literature about the nature of the physiotherapy practice and the lack of a system to define, describe and record the interventions made by the physiotherapists. The literature contains few studies which provide specific details of the physiotherapy activities used throughout the course of treating people with ABI, though the physiotherapy service is poorly described and evaluated in the literature (Putman and De Wit, 2009). The lack of written documentation leads to more difficulties in specifying the nature and content of the physiotherapy service (Ballinger et al., 1999, DeJong et al., 2005, Horn et al., 2005). All aforementioned factors make it uncertain which aspects of physiotherapy are the most effective and/or efficient (Kwakkel et al., 1997, Putman and De Wit, 2009, Tyson and Selley, 2006).

Most published articles that investigate the documentation of interventions are too general and do not provide a clear understanding of what activities physiotherapists use with their patients and do not allow other researchers or clinicians to replicate those interventions in their studies or clinics(Dreiling and Bundy, 2003, Steultjens et al., 2005). There are some studies where the intervention process is described but these have usually focused on specific performance skills or

addressed specific disabilities (Case-Smith, 2000). It is important to note that there is no consistency in the terminology used in studies and that each study is unique in the way in which it describes the intervention process, which makes it very difficult to compare studies (Steultjens et al., 2005).

Despite the importance of documenting the physiotherapy rehabilitation process and the fact that all documented information about the physiotherapy service should be accurate, valid and updated, little has been published on the evaluation of the overall standard of medical record documentation kept by physiotherapists (Phillips et al., 2006). Physiotherapists often view documentation negatively, due to the time it involves and the little training they have received in documentation methods (Quinn and Gordon, 2010). The traditional paper-based recording method is the most common and well-known way of documenting the physiotherapy process in most inpatient rehabilitation services in the UK. It has been reported that paper-based documentation has many drawbacks, such as missing records, illegible handwriting, bulkiness and slowness in information retrieval which overshadow its usefulness (Phillips et al., 2006). A few studies have reported that information documented on paper is sometimes not as precise as might be expected, or that therapists often forget to document some necessary elements of information, such as times, dates, treatment locations and/or duration and intensity. Such missing information might affect the quality of future physiotherapy services (Pourasghar et al., 2008). Several studies have evaluated paper-based documentation methods from different points of view, and most of these studies have found quality problems of various kinds (Murphy et al., 2001). Modern medical documentation is one of the most important and promising methods to document the physiotherapy rehabilitation process and to overcome the limitations of paper-based documentation. The treatment schedule is one of the methods which has been developed and used to document treatment within the health profession (Whiddett et al., 2006).

The treatment schedule is a tool which describes the rehabilitation treatment in sufficient detail so that the content can be used for clinical and/or research purposes. It helps in standardising the method used to document physiotherapy rehabilitation interventions so that any study can be replicated. It enables the researcher to investigate the current physiotherapy treatment methods used in clinical practice and includes the range of interventions needed to individualise a patient's treatment. Developing a treatment schedule is a crucial step in being able to evaluate complex interventions such as ABI rehabilitation (Whiddett et al., 2006).

Some researchers emphasise the need for a robust method to document the physiotherapy activities provided for people with ABI. Improving the documentation process will bring systemisation, greater clarity and more precision to describing and quantifying what happens in the rehabilitation process, and thus serve to test the effectiveness and efficiency of the service (DeJong et al., 2004). Proper documentation will bring order and rigour to the description of physiotherapy interventions and help to characterise physiotherapy treatments, procedures and interventions, taking into account their multidimensionality with respect to content, purpose, intensity, duration, sequence, frequency and other characteristics of care provided (DeJong et al., 2004). It has also a potential to improve patient care by facilitating accurate and appropriate communication between physiotherapists and between physiotherapists and other specialists. However, it has been reported that the lack of documented detailed characteristics of physiotherapy interventions leads to difficulties in defining the content of physiotherapy practice (De Wit et al., 2006, Pomeroy and Tallis, 2000).

The literature reports two main approaches to developing a documentation method in an inpatient setting: deductive and inductive (DeJong et al., 2004). The deductive approach is a theory-driven, top-down method led by scientific evidence and expert opinion. The process involves assembling a group of experts to define a list of interventions within their scope of practice. The main

disadvantage of this method is that little attention is paid to whether their selections correspond to the real practice of rehabilitation (DeJong et al., 2004). Another limitation of this method is that the theory may overlook important behaviours and distinctions that may not fit the theory. The second method is an experience-driven, bottom-up, inductive approach led by practitioner's opinions and scientific evidence. This approach is based on what clinicians do in a clinical setting. Information is gathered from clinicians to identify what they actually do in their practice and then the interventions are categorised using a common language. A possible limitation of the inductive approach is that clinicians may not see how disparate interventions fit together. Thus, the approach needs to incorporate theory at some level (DeJong et al., 2004).

A treatment schedule is one of the methods which has been developed and used recently to improve the treatment documentation method in the health profession (Donaldson et al., 2009). Several studies (DeJong et al., 2005, Hunter et al., 2006, Donaldson et al., 2009) have been conducted to develop treatment schedules to document the physiotherapy activity administered to treat patients with neurological conditions. Edwards, Partridge and Mee (1990) were the first researchers to publish a study which presented a methodology for the development of a treatment schedule to enhance the documentation of physiotherapy interventions in clinical practice (Edwards et al., 1990). Researchers have developed a treatment schedule to provide a range of techniques which reflect the physiotherapy clinical practice so that physiotherapists can use their clinical judgement in treatment situations. The researcher has developed two schedules to examine the effectiveness of two treatment techniques: the Bobath Approach and Cryotherapy. The process of developing the treatment schedule passed through six different stages, starting with a literature review and discussions with experienced clinicians. Based on these two initial steps, a draft treatment schedule was developed and tested in clinics. More consultation with experienced clinicians occurred before developing the final treatment schedule. However, the developed treatment schedule was designed to be used with patients with shoulder pain only.

Mickelborough et al. (1997) developed a treatment schedule to standardise and clearly document the interventions used by physiotherapists for gait retraining in patients with cerebral multiple infarct or similar neurological conditions. The developed treatment schedule modules were divided into three main parts, including physiotherapeutic interventions to treat gait initiation and turning difficulties, interventions to improve postural alignment and enhance balance reactions, and finally interventions aimed at the components of higher-level gait disorder (HLGD) not specifically addressed in modules 1 or 2 (see table 2-16)

According to Mickelborough et al. (1997), the developed treatment schedule was comprehensive, with a total of 31 possible interventions. The first step in completing Mickelborough et al's (1997) treatment schedule is to undertake an assessment of gait problems to determine any walking difficulties and what the patient can do. Appropriate outcome measures suitable for clinical use are also documented in the treatment schedule. The amount of support or facilitation required to perform each intervention as well as the starting position are all requested to be reported in the treatment schedule. Details of all the interventions reported in the treatment schedule are shown in table 2-16. The method used to design the treatment recording tool was based on reviewing and identifying all the intervention techniques used in clinical practice to treat people with Parkinson's disease and people after stroke.

Table 2-16: All interventions reported in Mickelborough et al's (1997) treatment schedule

Module	Intervention	
Gait Ignition/ Turning		Standing: transferring weight sideways over each foot in turn.
		Standing: stepping over.
		Standing: walking towards visual cue above eye level.
		Standing: walks up and down stairs.
		Stride standing (weight transfers).
Alignment and Balance	Balance reactions	Sitting: with the trunk unsupported, the patient reaches out with one hand at a time to touch the therapist's hand.
		Standing: perturbation of balance by the therapist exerting a push at the sternum or shoulder.
		Standing: reaching out with alternating hands
		Standing: with an erect body, the patient transfers weight forwards, backwards and side to side
	Postural alignment and pelvic control	Back lean standing: the patient moves the head and shoulders forward and then moves the pelvis backward and controls the movement.
		Standing: the patient stands on alternate legs.
		Standing: rhythmic stepping using alternate feet onto a 3" high step.
		Sitting: patient attains good alignment prior to standing.
		Standing: the patient initiates sitting down.
		Sitting: the patient leans forward, sliding the hands down the shins towards the feet and returns upright
		Crook lying: unilateral bridging.
		Crook lying: abduction and lateral rotation of the right leg, returning to midline with the left leg still and vice versa
		Sitting. anterior, posterior and lateral pelvic tilting
		Sitting: patient moves weight onto left but tock, crossing right leg over left leg and vice versa
	Trunk mobility	Sitting the arms of the patient are flexed so that their hands rest on their own shoulders, turn to look over left shoulder without moving base and then repeat to right side.
		Standing same as above but patient's hands rest on their own pelvis
Other Elements	Slowness of walking and shortening of stride length	Standing: step backwards and then forwards gradually increasing the length of the step.
		Stride standing: transferring body weight forwards and backwards.
		Stride standing: standing with a wedge underneath the leading foot, weight is transferred forwards and backwards keeping the trunk erect.
		Stride standing: standing with narrow end of wedge underneath the heel of the back foot, practicing push-off, to transfer weight to the leading leg.
	En-bloc turning	Standing: cross sideways stepping where the right foot moves in front and across the left leg. Then weight transfers to the right leg as the left foot moves sideways to regain starting position. Repeat in opposite direction
	Tendency to fall backwards	Standing The patient faces a wall an arm's length away, then transfers weight forwards until the heels lift from the floor.
		Standing: a rolled-up towel is placed underneath the patient's forefeet. The patient is then lean forward.
	Shuffling gait and inadequate heel strike	Either sitting or standing the patient alternately lifts one forefoot off the ground, keeping the heel on the floor.
	Inadequate foot clearance	Standing: the patient walks on the spot aiming 90' of hip and knee flexion.
		Walking: the patient practises walking for to obtain wards, backwards and sideways.

In 1999, Ballinger et al. conducted a study to design a tool for recording interventions provided by physiotherapists and occupational therapists for people with stroke. In all, 89 patients with stroke were recruited for the study (Ballinger et al., 1999). Physiotherapists and occupational therapists were involved in designing treatment codes. Details about the process of developing the treatment codes have not been reported. The 14 physiotherapy codes are shown in Table 2-17. The tool was used to record the physiotherapists' and occupational therapists' activities over a two-week period; 10 sheets of data collection forms were sent to the therapists along with brief instructions for completion of the form and definitions. Therapists were asked to complete one sheet every day and each sheet was broken down into 15-minute periods. Therapists were asked to allocate one code to each period of 15 minutes' face-to-face contact with the patient. The researchers found the developed data collection tool was very simple and practical to use. They also admired the complexity of both the intervention provided and the condition. They concluded that stroke rehabilitation varies according to the setting and cannot be described in terms of the duration of treatment, and the data collection tool alone does not reflect the process and complexity of rehabilitation. Ballinger et al. (1999) with their method recorded only one physiotherapy and/or occupational therapy activity every 15 minutes. In reality, the physiotherapist and patients might be working on more than one intervention in this time (Ballinger et al., 1999). Although therapists were asked to record the main primary activity, it may still not be adequate as it is limited in the depth and accuracy of the information collected. The method of developing the recording intervention tool did not include validity and reliability testing. Another limitation was that the developed tool does not record the process of the treatment, such as problem-solving, clinical reasoning or decision-making. The researchers suggested that in a future study, further reliability testing and refinement of the recording tool would be necessary. They believed that the use of qualitative methods such as semi-structured

interviews or observations to explore and understand physiotherapy and occupational therapy interventions, to develop a recording intervention tool, was desirable.

Table 2-17: Physiotherapy codes in Ballinger et al.'s (1999) study

Code	Physiotherapy activity
1	Positioning/passive movements, i.e. for normalizing position and range of movement.
2	Bed mobility, e.g. bridging and rolling.
3	Sitting balance, i.e. static and dynamic.
4	Standing balance, i.e. static and dynamic.
5	Sit to stand/transfers, i.e. practising skill.
6	Walking, i.e. all aspects of skill acquisition.
7	Stairs, i.e. patient practice.
8	Control of pain, e.g. handling, ultrasound.
9	Movement patterns of upper limb, i.e. relearning movement.
10	Movement patterns of lower limb, i.e. relearning movement.
11	Aids and equipment, e.g. walking aids, wheelchair use.
12	Education of carer.
13	Home visit.
14	Other.

(Ballinger et al., 1999)

In 2000, Wittwer and his colleagues conducted a study aiming to investigate how accurately physiotherapists record treatment time (Wittwer et al., 2000). The researchers had a long-term aim to provide descriptive data about the activities undertaken in physiotherapy practice. Twenty-six physiotherapists from four different rehabilitation hospitals in Melbourne, Australia were recruited for this study. The researchers developed a treatment recording form for data collection. Two expert physiotherapists, each with at least five years' experience in stroke rehabilitation, were involved in the process of developing the treatment recording tool. There are no specific details provided of how they developed the treatment record form in the study. Physiotherapists were asked to keep daily records of the time, in minutes, for each of the following activities: upper limb, bed mobility, sitting, sit to stand, standing, early gait and advance gait. Instructions

on how to use the treatment record form were sent to all physiotherapists. To obtain measurements of real time against what each physiotherapist recorded using the treatment record tool, the researchers videotaped the treatment sessions. This method provided a permanent accurate record of treatment times. The two expert physiotherapists who developed the treatment record form used the video-recordings to report the criteria to measure treatment time and this time was used as the standard against what the physiotherapists reported on the treatment record forms. The researchers found that human error in recording treatment activity is a very important factor which affect the quality of the documentation process. The complexity of the treatment sessions and the difficulties in precisely reporting the time spent on each activity both increased the rate of human error. Although the researchers reported the possibility of reducing human error by asking the clinicians to record times immediately after the treatment sessions, it might be still unrealistic in real clinical situations when time data are likely to be recorded at the end of the day, or even later still, and recalling information at this time will be difficult. The researchers also mentioned the effect of the design of the treatment form on data recording errors, as clinicians may have accurately recorded the time spent on activities but used the wrong category. Although the categories were defined, experience with the form revealed that further clarification for some categories may be needed. To take an example, clearer justification was required to distinguish early and advanced gait activities. Another potential problem in the developed treatment record is that the selected categories were not mutually exclusive. For example, a therapist could combine two or more treatment tasks and so, for example, confusion may occur when an upper-limb activity is performed in a standing position. A more robust and validated method to record physiotherapy activity was recommended by the researchers. Bagley et al. (2009) also used the video recording method to assess and compare two methods of describing and reporting the duration of the physiotherapy provided for stroke patients (Bagley et al., 2009). Thirty-nine patients who were receiving physiotherapy input in Bradford Stroke Unit were recruited in this

study. At the end of each physiotherapy session the physiotherapists were asked to record the actual start and end times using a treatment recording book (treatment log). In addition, a video recording of one treatment session for each patient was made by a physiotherapy assistant. The researcher physiotherapist used the video recorded to report the duration of the physiotherapy interventions and the times were rounded to the nearest minute. Intra-class correlation coefficients and the Bland and Altman plot were used to measure the relative and absolute reliability (ICC = 0.50 (95% confidence interval (CI) 0.12 to 0.73). The researcher found that the agreement between the records of the physiotherapy treatments' duration reported by physiotherapists in the treatment log and video record was poor and there was an overestimation of the physiotherapy treatment duration reported in the treatment log compared to that reported in the video recording. Although it has been acknowledged that the presence of the video camera may affect the patient and physiotherapists' behaviour, the researcher believes that the video records may provide an improved method to describe and quantify the physiotherapy under investigation.

Van Vliet et al. (2001) published a study to identify similarities and differences between a movement science-based (MSB) approach and a Bobath-based (BB) approach to treating patients with stroke. To meet their research aim, the researchers developed a treatment schedule to categorise and describe the interventions provided during treatment sessions. The process of developing a treatment schedule started with videotaping three 20-minute treatments for each of the two approaches. Four expert therapists observed the videotapes and independently wrote down categories of intervention provided to patients. The therapists then discussed and agreed on the wording of the treatment schedule categories. The treatment schedule categories were then divided into two main areas: physical and communication (see table 2-18 for all the categories included in the treatment schedule).

The inter- and intra-rater reliability of the developed treatment schedule was evaluated by two psychologists who received 11 hours of training from the first author to familiarise them with the categories. The two observers simultaneously watched two previously unseen videotaped treatment sessions and recorded the treatment provided to the patients using the developed treatment schedule. One observer watched the same videotape a week later to assess intra-rater reliability. The results for both inter- and intra-rater reliability of the observation method were acceptable.

Van Vliet et al.'s (2001) tool was however developed based on the experiences of a small number of physiotherapists and specifically designed to describe the movement science-based (MSB) and Bobath-based (BB) treatment approaches. The categories might therefore need to be altered to investigate other treatment approaches or other patients with different conditions.

Table 2-18: Van Vliet et al's (2001) treatment schedule categories

Category		List	
Physical observation categories	Transfer	Independent	Pivot transfer
		Stand by help	Stand and step
	Activity	Rolling to side	
		Side lying to sitting Leg activities in lying Bridging	
		Sitting activities	Manipulation
		Sit to stand Standing activities	Arm activities in supine
		Stepping/walking	Arm activities in side lying
		Reaching	Arm movements in sitting
		Other arm activities	
	Patient position	Supine Long sitting	Sitting unsupported
		Side lying	Prone Standing supported
		Sitting supported	Standing unsupported
	Assistance given by therapist	None	Facilitation
		Stand by help	Moving
	Movement by the patient	Independent	Passive
		Assisted	
	Body part moved	Foot/ankle	Shoulder/upper arm/elbow
		Leg/knee/thigh	Forearm/wrist
		Hip	Hand
		Pelvis	Fingers
		Trunk	Thumb
		Neck/head	Whole body
	Specific strategies	Quick stretch	Very quick stretch
		Sustained stretch	Joint mobilizations
		Demonstration (hands off)	Skin stimulation
		Physical demonstration(hands-on)	Massage
		Weight bearing through affected arm Trunk mobilizations	
	Measurement	Visual observation	Quantitative measurement
		Quantified but based on subjective judgment	
	Practice		
Communication observation categories	Therapist	Communication of goal	Question
		Instruction	Explanation
		Feedback on performance	Social conversation
	Patient	Question	Comment on own performance
		Feedback on performance	Social conversation

In 2001, Lennon developed a checklist to allow the physiotherapist to document the content of a treatment session which aimed to re-educate normal movement during functional activities based on the Bobath concept (Lennon, 2001). The checklist was derived from the literature, clinical experience and interviews with three experienced Bobath therapists. Thirty-five treatment techniques or activities were identified and are shown in table 2-19.

Table 2-19: Treatment checklist developed by Lennon (2001)

Category	Techniques/activities
Preparation	1. Circular trunk mobilizations 2. Shoulder girdle mobilizations 3. Inhibitory mobilizations of any specific muscle (see definition above)
Facilitated movements	**Proximal** 4. Weight transfer to unaffected side (sitting) 5. Weight transfer to affected side (sitting) 6. Anterior/posterior pelvic tilt (sitting) 7. Lateral pelvic tilt (sitting) 8. Moving the trunk over the affected arm with weight bearing on the arm (sitting) 9. Reaching to the unaffected side (sitting/standing) 10. Weight transfer in stride standing (standing) 11. Prone standing (in standing, the patient's upper body is supported on a treatment bed placed at waist height in front) 12. Weight transfer in step position (standing) 13. Anterior/posterior pelvic tilt (standing) 14. Reaching to the unaffected side (standing) 15. Reaching across the body with the unaffected limb to the affected side (standing) 16. Knee flexion/extension with unaffected foot on a step (standing) 17. Bridging (supine) 18. Holding different positions with the affected lower limb supine 19. Selective movement of the hip (supine/side lying) (basic movement patterns of the hip; this refers to the ability to move the hip independently from the knee or foot) **Distal (leg)** 20. Selective movement of the knee (supine) 21. Selective movement of the foot (supine) 22. Placing the lower limb (supine) (the response of the lower limb to being moved by the therapist) **The arm** 23. Selective movement of the upper limb (supine) 24. Reaching to the affected side with the affected upper limb (sitting/standing) 25. Holding the upper limb (supine) 26. Placing the upper limb (supine) (the response of the upper limb to being moved by the therapist)
Gait-specific activities	27. Stepping with the unaffected lower limb forward 28. Stepping with the unaffected lower limb backward 29. Stepping with the unaffected lower limb sideways
	30. Stepping with the unaffected lower limb on and off a step Swing phase re-education 31. Stepping with the affected lower limb Walking 32. Walking around a plinth (side stepping or using the treatment bed for support on the unaffected side) 33. Walking
Functional activities	34. Standing up from sitting 35. Stair climbing

Wottrich et al. (2004) tried to explore, describe and compare the characteristics of physiotherapy sessions with stroke patients from physiotherapist and patient perspectives (Wottrich et al., 2004). The researchers interviewed ten physiotherapists and nine patients from different rehabilitation centres in the Stockholm area, Sweden. Physiotherapists and patients were interviewed separately not later than three days after their treatment sessions. Each interview lasted 20 to 30 minutes. Table 2-20 gives more details about the general domains of the semi-structured interviews.

Table 2-20: Interview Guide

- The rehabilitation process and physiotherapy in general and in the present case - The structure and content of the physiotherapy session - The patient's and physiotherapist's role in the session/s - Problems and possibilities with physiotherapy - Problematic and rewarding situations - Goal-setting - Knowledge of rehabilitation and physiotherapy - Other important aspects of rehabilitation and physiotherapy

The researchers identified six characteristics of a physiotherapy session including: (1) setting and attaining goals, (2) focusing on motor activity, (3) finding the optimal training strategy, (4) facilitating active patient involvement, (5) making use of environmental factors, and (6) adjusting to the structural reorganisation of the rehabilitation service. However, the numbers of treatment sessions observed and physiotherapists and patients interviewed in this study are not big enough to generalise the findings and it would be very difficult to use the same method to collect more information about the service from a wider range of physiotherapists and clinical practice.

A study by Bode et al. (2004) provides the most comprehensive assessment of the patterns of rehabilitation activities during inpatient stroke rehabilitation (Bode et al., 2004). A multicentre study examined the rehabilitation outcomes in two rehabilitation settings: acute and sub-acute facilities in the United States. A group of experienced therapists from the major clinical disciplines that provide care for people with stroke, spinal cord injury and traumatic brain injury in inpatient rehabilitation settings worked together to identify, review and approve a list of rehabilitation goals, therapy activities and interventions. The researchers used the Delphi process to reach a consensus on appropriate goals, activities and barriers. The researchers identified 25 therapy activities used by occupational and physical therapists (Bode et al., 2004) (see Table 2-21 for more details). However, this study only reported activities classified into two general categories, function or impairment activities, and did not examine how specific physiotherapy treatments change over time during the course of stroke rehabilitation or according to patients'

functional status. Without such information it is difficult to know whether current practice follows the treatment approaches described in the literature (Jette et al., 2005).

Table 2-21: Classification of physiotherapy activities into categories

Activity category	Physiotherapy activity
Evaluation	Initial evaluation and screening
Function	Bed/chair/WC transfer
	Tub/shower transfer
	Toilet transfer
	WC to floor transfer
	Car transfer
	Walking
	Power WC propulsion
	Manual WC propulsion
	Stair climbing
Impairment	Address positioning needs
	Casting/splinting
	Balance training
	Strengthening
	Range of motion
	Path finding and orientation
	Orthotics
Discharge planning	Patient/caregiver education
	Home visits
	Team/family conferences
Case management	Documentation
	Consultation with team members
	Work with third-party payers

Tyson and Selley, (2004) developed a Stroke Physiotherapy Intervention Recording Tool (SPIRIT) (Tyson and Selley, 2004). It is a checklist of interventions designed to be used by physiotherapists to record their treatment of postural control problems (sitting balance, standing balance or stepping/walking) post-stroke. Interventions were divided into eight categories (see Table 2-22). The researchers developed a draft of the recording tool using a 6-step method involving a literature search and discussions with experienced clinicians. These two steps were

used to produce a draft of the treatment record tool. The developed treatment recording tool was then used to record patient treatment and was followed by consultations with participating clinicians. Based on the clinicians' feedback the final draft was refined for use to describe the content of physiotherapy interventions.

Thirty-five physiotherapists used SPIRIT to record their treatment of 120 patients in 590 treatment sessions as a process to pilot SPIRIT and establish whether it included all the interventions physiotherapists use to treat balance and gait problems post-stroke. A cross sectional survey was used to collect the feedback from physiotherapists who used SPIRIT to record the interventions used in the physiotherapy treatment sessions for 5 days (or 5 treatment sessions) per patient. The piloting also included an investigation of whether SPIRIT uses descriptions and categorisations that reflect clinical practice, is suitable for all grades of therapists, and is feasible for the day-to-day recording of therapy practice. Although the process which was used to design and develop the SPIRIT tool was robust, the SPIRIT recording tool was specially designed to be used primarily for a postural control or mobility problem (defined as limited sitting balance, standing balance or walking) only. However, generalising the use of SPIRIT to other neurological conditions should be considered with caution, since the rehabilitation plan differs from one condition to another and the tool's validity and reliability were not tested in stroke or any neurological condition. The method used to develop the SPIRIT can be used as a model to develop recording tools for other aspects of rehabilitation and/or for physiotherapy with other conditions, such as ABI. However, a more comprehensive treatment recording tool which covers all treatment tasks and positions is still needed. The positive feedback from physiotherapists who participated on the piloting process of SPIRIT was that the treatment recording tool was a quick and easy method of documentation. It was a useful method for junior staff as it provides an aid to individual patient problem-solving and treatment planning, and for senior staff, for keeping an explicit track of where therapy time was being spent. This

indicates that a treatment recording tool is a promising method of developing a documentation process to be used by physiotherapists in an inpatient setting.

Table 2-22: categories in the final version of SPIRIT and examples of content

Category	Example interventions in each category
Preparation for treatment	Trunk mobilizations
	Muscle or joint mobilization
Facilitated movements	Weight transfer in sitting & standing,
	Weight bearing through the affected arm
	Pelvic tilt in sitting & standing
	Reaching
	Stepping
	Selective movements of arm and leg
Balance activities	Reaching in sitting and standing
	Stepping in different standing positions
Walking activities	Walking with and without aids
	Walking with and without assistance
	Walking over and around obstacles
	Treadmill training
Practising functional activities	Bed mobility
	Transfers
	Stairs
	Walking in different environments
	Wheelchair skills
Organizing patient activities for independent practice	Exercises
	Bed mobility
	Transfers
	Walking
Teaching health care professionals or carers to do or assist	Positioning
	Stretching
	Stretching
	Bed mobility
	Transfers
	Walking
	Wheelchair
Equipment provision or training	AFOs
	Splints
	Transfer equipment
	Wheelchairs

(Tyson and Selley, 2004)

In a study conducted by Tyson et al. (2008) to describe the content of stroke physiotherapy in an acute setting in the UK, thirty-six physiotherapists working in 16 hospitals in Great Manchester, Nottingham, Bristol, Wales and Northern Ireland used SPIRIT to record 364 treatment sessions for 76 patients. However, the study only focused on the treatment of postural control and/or mobility (Tyson et al., 2008). Using SPIRIT helped the researcher to describe the postural control and mobility physiotherapy activities provided for people with stroke in an acute stage. Tyson et al (2008) found that physiotherapists in the UK use therapist-led hands-on facilitation techniques to treat postural control and mobility problems in the acute stage of stroke rehabilitation. It can be concluded that the SPIRIT is a powerful tool to describe the postural control and mobility treatment activities used by physiotherapists to treat stoke patients in the acute stage.

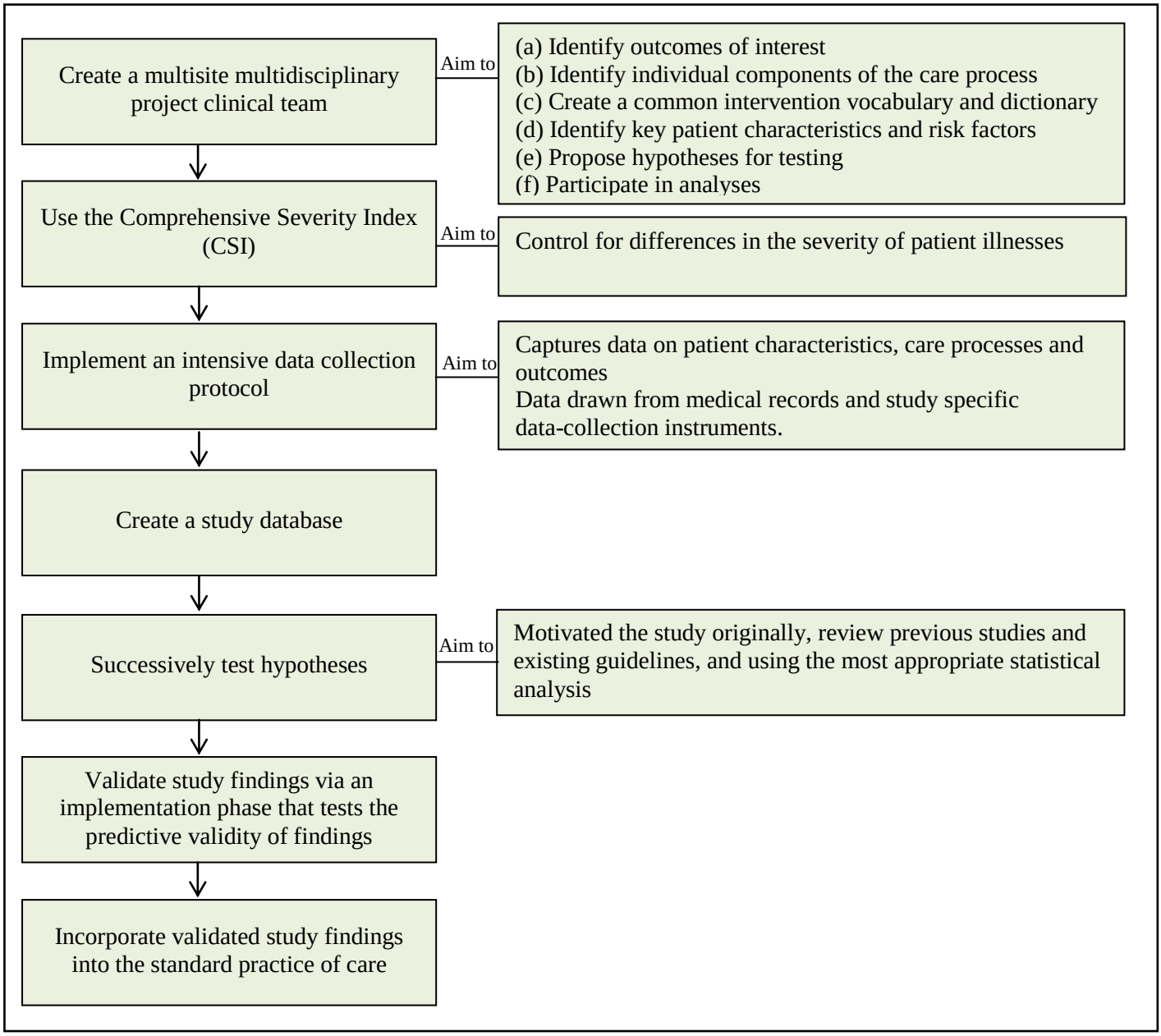
In 2009, Tyson, Connell, Lenon and Busse conducted a study to identify the treatment package (combination of interventions) used by physiotherapists to treat postural control and mobility problems in stroke patients (Tyson et al., 2009). Seventy-four physiotherapists from thirty-four hospitals were asked to use SPIRIT to record the postural control and mobility activities used to treat 251 patients with stroke in the UK. Tyson and her colleagues (2009) used a unique geometric coding process to identify treatment packages used to treat postural control and mobility problems for patients with stroke using the SPIRIT tool (Tyson et al., 2009). Each treatment activity was assigned a unique code from numbers in the sequence: a (n) = 2^n (1, 2, 4, 8, 16, 32, 64, 128…). The geometric progression was a sum-free sequence which means that the summated number can only come from one combination of numbers that are added together to produce that number. The findings of this study support the results of Tyson et al.'s (2008) study. The researchers concluded that physiotherapists most often focus on walking and basic mobility activities, such as sit to stand and balance exercises. Two treatment packages were identified in this study. It was found that a facilitation technique was always combined with mobilisation. The second package of treatments involved the facilitation and practice of whole activities combined

with activity components. The interventions less used were independent practice, exercise and the use of equipment. They concluded that any physiotherapy provided for stroke patients to treat postural control and/or mobility should include facilitation, practice and mobilisation interventions (Tyson et al., 2009).

Gassaway et al. (2005) carried out a multicentre study to describe the treatment activities provided by physiotherapy for post-stroke patients (Gassaway et al., 2005). The post-stroke rehabilitation outcomes project (PSROP) is a large, multicentre stroke rehabilitation study carried out in collaboration with seven hospital-based rehabilitation centres (six in the United States and one in New Zealand). The study aimed to provide an in-depth view of the rehabilitation practices in inpatient settings (DeJong et al., 2005). Researchers in this study developed a taxonomy of stroke rehabilitation activities and interventions in order to carry out and characterise the black box of stroke rehabilitation. The taxonomy used a common vocabulary and uniform methods of documenting stroke rehabilitation activities and interventions. The treatment documentation tool is intended specifically for use with a stroke population. Specialty teams met via teleconferences to conceptualise and create discipline-specific intervention documentation forms to record activities and interventions used in stroke rehabilitation. Researchers and clinicians spent three months piloting the recording tool. Clinicians who worked on form development used the form during patient treatment sessions and asked for impact assessments and feedback from clinician colleagues. Weekly teleconferences were conducted to discuss the findings and agree to add to, edit or delete items from the form. However, the researchers did not test the reliability and validity of the developed taxonomy and they admitted that they were not presenting their taxonomy as a definitive recording tool for stroke rehabilitation but believed that it might provide useful insights into how future and more formal stroke rehabilitation taxonomies could be developed.

In the PSROP study, the researchers used a new type of research methodology known as clinical practice improvement (CPI) (Gassaway et al., 2005). A CPI study is an observational cohort study that advocates the collection of prospective and retrospective data, while not disrupting the natural environment where treatment is provided (Gassaway et al., 2005). It allows researchers to investigate what actually happens in the rehabilitation process and to capture in-depth comprehensive information about rehabilitation processes, patient characteristics and rehabilitation outcomes (the CPI process is described in Figure 2-13).

Figure 2-13: clinical practice improvement process



Although this observation method is similar to most other observational methodologies in its inclusion of generally defined groups of patients and in its use of multivariate statistical analyses to separate the effects of treatment from other pertinent factors, Jette et al. (2005) reports that the CPI methodology differs from other observational methodologies in its active collaboration between therapists in the whole research process, from the planning and development of data collection instruments to the actual data collection, data analysis and reporting of findings (Jette et al., 2005). The success of PSROP depends on the active involvement of therapists, at each

participating site, who contributed to the development of the taxonomy used to characterise rehabilitation activities and all other parts of the research process (Jette et al., 2005).

The researchers of PSROP address a critically important question faced in most areas of rehabilitation: what is the measurable impact of rehabilitation intervention or activities? The PSROP research team have used the developed treatment recording tool for many purposes such as to describe how physiotherapy activities in inpatient rehabilitation vary by admission walking ability and over time (Jette et al., 2005). Jette et al. (2005) conducted a study to describe activities associated with mobility outcomes in post-stroke patients (Jette et al., 2005). Researchers used the physiotherapy intervention documentation form which was developed for the PSROP and included a taxonomy of information such as targeted activity areas. Interventions used by the clinician within each activity, and the duration of each activity were measured in 5-minute increments. The researchers concluded that the PSROP provides among the largest and most detailed explorations of PT in stroke rehabilitation. Overall, this study found that physiotherapists are focusing their treatment on the task of gait and patients in post- stroke rehabilitation are receiving therapy that is generally consistent with a task-based training approach. However, based on the collected data, the researchers reported that a small percentage of treatment time is spent on advanced mobility activities, and most patients do not practice walking in the community during their hospital admission before they are discharged home.

There is great pressure on rehabilitation providers to demonstrate the effectiveness of the treatment provided. Although the PSROP project is among the largest and most detailed explorations of physiotherapy in stroke rehabilitation and the developed treatment schedule facilitates a precise understanding of specific physiotherapy activities, the treatment schedule was designed to be used with the stroke population and validated to be used in the US, where they use different terminology and rehabilitation practice compared to the United Kingdom. In both

countries, the patient would follow a similar rehabilitation pathway but the treatments provided and treatment plans are different (Jette et al., 2005, Tyson et al., 2009).

Pomeroy et al. (2005) conducted a study which aimed to develop a treatment schedule of intervention to be used by physiotherapists to document the treatment provided to stroke patients to improve the movement control and functional activity of the lower limbs. Ten physiotherapists were interviewed to identify what physiotherapy intervention participants were given to stroke patients in an inpatient setting. All the recruited physiotherapists were then invited to join a focus group to discuss the list of interventions which were generated by the interviews. Participants were asked to comment on the list and/or add any interventions that they thought should be included. Subsequent to the focus group, the researchers designed a draft of the treatment schedule which was piloted by the same physiotherapists who completed it after each treatment session provided to their patients for two weeks. Pomeroy et al.'s (2005) treatment schedule is a treatment recording form printed on an A4 sheet which enables the physiotherapist to record details of the treatment provided to the patient by ticking appropriate boxes. The treatment schedule provides information about the duration of the treatment session, the number of physiotherapists/physiotherapy assistants providing the treatment, the aim of the treatment, the treatment position, the adjuncts the physiotherapist uses during the treatment and the specific physiotherapy treatment provided to the patient. Pomeroy et al. (2005) believe that the treatment schedule developed represents one step towards providing an explicit description of the content of the physiotherapy provided to stroke patients in clinical practice.

Hunter et al. (2006) developed a treatment schedule to allow a written description of the mobilisation and appropriate tactile stimulation treatment provided to help the recovery of paretic upper limbs after stroke. The researchers emphasised the importance of developing a treatment schedule to enable physiotherapists to describe their interventions. According to Hunter et al.

(2006), a treatment schedule helps the researcher to replicate a research study by enabling sufficient standardisation of physiotherapy interventions and allowing physiotherapists to describe the treatment provided in sufficient detail so that the research results can be used in clinical practice (Hunter et al., 2006).

To develop a treatment schedule, Hunter and her colleagues (2006) systematically reviewed the literature to identify the most appropriate research designs which had been used to develop a description of physiotherapy practice. The researchers used a three-stage process to develop their treatment schedule, which included the stage of generating a treatment list from clinical experience and the literature, then refining the list into a treatment schedule, and finally piloting the treatment schedule in practice.

Seven experienced physiotherapists were interviewed by the main researcher to identify all the interventions and techniques involved in the mobilisation and appropriate tactile stimulation treatments provided for people with stroke. The treatment doses and treatment aims were also reported. All interviews were audio recorded and transcribed. A preliminary list of intervention techniques, doses and clinical problems was created and sent to all participants. Each participant was asked independently to consider the content of the list. All participants were then invited to attend a focus group (n=6) to clarify and agree wording that described the treatment provided. A final version of the list was agreed and a draft of the treatment schedule was produced.

The draft treatment schedule was then sent to all participants, who were asked to complete the treatment schedule every time they used MTS during a two-week period. Each participant (n=5) was asked to give verbal feedback, and appropriate changes were made to the original draft of the treatment schedule before producing an updated draft which was again sent to all participants for final comments before the final treatment schedule was created (see table 2.23).

Table 2-23: Mobilisation and appropriate tactile stimulation treatment activities reported in Hunter et al.'s (2006) treatment schedule

Passive movement through anatomical range - Radio-ulnar pronation/supination - Wrist flexion/extension - Wrist radio-ulnar deviation - Thumb MCPJ flexion/extension - Thumb IPJ flexion/extension - Thumb abduction/adduction - Thumb opposition - Finger MCPJ flexion/extension - Finger IPJ flexion/extension - Finger abduction/adduction
Accessory movement (indicate type, e.g. glide, distraction and direction, e.g. AP, PA etc.) - Radio-ulnar joint - Wrist joint - MCPJ1 - MCPJ2-5 - IPJ - PIPJ2-5 - DIPJ2-5
Massage (name body part massaged) - Effleurage - Circular kneading - Picking up - Wringing
Soft tissue stretch (state which tissue) - Longitudinal - End of range - Transverse - Diagonal - Sustained
Placing the hand on - Flat surface - Edge/corner
Isolate/selective joint movement (state direction of movement) - Radio-ulnar - Wrist - MCPJ1 - MCPJ2-5 (lumbrical action) - IPJ 1-5
Compression - MCP joints - Palm - Wrist
Specific sensory input (name objects or body parts) - Visual - Auditory - Active touch (objects/body parts) - Passive touch (objects/body parts)
Patterns of co-ordinated movement underlying functional activity - Reach – with/without object - Grasp and release – with/without object - Fine finger activity – with/without object - Weight-bearing through limb

MCPJ: Metacarpal Phalangeal Joint: IPJ: Interphalangeal Joint;PIP Proximal Interphalangeal Joint; DIP: Distal: Interphalangeal Joint

The European project CERISE "Collaborative Evaluation of Rehabilitation in Stroke across Europe" is another multicentre study aiming to describe and evaluate the rehabilitation process of stroke patients across Europe to provide better insights into the "black box" of physiotherapy in stroke rehabilitation in four European rehabilitation centres located in the United Kingdom (UK), Switzerland (CH), Belgium (BE) and Germany (DE) (De Wit et al., 2006, De Wit et al., 2007, Putman et al., 2009, Putman et al., 2006, Putman et al., 2007). As part of this project, the researcher realised the need for developing a treatment schedule to be able to record the treatment activities during treatment sessions. Accurate documentation of the treatment activity would help the researcher to evaluate the content of physiotherapy and occupational therapy treatment sessions.

A treatment schedule was therefore developed by a group of experienced physiotherapists in the field of neurological rehabilitation based on the literature and videotapes of PT and OT sessions with stroke patients in different European rehabilitation centres and semi-structured thematic interviews, content analysis and focus-groups methods. A comprehensive treatment schedule recording form was developed to describe physiotherapy treatment for upper-limb stroke rehabilitation. The scoring list contained 12 categories including: (1) mobilization; (2) selective movements; (3) exercises and balance in lying; (4) exercises and balance in sitting; (5) exercises and balance in standing; (6) sensory and perceptual training and cognition; (7) transfers; (8) ambulatory activities; (9) personal activities of daily living **(**ADL**)**; (10) domestic ADL; (11) leisure and work-related activities; and (12) miscellaneous techniques (see Table 2-24 for more details).

Table 2-24: Scoring list of PT and OT activities based on De Wit et al.'s (2007) study

Scoring list category	Scoring list subcategory
1. Mobilisation, manual joint mobilisation, stretching, palpation (including pain assessment) passive relaxation and massage	1.1.Head, arm, trunk and pelvis
	1.2. Leg and foot
2. Relearning selective movements, co-ordination exercises, strengthening exercises and active relaxation	2.1. Head, arm, trunk and pelvis
	2.2. Leg and foot
	2.3. Arms and legs simultaneously
	2.4. Treatment of face and swallowing problems
3. Lying and lying balance	
4. Sitting and sitting balance	
5. Standing and standing balance	
6. Sensory and visual perceptual training and cognition	
7. Transfers	7.1. Rolling
	7.2. Sitting to lying or vice versa
	7.3. Sitting to sitting and sitting to standing or vice versa
	7.4. Getting on the floor and up again
8. Ambulatory activities	8.1. Wheelchair handling
	8.2. Wheelchair driving
	8.3. Walking with aid and/or therapist
	8.4. Walking independently
	8.5. Climbing stairs with aid and/or therapist
	8.6. Climbing stairs independently
9. Personal activities of daily living	9.1. Washing
	9.2. Drying
	9.3. Dressing
	9.4. Undressing
	9.5. Toilet (W.C.)
	9.6. Shaving
	9.7. Brushing teeth and mouth hygiene
	9.8. Combing or drying hair
	9.9. Feeding and preparing to eat
	9.10. Other
10. Domestic activities of daily living	10.1. Cooking, laying or clearing the table
	10.2. Cleaning, washing up
	10.3. Laundry
	10.4. Ironing
	10.5. Bed making
	10.6. Tidying up
	10.7. Other
11. Leisure and work-related activities	11.1. Painting/printing/drawing
	11.2. Woodwork
	11.3. Basketwork
	11.4. Needlework
	11.5. Office or computer work
	11.6. Modelling clay
	12.7. Other
12. Miscellaneous techniques	12.1. Chest physiotherapy
	12.2. Vojta
	12.3. Electrotherapy
	12.4. Hydro-, thermotherapy
	12.5. Cycling and theravital
	12.6 .Other

Treatment aims, settings and position of patients during treatment were included in the schedule. However, developing this scoring list was based on the literature and the experience of a small group of physiotherapists from four different European countries and thus it may not represent the whole content of PT and OT treatment in the UK and/or other European countries (De Wit et al., 2006). The researcher has selected a comprehensive scoring list of PT and OT activities consisting of 50 different activities. The developed treatment schedule does not give a clear idea of the amount of time therapists spent on each activity, which might be considered a limitation as the researcher cannot justify how much time the therapist spent of the session time on the treatment activities.

Comparing the CERISE and PSROP recoding tools proves that physiotherapy practice is different between the United States and Europe. The list of treatment activities listed in the two tools is different in terms of the terminology used to describe interventions and the content of the list. Taking an example, in CERISE projects, most treatment activities aim to restore the efficiency of movement and normalise the movement pattern and muscle tone, while the treatment activity list in the PSROP treatment schedule focuses on improving the patient's general functional activities. Some treatment activities reported in the PSROP study such as education intervention, pet therapy and equipment intervention are not included in CERISE studies. Additionally, the scoring list in the PSROP study allows the clinician to provide more details about the adjuncts used during a treatment session. On the other hand, the CERISE scoring list includes some treatment activities which are not reported in the PSROP list, such as hydrotherapy, vojta therapy, passive relaxation, massage and transfer activities

Another list of physiotherapy activities was developed in the CERISE project by Putman et al. (2006). The list was developed based on three weeks of observations (Putman et al., 2006). The study aimed to compare the time allocated to therapeutic and non-therapeutic activities in

physiotherapy and occupation therapy in four different stroke rehabilitation centres in four European countries. The researchers identified seven types of activity which were divided into four therapeutic categories and three non-therapeutic categories (see Table 2-25). The therapeutic categories include: mobility training, activities of daily living training (ADL-training), neuropsychological training and other training; and the non-therapeutic categories include: patient-related coordination, unit-related co-ordination and other. This study provides a complementary approach to describing and documenting therapeutic and non-therapeutic activity and the time taken to plan the allocation of PT and OT to treat stroke patients in an inpatient setting. The clinicians called them one-to-one or one-to-many sessions. The researchers used five categories to describe the involvement of any other people in the treatment sessions. The five categories demonstrate whether the therapist was alone, with a peer (same profession), with a team member (different profession), with the patient's family or with another person. In each treatment setting, researchers divided locations into four categories: (1) rehabilitation room, (2) office (3) ward and (4) other. The regularity or 'frequency' of an activity was documented using four categories: (1) daily, (2) several times a week, (3) several times a month and (4) several times a year, and therapists were asked to document their activities in 15-minute periods. This method offers a very good balance between accurate documentation and the practical constraints of daily work (Putman et al., 2006). Such detail of the treatment activity would provide robust information of the treatment provided to the patient.

Table 2-25: Code list of physiotherapy activities

Therapeutic activities		**Non-therapeutic activities**	
Mobility training	mobilization + positioning	Patient-related co-ordination	patient administration
	sitting + sitting balance		discussion of patient(s)
	standing + standing balance		ward round
	relearning selective movements		team conference
	transfers	Unit-related co-ordination	centre/unit administration
	fitness training		training/demonstration
	assessment		supervision
ADL training	PADL activities		discussion of the team
	domestic activities		discussion of the unit/centre
	aids + equipment	Other	break
	home visit		giving advice to external parties
	leisure + work-related activities		other
	wheelchair training		
	walking		
Neuropsychological training	sensory/perceptual training		
	cognitive training		
Other training	miscellaneous techniques		
	other		

(Putman et al., 2006)

Donaldson, Tallis and Pomeroy (2009) developed a treatment schedule for conventional physiotherapy treatment activities provided for people with stroke to enhance the sensorimotor recovery of the upper limbs (Donaldson et al., 2009). The researchers used a wide range of research methods, including: semi-structured thematic interviews, content analysis, focus groups and finally they tested the validity and reliability of the developed schedule in clinical practice. Twelve physiotherapists were involved in the process of developing the treatment schedule and three patients were recruited to test the treatment schedule's validity and reliability. The treatment schedule was developed in five stages: (1) Generation of a treatment list via semi-structured thematic interviews; (2) Refinement of the list into a treatment schedule; (3) Piloting the draft treatment schedule in clinical practice; (4) Validation of the treatment schedule; and (5) Testing the reliability of the treatment schedule. The developed treatment schedule consists of a treatment

recording form and an explanatory booklet. The recording form is divided into five categories: aims of treatment, gross position of patient during activities used, setting, equipment used and treatment activities. The recording form also allows the clinician to record the treatment date, the duration of the upper-limb treatment intervention, the number of therapists and assistants involved, and their identification. However, although the study results revealed that the treatment schedule was valid and reliable, the researchers acknowledged that since all the physiotherapists who were involved in this study were working in selected hospitals, they might not have been representative of physiotherapists outside the geographical area in which the study was conducted. Thus the treatment schedule should be used with caution outside that geographical area. The researchers mention the need for a generalisability study to investigate whether the developed list of treatment activities incorporates all those used by physiotherapists in the United Kingdom and whether the treatment activities already identified are described appropriately and adequately. Since the treatment schedule was developed specifically for use with stroke patients undergoing upper-limb rehabilitation, this treatment schedule recording form cannot be used to record the treatment activities provided for other parts of the body and/or with other patient populations such as TBI. Further study can be conducted, firstly to investigate whether the list of treatment activities used in Donaldson et al.'s treatment schedule represents all the activities used by physiotherapists in the United Kingdom and whether the treatment activities are described appropriately and adequately. Secondly, developing a treatment schedule will allow the recording of all treatment activities which are provided by physiotherapists during a treatment session, including on the entire body. This research method can also be used to develop a treatment schedule to be used by physiotherapists to document the treatment activities used for conditions other than stroke.

Over the last 5 years, another research group has been working on the development of a rehabilitation treatment taxonomy (RTT), which is a system for classifying all treatment activities

delivered by a multidisciplinary team to all diagnostic groups of patients (Dijkers, 2014; Dijkers et al., 2014; Whyte, 2014; Whyte et al., 2014; Hart et al., 2014; Zanca & Dijkers, 2014). However, the actual RTT has not been finalised yet and the researchers have focused on developing a conceptual framework for a taxonomy. Dijkers (2014) is one of the research team and published an article to present a conceptual framework for the creation of a cross-disciplinary rehabilitation treatment taxonomy (RTT) that offers terms which are needed to describe the treatments provided to patients. A series of articles has also been published to describe the key theoretical, empirical and commentaries that were sought during the research process; it reviews the various intervention taxonomies that exist in healthcare and attempts to build a classification of rehabilitation and to describe the benefits to the field of rehabilitation of building such a taxonomy (Dijkers, 2014; Dijkers et al., 2014; Whyte, 2014; Whyte et al., 2014; Hart et al., 2014; Zanca & Dijkers, 2014).

The conceptual framework proposed by the researchers represents a start to the creation of a RTT. The researchers have reported all the difficulties that they faced during the process of developing an RTT and emphasised the need for further development of the framework they have proposed. They have reported that the actual process of creating a RTT based on their framework would involve a critical thinking and combination between theoretical principles, the observation of rehabilitation practices and collaboration between rehabilitation stakeholders. As part of the development process, researchers and clinicians have been invited to develop an organisational structure to guide the further development and testing of the Rehabilitation Treatment Taxonomy (Dijkers et al., 2014).

The researcher in this study considered all previous research to build a list of physiotherapy treatment activities which were identified and used by other researchers to develop a documentation method and to design a treatment recording tool to be used by physiotherapists with ABI patients in an inpatient setting. See Table 2-26 for more details of treatment activities.

The treatment activities list is divided into three main categories: treatment techniques, treatment adjuncts and treatment tasks and positions. Each category contains a comprehensive list of physiotherapy activities.

Table 2-26: List of all physiotherapy activities reported in the literature

Author	Physiotherapy techniques	Treatment Adjuncts	Treatment task and positions
Edwards, et al. (1990)	- Head and trunk mobilisation - Proximal stability to allow for selective function	None	- Inhibition of spasticity around the head and trunk - Specific inhibition of spasticity around the shoulder - Facilitation of normal movement pattern
Mickelborough et al. (1997)	- Gait Ignition/Turning - Alignment and Balance (for more details see table 2-14)	None	None
Ballinger et al. (1999)	- Positioning/passive movements - Control of pain	- Aids and equipment - Education of carer	- Bed mobility - Sitting balance - Standing balance - Sit to stand/transfers - Walking - Stairs - Movement patterns of upper limb - Movement patterns of lower limb - Home visit
Wittwer et al. (2000)	None	None	- Upper limb - Bed mobility - Sitting - Sit to stand - Standing - Early gait - Advance gait
Van Vliet et al. (2001)	- Transfer - Activity Rolling to side Side lying to sitting Sitting activities Sit to stand Standing activities Stepping/walking Reaching Manipulation Arm activities in supine Arm activities in side lying Arm movements in sitting - Assistance given by therapist Stand by help Facilitation Moving - Specific strategies Quick stretch Very quick stretch Sustained stretch Demonstration (hands off) Physical demonstration(hands-on) Weight bearing through affected arm Trunk mobilizations Joint mobilizations Skin stimulation Massage - Communication Therapist Patient	- Measurement Visual observation Quantitative measurement Quantified but based on subjective judgment	- Patient position Supine Long sitting Side lying Sitting supported Sitting unsupported Prone Standing supported Standing unsupported -

Continue Table 2-26: List of all physiotherapy activities reported in the literature

Author	Physiotherapy techniques	Treatment Adjuncts	Treatment task and positions
Lennon, 2001	- Preparation Mobilizations - Facilitated movements Proximal Weight transfer Pelvic tilt (sitting) Moving the trunk Weight transfer Prone standing Reaching across the body with the unaffected limb Knee flexion/extension Bridging Holding different positions Selective movement of the hip Distal (leg) Selective movement The arm Selective movement Reaching to the affected side Holding the upper limb Placing the upper limb Gait-specific activities Stepping with the unaffected lower limb forward/ backward/ sideways/ on and off a step Swing phase re-education and/or Walking Walking around a plinth - Functional activities Standing up from sitting Stair climbing	None	None
Wottrich et al. (2004)	None	None	- facilitating active patient involvement - motor activity - making use of environmental factors
Bode et al. (2004)	- Address positioning needs - Casting/splinting - Balance training - Strengthening - Range of motion - Path finding and orientation	- Patient/caregiver education - Home visits - Team/family conferences - Orthotics	- Bed/chair/WC transfer - Tub/shower transfer - Toilet transfer - WC to floor transfer - Car transfer - Walking - Power WC propulsion - Manual WC propulsion - Stair climbing
Tyson and Selley, (2004)	- Trunk mobilizations - Muscle or joint mobilization - Positioning - Stretching - Stretching - Exercises	- Treadmill training - AFOs - Splints - Transfer equipment - Wheelchairs	- Weight transfer in sitting & standing. - Reaching - Weight bearing through the affected arm - Stepping - Pelvic tilt in sitting & standing - Selective movement - Bed mobility - Transfers - Walking in different environments - Stairs - Wheelchair skills of arm and leg - Bed mobility - Reaching in sitting and standing - Transfers - Stepping in different standing positions - Walking - Walking with and without aids - Walking over and around obstacles - Walking with and without assistance

Continue Table 2-26: List of all physiotherapy activities reported in the literature

Author	Physiotherapy techniques	Treatment Adjuncts	Treatment task and positions
Pomeroy at al (2005)	1. Specific physical therapy interventions - Soft tissue mobilisation - Specific soft tissue mobilisation - Passive movement - Muscle stretching 2. Facilitation of activity in specific muscles - Imagery of specific muscle activity - Specific muscle activation - Activation of muscle activity during function 3. Facilitation of isolated (selective) joint movement - Imagery specific joint movement - Active assisted isolated joint movement - Facilitate specific joint movement during function 4.Facilitation of co-ordinated (combined) movement - Imagery of co-ordinated patterns of movement - Active assisted co-ordinated patterns of movement - Facilitate co-ordinated movement during function - Facilitate leg/foot activity from another body part 5. Resistive exercise - Resistance from therapist - Resistance from patient's bodyweight Resistance from equipment	- High hold/surface - Perching stool - Walking aid - Low hold/surface - Rolled up towel - Tilt table - Hip high hold/surface - Gym ball - Standing frame 6.Specific sensory (tactile & proprioceptive) input - "Hands-on" techniques - Provision of environmental surface 7.Splinting techniques - Strapping - Splinting 8.Function – walking and onward - PT "hands-on" techniques to re-ed posture - Re-ed of funct act through specific mvmnt patterns - Overground indoor walking training - Overground outdoor walking training - Treadmill walking/bicycle training - Obstacle negotiation training - Ascending/descending stair training 9.Function – in sitting towards standing - PT "hands-on" techniques to re-ed posture - Re-ed of funct act through specific mvmnt patterns - Dynamic sitting balance training - Transfers training - Sit to standing – functional activity training - Stand to sit – functional activity training. 10.Function – in standing towards walking - PT "hands-on" techniques to re-ed posture - Re-ed of funct act through specific mvmnt patterns - Static standing balance training - Dynamic standing balance training - One leg stand activities – functional training 11.Function – walking and onward - PT "hands-on" techniques to re-ed posture - Re-ed of funct act through specific mvmnt patterns - Overground indoor walking training - Overground outdoor walking training - Treadmill walking/bicycle training - Obstacle negotiation training Ascending/descending stair training	- Supine lying - Non-paretic side lying - Patient kneeling - Standing - Crook lying - Sitting - Patient kneeling - Walking - Paretic side lying - Sitting – perch½ kneeling

Continue Table 2-26: List of all physiotherapy activities reported in the literature

Author	Physiotherapy techniques	Treatment Adjuncts	Treatment task and positions
Gassaway et al. (2005) PSROP	- Balance training - PNF - Postural awareness - NDT - Motor learning - Motor control - Stretching - Mobilization - PROM/Stretching - Manual therapy - Breathing - Aerobic - Cognitive training - Perceptual training - Visual training - Sensory training - Education (Patient, Family and staff) - Gait with body weight support - Involved upper extremity addressed - Constrained induced therapy	- Prescription/selection - Application - Fabrication - Ordering - Electrical stimulation - Biofeedback - Ultrasound - Use of dog Ankle dorsi flex assist Cane –Large base - Cane – Small base - Cane – straight - Crutches – Forearm - Crutches – Axillary - Grocery Cardiff University - Bowel - Hemirail - Ironing board - KAFO - Lite gait - Mirror - Parallel bars - Platform - Standing frame - Steps - Step ladder - Swedish knee cage - Swiss ball - Tray table - Wheelchair - Walker – Hemiwalker - Walker – Rising stair - Crutches – Small base forearm	- Pre-functional activity - Bed mobility - Sitting - Transfers - Sit-to-stand - Wheelchair mobility - Pre-gait - Gait - Advanced gait - Community mobility - Upper extremity - Lower extremity - Trunk - Head and neck
Putman et al. (2006).	- mobilization + positioning - relearning selective movements - sensory/perceptual training - cognitive training - miscellaneous techniques	- aids + equipment	- sitting + sitting balance - standing + standing balance - transfers - fitness training - PADL activities - domestic activities - home visit - leisure + work-related activities - wheelchair training - walking
Hunter et al. (2006)	- Passive movement through anatomical range - Accessory movement (indicate type, e.g. glide, distraction and direction, e.g. AP, PA etc.) - Massage Soft tissue stretch - Isolate/selective joint movement - Compression - Specific sensory input - Patterns of co-ordinated movement underlying functional activity		

Continue Table 2-26: List of all physiotherapy activities reported in the literature

Author	Physiotherapy techniques	Treatment Adjuncts	Treatment task and positions
de Wit et al. (2007) CERISE	- Mobilisation - Manual joint mobilisation - Stretching - Palpation (including pain assessment) - Passive relaxation - Massage - Selective movements - Co-ordination exercises - Strengthening exercises - Active relaxation	None	- Lying and lying balance - Sitting and sitting balance - Standing and standing balance - Sensory and visual perceptual training and cognition - Transfers - Ambulatory activities - Personal activities of daily living - Domestic activities of daily living - Leisure and work-related activities - Miscellaneous techniques
Donaldson et al (2009)	**1**. Soft tissue mobilisation - Stroking - Effleurage - Lymph drainage techniques - Petrissage (kneading/wringing/picking-up/rolling) - Specific compression (trigger points) - Myofascial release 2. Joint mobilisation - Accessory Movements - Passive Movements - Active Movements 3. Facilitation of muscle activity/movement - Mental Imagery - Patient Generated Cueing - Therapist Generated Cueing - Hand on. to induce a desired motor response - Active Assisted - Facilitated Arm/Hand Activity from another body part - Restricted use of non-paretic limb 4. Positioning - Side lying hemiplegic side - Side lying non-hemiplegic side - Supine lying - Half lying - Sitting in armchair - Forwards lean sitting - Sitting in wheelchair 5. Specific sensory input - Tactile Stimulation - Proprioceptive Stimulation - Electrical stimulation 6. Splinting techniques - Shoulder support - Elbow support - Wrist/hand support	None	- Supine - Prone - Sidelying on unaffected side - Sidelying on affected side - 4 point kneeling - 2 point kneeling - Unsupported sitting - Suported sitting - Asymmetrical setting - Perch sitting - Standing - Prone standing
	7. Exercise to increase strength - Frictions - Resistance from the therapist - Resistance from body weight - Resistance from equipment - Gravity neutral repetitive movement 8. Balance and mobility incorporating upper limb activity - In, or from, lying - In, or from, kneeling - In, or from, sitting - In, or from, standing - In walking 9. Upper limb functional tasks - Bilateral functional activities - Unilateral reaching activities that are object directed - Unilateral reaching activities that are spatially directed - Dexterity exercises 10. Education for patient and/or carer - To encourage self monitoring of upper limb - Transfers training - Limb handling and positioning skills - Written/ visual/ photo exercise programme 11. Other interventions / techniques - Acupuncture - Ultrasound - Compression		

Continue Table 2-26: List of all physiotherapy activities reported in the literature

Author	Physiotherapy techniques	Treatment Adjuncts	Treatment task and positions
Hart et al, 2014	Treatment activity aim to improve one of the following: - Balance and posture - Muscle function (strength, flexibility, control) - Cardiopulmonary endurance - Vestibular habituation - Attention - Orientation - Executive function - Bed/mat mobility - Transfers - Wheelchair management - Wheelchair locomotion - Ambulation - Elevations - Transportation and travel	- Devices • Cane • Walker • Transfer board, • Tub bench, • Adapted computer mouse • Prosthetic/orthotic device	- Physical function - Cognitive/behavioral function - Mobility - Education

Although there are many recording tools that have been developed to be used by physiotherapists with stroke patients, to date, there is no published work which reports on the use of treatment schedules to record the interventions provided for people with any ABI condition in an inpatient setting. The term ABI is used to describe all types of brain damage which occur after birth and there are key differences that make coping between conditions quite different and difficult. Furthermore, all the treatment schedules and treatment recording tools developed were designed to report the physiotherapy interventions provided to certain body parts or specific treatment tasks. Therefore, there is a need for such a comprehensive treatment recording tool to be developed and tested in real practice to make sure that it is valid and clinically feasible. The tool should allow physiotherapists to record all the activities provided during a treatment session and be suitable to be used with any ABI condition. Such a schedule will help researchers and clinicians alike to define and evaluate the content of the physiotherapy rehabilitation interventions provided for people with ABI in inpatient rehabilitation settings (Whiddett et al., 2006).

2.3.10. **Conclusion (section two)**

Good standards in medical record-keeping are widely recognised as an important feature of patient care (Quinn and Gordon, 2010). They enable the accurate and efficient communication of important clinical information among a multidisciplinary team and help facilitate continuity of care. High quality medical records assist research and audits and is a legal requirement.

Record-keeping procedures show considerable variation between different centres (Scott, 2004). The Audit Commission (1995) widely criticised the quality of paper medical records, commenting that a low priority was given to record management and a lack of information-sharing existed (The Audit Commission, 1995). Although some improvement was found during a progress review by the Audit Commission (1999), it found that the standard of medical records was poor (The Audit Commission, 1995).

Many researchers found that to improve the quality of the physiotherapy service provided for people with neurological conditions, a robust method to document physiotherapy practice, with structured record keeping which facilitates easy access to information relating to the care given to a patient in an inpatient setting, is necessary (DeJong et al., 2005, Jette et al., 2005). This could be a structured form, such as a treatment schedule, which is uniform in terms of its language and layout. That is, all physiotherapists using the form should follow the same format. Structured records are more easily automated, and with the present increase in the use of computers in healthcare, a change from manual to automated recording systems would be easier if a structured record format was already in use (Teasell et al., 2009).

2.4. Summary of the literature review

ABI covers all conditions of brain damage occurring after birth. Although, stroke and traumatic brain injury are both forms of ABI, the term ABI is an umbrella term that includes all traumatic

brain injuries and non-traumatic brain injuries. The literature reports that, in TBI, the damage to nerve tissue is focused in one or more areas, compared to non-traumatic injury such as stroke, where damage to the nerve tissue usually spreads throughout the brain. This difference can make the functional deficits arising from each condition different and consequently the patient's recovery and rehabilitation process will be different (Brain Injury Centre, 2008; Kimberley et al., 2010). Moreover, patients with ABI in the United Kingdom are admitted to a specialised rehabilitation centre, different to stroke patients, and so the documentation method used in such rehabilitation centres should be broader and more comprehensive to cover all ABI conditions. Generalising what has been published on one condition to another condition would be inappropriate. The literature has reported a few rehabilitation models that describe the rehabilitation process those patients go through if they have ABI (BC Stroke Strategy, 2010, Donnelley, 2007, Strasser and Falconer, 1997). Generally, a patient goes through a process of initial assessment to determine whether he/she satisfies pre-set admission criteria to accept him/her to be admitted to an inpatient rehabilitation service. Although the literature has stressed the importance of the admission criteria to the inpatient rehabilitation service (Beecham et al., 2009, Turner-Stokes, 2009), it remains necessary to identify what admission criteria the heads of rehabilitation teams in the United Kingdom's rehabilitation service follow in their practice. A comprehensive assessment of the patient's body function and structure deficit, activity limitations and participation restrictions will take place once the patient has been admitted to an inpatient rehabilitation setting. Despite the various guidelines which have discussed the physiotherapy assessment process in inpatient settings (Association of Chartered Physiotherapists Interested in Neurology, 1995, British Society of Rehabilitation Medicine, 2003, Chartered Society of Physiotherapy, 2005, Rentsch et al., 2003), identifying what guidelines the healthcare professions follow in their practice and what the process of patient assessment is remain necessary. The assessment process is usually followed by a process for goal-setting, treatment, a re-evaluation

process and a discharge plan. However, the lack of information in the literature about the nature of healthcare practice, including the goal-setting process and interventions provided to people with ABI, highlight the importance of an in-depth understanding of the currently used goal-setting process and interventions provided for ABI patients by inpatient rehabilitation services.

Physiotherapy is a standard part and a key component of rehabilitation after ABI (De Wit et al., 2006, DeJong et al., 2005, Magasi and Post, 2010, Pomeroy and Tallis, 2000). It has been reported that the complexity, variability and multiplicity of physiotherapy rehabilitation processes provided for patients with ABI and the lack of written documentation may lead to difficulties in describing and evaluating the content of physiotherapy services (Ballinger et al., 1999, DeJong et al., 2005, Horn et al., 2005). Researchers emphasise the need for a study which describes and evaluates the physiotherapy activities provided for people with ABI (DeJong et al., 2005 and Hunter et al., 2006). Such a study could help to understand the services provided to people with ABI during inpatient rehabilitation and facilitate researchers' understanding of which activities are of benefit to recovery, for which types of patients and how physiotherapy aids recovery (Bode et al., 2004).

Numerous studies have investigated the documentation process in an inpatient setting and reported that the documentation process should produce consistent data using a data collection form (De Wit et al., 2006, DeJong et al., 2004, Pomeroy et al., 2005, Pullen and Loudon, 2006, Tyson and Selley, 2004, Whiddett et al., 2006, Hunter et al., 2006).

Researchers have developed several treatment recording tools to record stroke rehabilitation activities and interventions in an inpatient setting. However, most developed tools are intended specifically for use with a stroke population. Some tools were developed specifically for use with stroke patients undergoing specific rehabilitation, e.g. upper-limb treatment (Donaldson et al., 2009), and the reliability and validity of some of the tools developed have not been tested.

Although many recording tools have been developed for use by physiotherapists with stroke patients, to date, there is no published work which reports on the use of a treatment recording tool to record the interventions provided for people with an ABI condition in an inpatient setting. Therefore, there was a need for a comprehensive treatment recording tool to be developed and tested in real practice to make sure that it was valid and clinically feasible. Any new treatment recording tool should be comprehensive enough to cover all conditions of ABI and allow the recording of all treatment activities provided by physiotherapists during a treatment session, including on the entire body.

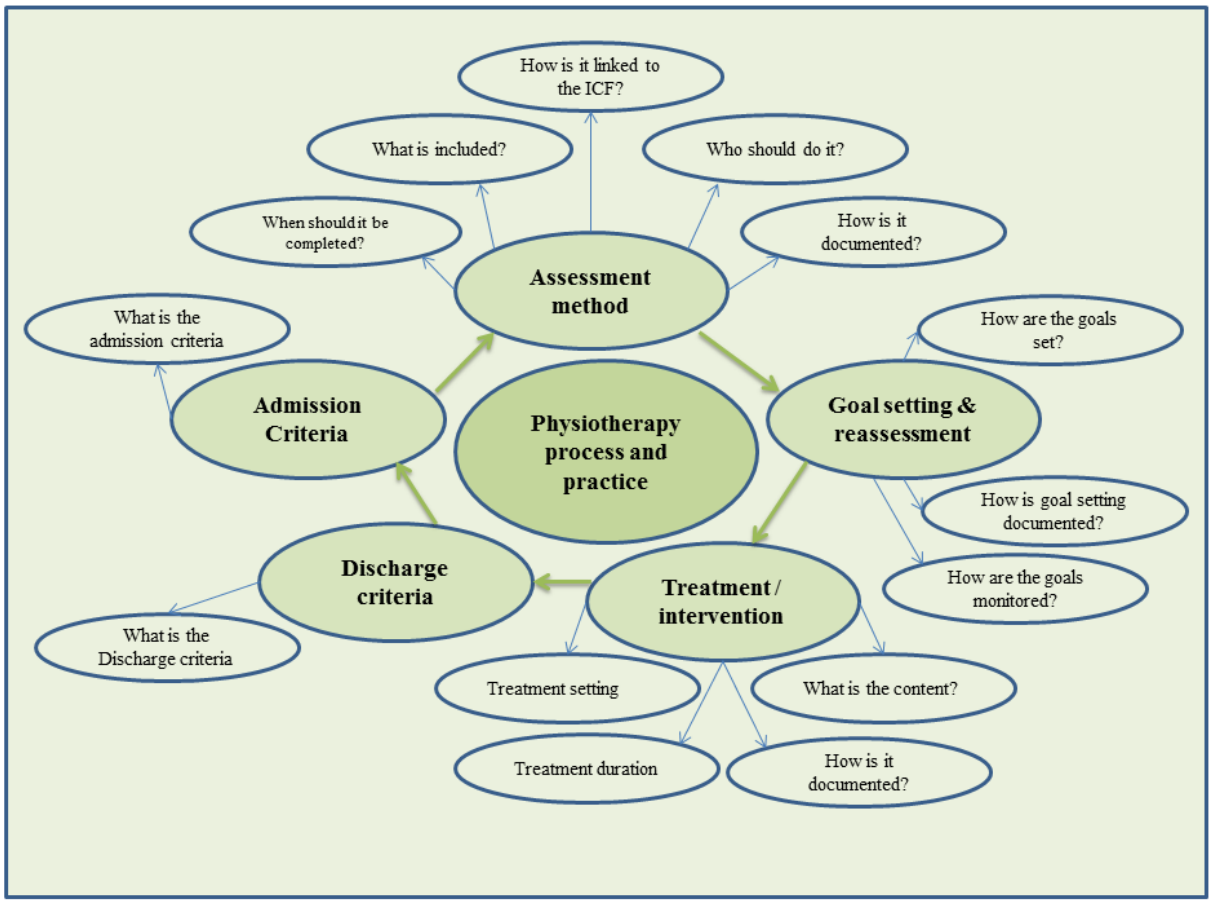
Due to the limited studies available in the literature which provide specific details about the physiotherapy processes throughout the course of rehabilitation (Jette et al., 2005, Putman and De Wit, 2009), it is necessary to describe the physiotherapy rehabilitation process provided to people with ABI to have a better understanding of the ABI rehabilitation process in the UK. A mapping process is a visual representation of the patients' journey (Institute for Innovation and Improvement, 2008). It summarises the whole rehabilitation process as a picture in model format which helps the researcher to know what exactly happens on the patients' rehabilitation journey, not what should happen. It also helps the researcher to diagnose problems, identify areas for improvement and search for opportunities for improvement by visualising how the whole patient rehabilitation service works and thus identify points of inefficiency if there are any. It captures the reality of the rehabilitation process and identifies strengths, weaknesses, variations and unnecessary steps in the service. It also provides good ideas and helps the researcher to know where and how to start to make improvements that will have the biggest impact for patients, service outcomes and staff.

Reviewing the literature is recommended in order to to process map the service by the Medical Research Council (Craig et al., 2008) to establish the theoretical basis of the service and explore

all the relevant components. However, according to the Medical Research Council Framework for Development and Evaluation of Complex Interventions (Craig et al., 2008), once the theory phase has been completed, it is quite likely that some questions will remain unanswered, which may be addressed by some primary research. However, there were also some questions which derived from the literature reviewed that needed to be answered by this research. All questions were summarised as a mind-mapping process, as shown in Figure 2-14, which illustrates how these key components and questions about the rehabilitation process are connected. The questions needing to be answered include:

- What is the pathway that patients follow if they have ABI and are treated in one of the United Kingdom's rehabilitation centres?
- What admission criteria are followed to admit a patient with ABI into an inpatient rehabilitation service?
- What physiotherapy assessment process is followed in the inpatient ABI rehabilitation service in the United Kingdom?
- What is the goal-setting process used in inpatient ABI rehabilitation services?
- What physiotherapy interventions, including treatment techniques, treatment adjuncts and treatment tasks and positions, do physiotherapists use to treat ABI patients in inpatient rehabilitation services in the United Kingdom?
- What discharge criteria are followed to discharge a patient from an inpatient rehabilitation service in the United Kingdom?

Figure 2-14: Mind-mapping for questions in the literature that need to be answered.



Researchers have emphasised the importance of documentation because of the information it contains and because it is a professional and legal obligation for physiotherapists to practice (Phillips et al., 2006). It has been reported that a lack of documented detailed characteristics of physiotherapy interventions leads to difficulties in defining the content of physiotherapy practice (Ballinger et al., 1999, De Wit et al., 2006, DeJong et al., 2005, Horn et al., 2005, Pomeroy and Tallis, 2000). It has also been reported that documentation is essential to the delivery of high quality healthcare services, in order to support patient care and the continuity of care, to assist clinical and other audits, and to facilitate multi-professional working. Effective records also help to support sound administrative and managerial decision-making, as part of the knowledge base for NHS services (Welsh Health Circulate, 2004). The Medical Research Council has emphasised

the need to establish a comprehensive monitoring process in any healthcare practice to ensure that the delivery of the intervention is maintained.

A good documentation process brings order and rigour to the description of myriad physiotherapy interventions and it has a potential to improves the patient care by facilitating accurate and appropriate communication, between physiotherapists and between physiotherapists and other specialists. Information is only usable if it has been correctly recorded. The importance of using consistent terminology when documenting physiotherapy interventions has also been highlighted in the literature (Sames, 2009). Consistent documentation helps other professionals to better understand physiotherapy practice and the role that physiotherapists play in the multidisciplinary rehabilitation process (Donaldson et al., 2009). Standardised documentation will increase service effectiveness and efficiency and help to improve the quality of the intervention by allowing the evaluation of the service and minimising the difficulty of standardising the design and delivery of the interventions (Craig et al., 2008). De Wit et al. (2007) have pointed to the need for a better documentation process to help understand and evaluate the physiotherapy service and provide better insights into the "black box" of physiotherapy practice (De Wit et al., 2006). Despite the importance of medical record documentation, little research has been published evaluating clinical documentation by allied health professionals, including physiotherapists (Phillips et al., 2006). However, developing a documentation method which can be used by physiotherapists who treat patients with ABI in an inpatient setting is necessary. Such a documentation method can be used in ABI rehabilitation centres and it will be comprehensive enough to cover every different condition of ABI. Using one form to report any physiotherapy treatment session provided for any ABI patient will improve the consistency of the documentation method in an inpatient setting.

2.5. Study aims and objectives

This study aimed to develop and evaluate a robust documentation tool for use by physiotherapists who treat ABI in an inpatient setting. Due to the limited studies available in the literature which provide specific details about the physiotherapy processes throughout the course of rehabilitation (Jette et al., 2005, Putman and De Wit, 2009), it was necessary to initially describe the physiotherapy rehabilitation process provided to people with ABI via a mapping process.

The specific objectives for the current study include:

- To review the available literature and attain a better in-depth understanding of the inpatient physiotherapy rehabilitation process provided to people with ABI.
- To review the available literature and attain a better in-depth understanding of the physiotherapy documentation process used in an inpatient ABI rehabilitation setting.
- To design a semi-structured interview template to help the researcher to obtain more information about the documentation procedures used by multidisciplinary teams in inpatient rehabilitation services, what the advantages and disadvantages of the methods used are, and thus obtain an overall understanding of the rehabilitation process in inpatient ABI rehabilitation settings.
- To develop a data collection tool (questionnaire) to help the researcher to gather as much information as possible about the physiotherapy rehabilitation process from physiotherapists treating people with ABI in inpatient services in the United Kingdom.
- To determine the degree to which the questionnaire reflects reality and whether all important aspects of the construct are covered (questionnaire validity).
- To determine the stability of the final draft of the questionnaire's questions in terms of intra-rater test-retest reliability and evaluate the agreement between two different completions of the questionnaire by the same physiotherapist.
- To determine the acceptability of the developed questionnaire.

- To design a treatment recording tool for use by physiotherapists with people with ABI in an inpatient rehabilitation setting.
- To determine whether physiotherapists agree that the record of the treatment generated using the treatment recording tool would accurately describe the treatment activities which were provided to patients with ABI in an inpatient setting.
- To determine whether individual physiotherapists provided a similar list of treatment activities when, on two separate occasions, they viewed video tapes of the same treatment sessions provided for the same patient (intra-rater reliability).
- To determine whether two different physiotherapists provided a similar list of treatment activities when they viewed video tapes of the same treatment sessions provided for the same patient (inter-rater reliability).

CHAPTER THREE

METHOD

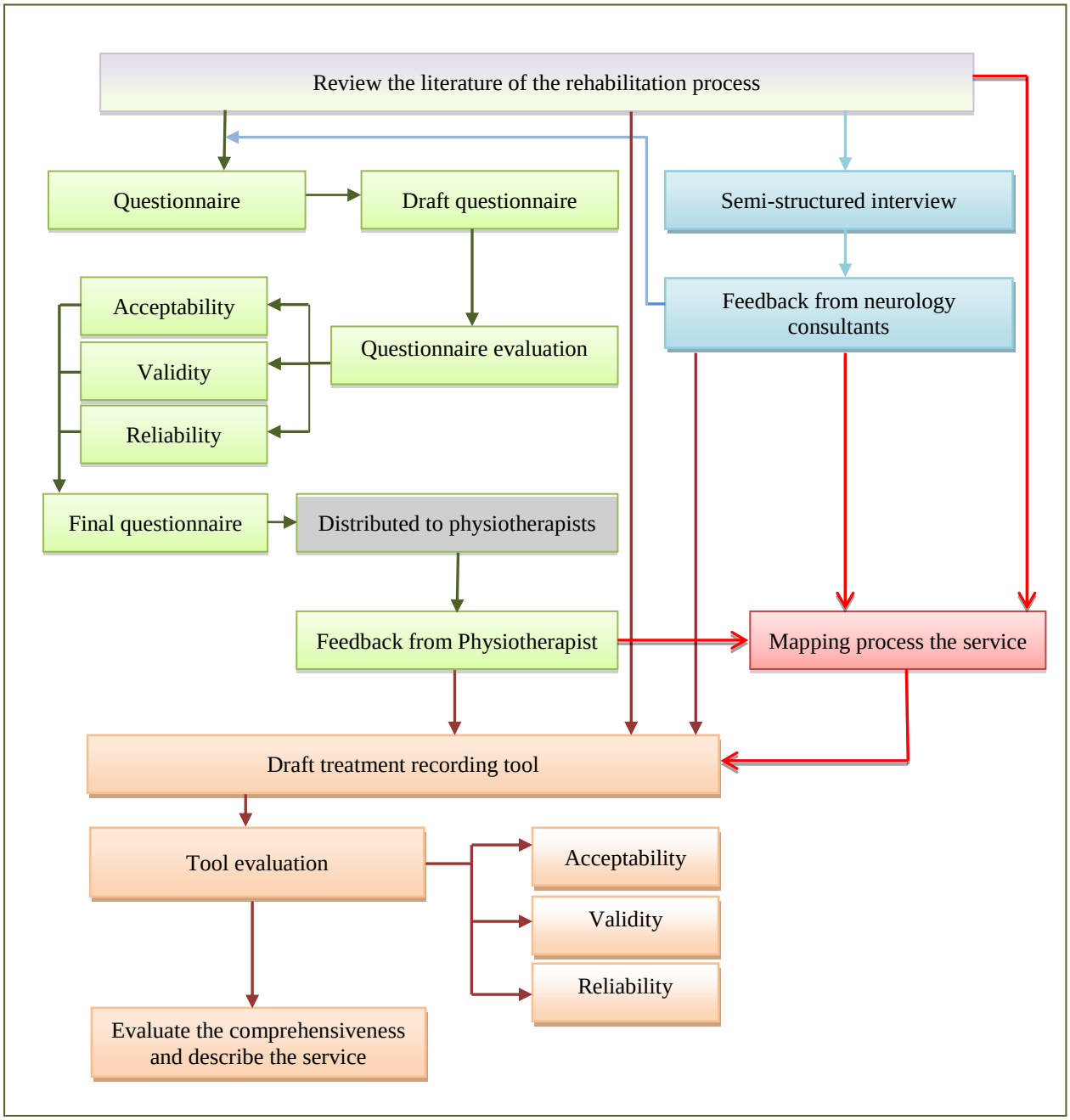
Chapter 3. Method

3.1. General overview

To meet the research aims and objectives, the researcher used a wide range of data collection methods, including interviews, questionnaires and observational processes. Interviews were conducted with heads of rehabilitation teams working in the inpatient rehabilitation service in the UK. Thereafter, a national questionnaire was sent to physiotherapists who had experience of treating patients with ABI in the UK so as to capture the breadth and scope of current physiotherapy practice and identify the physiotherapy treatment activities provided to people with ABI in an inpatient rehabilitation setting and process map the service. The validity, reliability and acceptability of the questionnaire were tested before the questionnaire was sent out to physiotherapists.

Information gathered during this developmental phase was then used to design a treatment recording tool for use with people with ABI in an inpatient rehabilitation setting. Once the final draft of the treatment recording tool was developed, the reliability, validity and acceptability of the tool were evaluated. Six experienced physiotherapists working in inpatient rehabilitation centres treating ABI in Wales, UK were invited to take part in this stage of the study. Eighteen treatment sessions were observed and videos recorded to evaluate the treatment recording tool. Finally, the comprehensiveness of the treatment recording tool and its ability to describe the physiotherapy rehabilitation service was then evaluated (see Figure 3-1).

Figure 3-1: An overview of the research method



The next sections will describe the research method in detail.

3.2. Semi-structured Interviews

3.2.1. **Aims**

The first part of the data collection process comprised semi-structured interviews with the heads

of rehabilitation teams. The main aim of the interviews was to obtain more information about the documentation procedures used by the multidisciplinary team in inpatient rehabilitation services and what the advantages and disadvantage of the methods used were. The interview also aimed to gain an overall understanding of the rehabilitation process in inpatient settings. It investigated the pathway(s) that patients would follow if they were to have an ABI, the admission and discharge criteria and what the process would be to move from one stage of rehabilitation to another. This helped the researcher to map the rehabilitation process provided for people with ABI. The rehabilitation process was summarised via a picture in model format which helped the researcher to clearly articulate the rehabilitation journey.

The objective of this part of the study was to answer the following questions:

1. What documentation process was followed to document a patient's rehabilitation process in the inpatient rehabilitation service and what were the advantages and disadvantages of the method of documentation currently used?
2. What was the pathway that patients followed if they had ABI and were treated in one of the United Kingdom's rehabilitation centres?
3. What admission criteria were followed when admitting a patient with ABI to an inpatient rehabilitation service in the United Kingdom?
4. What was the multidisciplinary team assessment process in the inpatient rehabilitation service in the United Kingdom?
5. What goal-setting process was used in inpatient ABI rehabilitation services?
6. What discharge criteria were followed in UK rehabilitation centres?

3.2.2. **Why interviews?**

Interviewing is a powerful qualitative method to gather data or information and to elicit

interviewees' opinions (Fontana and Frey, 2000). The interview approach was advocated to meet the aims of this part of the study for many reasons, including the information reported in the literature about the research topic being very limited and the in-depth semi-structured interview offering interviewers more flexibility to discuss the research topic in detail and to devote full attention to the interviewees (U.S. Department of Health & Human Sercvice., 2011). This was attained by allowing the researcher to ask for further elaboration of replies, such as "can you provide more details?" or "why do you say that?", and therefore collecting in-depth and robust information about the research topic. Semi-structured interviews also helped the researcher to direct and redirect the interview questions in order to obtain relevant data that could help to improve the understanding of the service and gather more information and constantly modify the data-gathering process as and when the study progressed (Trochim, 2006).

The use of qualitative methods, to gain in-depth information about complex interventions such as the ABI rehabilitation has also been suggested by the Medical Research Council Framework for the Development and Evaluation of Complex Interventions (Craig et al., 2008). Many other researchers who conducted studies aiming to identify and describe the rehabilitation service provided for patients in an inpatient setting (Ballinger et al., 1999, DeJong et al., 2004, Donaldson et al., 2009, Wottrich et al., 2004) have used semi-structured interviews to explore and understand the physiotherapy rehabilitation service.

3.2.3. **Participants**

Wales is part of the United Kingdom and was considered to sufficiently represent a wide geographical area of the whole United Kingdom. This study has recruited all heads of the rehabilitation teams in each of the only two inpatient rehabilitation hospitals in Wales that provide an inpatient service to people with ABI. The only two rehabilitation centres in Wales,

UK providing this service are: Rookwood Hospital in Cardiff and Morriston Hospital in Swansea. Rookwood Hospital is a regional self-sufficient neuro-rehabilitation hospital with 28 beds offering a specialist intensive neuro-rehabilitation service while the specialist neuro-rehabilitation service in Morriston Hospital is provided in a hospital ward which has only 12 beds. Both units provide specialist intensive neurological rehabilitation for people with disabilities resulting from neurological conditions, while the majority of patients admitted to these units have suffered traumatic head injuries, subarachnoid haemorrhages, stroke or other forms of brain injury. Interviewing the heads of rehabilitation teams running the two rehabilitation centres delivering the service to those patients who had ABI in Wales, UK, furnished comprehensive in-depth details of the service provided to 3,063,500 people in a large geographical area, 20,779 km2, in the United Kingdom (Office for National Statistics, 2012).

An invitation letter and information sheet were sent by email to the heads of rehabilitation teams working in all regional centres in Wales, UK which were treating ABI (See Appendix 1.1). Consent was obtained from the interviewees to audio-record the interviews before the interviews were conducted (See Appendix 1.7). There are two heads of the rehabilitation team in each hospital. The researcher interviewed four heads of rehabilitation teams for this part of the study. Interviewing four heads of rehabilitation teams from the only two rehabilitation centres in Wales represented the rehabilitation service provided for patients with ABI in a large geographical area.

3.2.4. **Research governance ethical considerations**

This study adhered to the research governance framework for health and social care in Wales, UK. For this part of the study, all necessary governance approvals were obtained prior to starting the data collection process including from the following: the School of Healthcare Studies Ethical Committee, Cardiff University; the South-East Wales Research Ethical Committee; Abertawe

Bro Morgannwg University Health Board; Research and Development office (Swansea); Cardiff & Vale University Health Board Research and Development office (Cardiff) (See Appendices 2.1; 2.2; 2.3 and 2.4 for all approvals)

3.2.4.1. Data protection

All collected data were stored electronically on a secure password-protected computer (and not placed on a server or network) located in the School of Healthcare Studies (SOHCS), Cardiff University. No collected data were held with any personal identifiable information. A unique code was given to each interviewee. The links between codes and interviewees' personal details were held in paper format in a locked filing cabinet.

3.2.5. **Interview process and data collection**

Given that the rehabilitation process comprises several critical key components including the admission criteria, assessment methods, goal-setting, treatment plan, follow-up schemes and discharge process, and the documentation process (Donnelley, 2007), interviews with the heads of rehabilitation team aimed to gather as much information as possible about these areas of rehabilitation process to gain an in-depth understanding of the rehabilitation service provided to people with ABI in an inpatient setting and to develop the documentation process and map the processes of the service. The researcher built up a series of questions which needed to be answered by the head of each rehabilitation team. These questions were either not answered in the literature and/or reported as needing to be answered by clinicians via a review of the literature on other neurological conditions, such as stroke.

The interview questions were designed to give as little guidance as possible so as to allow the interviewees to talk about what was of importance to them regarding a given question. The

interviews were divided into five sections (see Appendix 3.1): section one asked a few questions to gain some background information about the head of a rehabilitation team and his/her working experience. It also gathered data about the workplace. This information included questions about the rehabilitation team, the number of beds in the rehabilitation service and the patient's average length of stay in the rehabilitation unit. This information helped the researcher to describe the rehabilitation unit and the heads of rehabilitation teams working on these rehabilitation centres. The first section also included a question about the pathway that patients followed if they had ABI. This question helped the researcher to map the processes of the rehabilitation service. Section two covered all issues relating to the admission criteria, including the advantages and disadvantages of the admission criteria followed. This section was followed by a few questions asking about the process of the multidisciplinary goal setting for patients in inpatient settings (section three). Section four was focussed on the discharge criteria and the questions in that section included a discussion of the criteria a rehabilitation centre followed when discharging a patient from their service. The final part of the interviews was about the process of documentation. This section included a variety of questions about how the whole team documented the rehabilitation process, including assessment, goal setting, treatment or intervention and discharge plan. It also asked the consultants whether each discipline had a different documentation method and how the multidisciplinary team communicated with each other, what they thought about the documentation method used, and what its advantages and disadvantages were. Finally, the consultants were asked how they thought the documentation method could be improved. The feedback was used to map the processes of the rehabilitation service and develop a treatment recording tool to be used by physiotherapists to report the treatment provided for ABI patients in an inpatient setting. All information gathered was then used to develop a questionnaire to be sent to physiotherapists who were treating patient with ABI in an inpatient setting in the UK.

The heads of rehabilitation teams were initially contacted by email to arrange an interview time. Thirty-minute meetings were arranged with the heads of rehabilitation teams in the period between October 2010 and February 2011. The interviews were audio-recorded using a digital dictaphone (Olympus DS-5000). All audio-recordings were transcribed by the main researcher. Once this process was completed, all audio recordings and transcripts were sent to an independent researcher at the School of Healthcare Studies in Cardiff University to review and confirm the transcripts of the audio recorded. The independent researcher made sure that the transcriptions matched precisely what the interviewees were saying before being sent back to the interviewees for approval.

3.2.6. **Data analysis**

3.2.6.1. Thematic analysis

The researcher used a thematic analysis process to analyse the feedback from the interviewees. Thematic analysis is a qualitative analysis method which is widely used and seen as a foundation method of qualitative analysis. It is a method for identifying, analysing and reporting patterns within data (Braun and Clarke, 2006). One of the advantages of using the thematic analysis was its flexibility. It proved to be a flexible and useful research analysis tool which provided a rich and detailed, yet complex, account of the data (Braun and Clarke, 2006).

3.2.6.2. Inductive versus deductive thematic analysis

A theoretical thematic analysis theme was followed in this part of the data analysis. According to Braun and Clarke, (2006) themes within data can be identified in one of two primary ways: via either inductive or deductive (theoretical) approaches (Braun and Clarke, 2006). An inductive

approach means that the identified themes are strongly linked to the data. When using this approach, the themes identified may bear little relation to the specific questions that the researcher asked of the participants and themes are not driven by the researcher's theoretical interest in the topic. Meanwhile, inductive analysis is a process of coding the data without trying to fit it into a previous coding frame, or the researcher's analytic preconceptions. In this sense, this form of thematic analysis is data-driven.

On other hand, theoretical thematic analysis tends to be driven by the researcher's theoretical or analytic interest. This form of thematic analysis has been reported as providing less rich descriptions of the data though more detailed analyses of some aspects of the data. The process of choosing between inductive and theoretical approaches depends on how and why the researcher is coding the data. Since the research plan in this study was to code the data for a quite specific research question, the analysis mapping involved a more theoretical approach.

3.2.6.3. Semantic or latent themes

The analysis process of the interview feedback primarily focused on the semantic (explicit) level. Boyatzis (1998) indicates that thematic analysis typically focuses on one level: a semantic or explicit level, or a latent or interpretative level (Boyatzis, 1998). In this current study, the researcher identified themes within the explicit or surface meanings of the data. However the researcher did not look for anything beyond what an interviewee said. Ideally, the analysis process involved a progression from a description, where the data were simply organised to summarise them and show patterns of semantic content, for interpretation.

In contrast, the latent level goes beyond the semantic content of the data to identify or examine the underlying assumptions, ideas and conceptualisations. However, the development of themes

in latent thematic analysis involves interpretative work, and the analysis that is produced is not just a description, it is already theorised.

3.2.6.4. Epistemology: essentialist/realist versus constructionist thematic analysis

The research epistemology guides what the researcher can say about the data, and informs how the researcher theorises the meaning. The researcher in this part of the data analysis used a realist/essentialist paradigm. According to Braun and Clarke (2006), a thematic analysis can be conducted within both realist/essentialist and constructionist patterns (Braun and Clarke, 2006). A simple largely unidirectional relationship was assumed between meaning, experience and language, and the researcher has theorised experience and meaning in a straightforward manner.

3.2.7. **Data analysis process**

The researcher followed the guidelines provided by Braun and Clarke (2006) to analyse the data in this part of the study (Braun and Clarke, 2006). Braun and Clarke (2006) offer an outline guide with six phases of analysis: familiarising the researcher with the data; generating initial codes; searching for themes; reviewing themes; defining themes and naming themes.

3.2.7.1. Phase one: familiarising the researcher with the data

The first phase of the data analysis was to familiarise the researcher with data. According to Braun and Clarke (2006), it is important that the researcher familiarises him/herself with the data to the extent that he/she is familiar with the depth and breadth of the content (Braun and Clarke, 2006). The transcription of verbal data is considered to be one of the methods which help the researcher to develop a far more thorough understanding of the data (Braun and Clarke, 2006).

Some researchers (Bird, 2005) consider the transcription process to be a key phase of the data analysis within interpretive qualitative methodology. In this research, all audio-recordings of all interviews were transcribed by the main researcher. The literature reports that as there is no single way to conduct a thematic analysis, there is no set of guidelines to follow when producing a transcript (Braun and Clarke, 2006). What was important was that the transcripts retained the information the researcher needed from the verbal accounts, and in a way which was true to their original nature (Braun and Clarke, 2006). Hence, all the audio-recordings were transcribed exactly as per the original conversations between the researcher and the interviewees.

3.2.7.2. Generating initial codes

The second phase in the data analysis was to extract the phenomena or most significant data from the interviews by assigning conceptual labels, known as codes (Braun and Clarke, 2006). Interview coding was used to capture what was in the interview data. It helped to move away from particular statements to more abstract interpretations of interview data (Charmaz, 2009). In fact, it has been recommended that the researcher use different coding techniques to examine an interviewee's responses at different levels (Corbin and Strauss, 2008). In this research, the first coding method was the open coding or line-by-line coding. This method provided a good starting point for the researcher to identify and produce a list of themes of importance to the interviewee. The coding process began by putting the interview transcripts into a table with three columns: one for time, one for the full transcript of an interview, and the last for codes. The researcher went through the transcripts, line by line, to write codes for each line manually in the code column. A code or conceptual label was attached to almost every line of the interview transcript to capture what had been said. These labels correspond closely to the interview context. The codes were taken from the interviewee's own words and the transcripts were read and re-read to carry out further coding and refinement. This process was continuous and entailed comparing

codes from one interview with the codes from a newer interview, which helped to identify prompt questions. After open coding for the first 2 transcripts, the remaining transcripts were coded using the existing codes with new codes added on encountering data that did not fit into existing codes.

Once the line-by-line coding process was completed, the researcher started the process of focused or selective coding which helped the researcher to choose the most telling codes to represent the interviewees' opinions and responses to the questions asked. Focused codes were applied to several paragraphs or lines in transcripts. The researcher used open codes as a starting point to choose the most telling codes to represent the interviewee's opinion. This process helped the researcher to confirm the adequacy of the initial concepts developed. Once this process was completed, all transcripts and codes were sent to an independent researcher at the School of Healthcare Studies to review and confirm the codes. A discussion was conducted between the researcher and the independent researcher to define and refine the codes and their relationship to each other and to the main question.

3.2.7.3. Searching for themes

The next phase of the data analysis aimed to re-focus the analysis at the broader level of themes, rather than codes. This phase focused on building relationships between codes, themes and different levels of themes. The researcher began the process by analysing the codes and considering how different codes might combine to form an overarching theme and then sorting the different codes into potential themes, and collating all the relevant coded data extracts within the identified themes.

3.2.7.4. Reviewing themes

Phase four of the data analysis began by developing and refining a set of candidate themes. This phase involved two levels of reviewing and refining the themes identified. Level one involved reviewing at the level of the coded data extracted from the original transcripts. This process involved reading all the collected and extracted codes for each theme and considering whether they appeared to form a coherent pattern. If the themes did appear to form a coherent pattern, then the researcher moved on to the second level of this phase, which was to consider the validity of individual themes in relation to the data set and make sure that the candidate thematic map was 'accurately' reflecting the meanings evident in the data set. During this process, the researcher re-read the entire data set to ascertain whether the themes 'worked' in relation to it and to code any additional data within themes that had been missed in earlier coding stages if there were any. However, if the map did not fit the data set, the researcher returned to reviewing and refining the coding again until he devised a satisfactory thematic map.

However, if the candidate themes did not form a coherent pattern, the researcher considered whether the theme itself was problematic, or whether some of the data extracted within it simply did not accurately fit the theme. In that case, the researcher reworked the theme, thus creating a new theme and finding a suitable theme for those codes extracted which did not fit in an existing theme, and/or discarding them from the analysis.

3.2.7.5. Defining and naming themes

Once the "reviewing themes" phase was completed the next phase began. In this phase, the researcher defined and further refined the themes and analysed the data within them. This process included identifying the 'essence' of what each theme was about and determining what aspect of the data each theme captured. As part of the refinement, the researcher worked to identify

whether or not a theme contained any sub-themes. Sub-themes are essentially themes within a theme. The subthemes can be useful for giving structure to a particularly large and complex theme, and also for demonstrating the hierarchy of meaning within the data (Braun and Clarke, 2006). By the end of this phase, the researcher clearly defined what the themes were and what they were not.

3.2.7.6. Producing the report

The final phase of the thematic analysis was to produce a report to explain the results in a way which provided a concise, coherent, logical and non-repetitive appraisal of the data. The report was written to provide sufficient evidence of the themes within the data (Braun and Clarke, 2006).

3.3. Questionnaire

3.3.1. **Introduction and Aims**

The aim of this part of the study was to gather as much information as possible from physiotherapists treating people with ABI in inpatient services in the United Kingdom in order to develop the documentation method use by physiotherapists in an inpatient setting and to capture the breadth and scope of the current physiotherapy practice and conduct a mapping process of the whole physiotherapy service provided for people with ABI.

The objective of this part of the study was to answer the following questions:

1. What were the documentation processes used by physiotherapists to document the patients' assessment, goal-setting, treatment and discharge processes?
2. What was the physiotherapy assessment process in the inpatient rehabilitation service in the

United Kingdom?

3. What goal-setting processes were used in inpatient ABI rehabilitation services?
4. What physiotherapy techniques, treatment adjuncts and treatment tasks and positions did physiotherapists use to treat ABI patients in United Kingdom inpatient rehabilitation services?
5. What discharge processes were used in inpatient ABI rehabilitation services?

To meet the research aims, it was necessary to gather information from as many physiotherapists as possible in order to generalise the findings. A questionnaire was the means to gather information about a particular population or practice through a method of asking standardised questions. It is a data collection method commonly used in healthcare research and is considered to be one of the most economically viable options when collecting information from large, geographically dispersed segments (Edwards, 2002). Giving the fact that the questionnaires can be conducted in so many different ways such as by post, telephone, personal interview or via the Internet, it was necessary to choose the most appropriate questionnaire communication method to be used in this study. Choosing the questionnaire communication method was highly dependent on many things, such as personal preference, time constraints, cost and/or potential responses. Table 3-1 compares the various questionnaire communication methods (Frazer and Lawley, 2000).

Table 3-1: Comparison of questionnaire communication methods' characteristics
(Frazer and Lawley, 2000)

Criterion	Postal questionnaire	Interview questionnaire	Telephone questionnaire	Internet questionnaire
Cost	Low	High	Moderate	Very low
Speed of data collection	Slow	Immediate	Immediate	Fast
Ability to reach geographically dispersed segments	High	Very low	Medium	Very high
Length of the questionnaire	Long (4-12 pages)	Long (30-60 pages)	Medium (10-30 pages)	Long (4-12 pages)
Questionnaire complexity	Simple to moderate	Simple to complex	Simple only	Simple to moderate
Hard to recall data obtainable	Good	Poor	Moderate	Good
Respondent anonymity	Possible	Not possible	Not possible	Possible
Rapport with respondents	None	High	Moderate	None
Interview bias	None	High	Medium	None
Need for interviewer supervision	No	Yes	Yes	No
Response rate	Low	Very high	Moderate	Moderate

Looking at the above table, it can be clearly seen that Internet and a postal questionnaire were the most appropriate methods for the present research's aims due to their low cost and ability to reach a large number of potential respondents in a variety of large geographical locations. Such questionnaires are called self-administered questionnaires. However, the researcher bore in mind the fact that the response rates to self-administered questionnaires are usually lower than they are for interviews, as people do not often take the trouble to complete the survey and send it back, in fact this can vary depending on how invested potential respondents are in the topic (Vaus, 2002).

3.3.2. **Self-administered Questionnaire**

The main advantage of using the self-administered questionnaire was that the respondents had the flexibility to complete it in their own words and time which helped the respondents to more readily respond truthfully to sensitive questions. The self-administered questionnaire was more cost-effective than any other method of data collection (Riette, 2007). Using this research method helped the researcher to reduce interviewer bias. The most important disadvantage of self-administered structured questionnaires was that the researcher did not have full control over who filled in the questionnaire, even though it may be addressed or delivered to the intended participant. However, to overcome these drawbacks, the researcher added a few questions asking about the physiotherapist's years of experience of treating ABI patients, his/her band and level, the average number of ABI patients that the physiotherapist treated every month, and finally the place of work and which stage of the ABI the physiotherapist was usually treating.

3.3.3. **Participants**

Questionnaires were sent to physiotherapists treating patients with ABI. The researcher used the Association of Chartered Physiotherapists Interested in Neurology (ACPIN) and the Physiotherapy Acquired Brain Injury Network (PABIN) databases to obtain contact details for experienced physiotherapists who treat people with ABI in the UK. ACPIN is one of the largest clinical interest groups in the UK which has a large database containing more than 1,000 registered physiotherapists and PABIN is a network for physiotherapists who are treating ABI in the UK. These two networks are the largest and most well-known networks among any other neurology physiotherapy networks. Members of these networks who agreed to their names being held on the database and being contacted for research purposes were recruited in this study.

The process of developing the questionnaire involved work to test and improve the face validity of the questionnaire and test its reliability and acceptability before it was sent out to the physiotherapists. All physiotherapists who were working in the Regional Rehabilitation Unit at Northwick Park Hospital, London, UK were invited to take part in the validation process of the questionnaire. Physiotherapists who were working in the Regional Rehabilitation Unit (RRU) at Northwick Park were chosen to take part in this part of the study. The Regional Rehabilitation Unit (RRU) at Northwick Park has up to 22 beds for patients with severe and complex disabilities and who need specialist rehabilitation. Acquired brain injuries and people who have had strokes are the main focus of work in the RRU. There was an inter-disciplinary staff team working in the Regional Rehabilitation Unit (RRU) at Northwick Park; many of them were involved in research and the unit provided a high level of education and training in neuro-rehabilitation both locally and nationally. Moreover, all physiotherapists who were working with ABI patients at Rookwood Hospital, Cardiff, UK were invited to participate in the process of testing the questionnaire's reliability and acceptability.

3.3.4. **Response rate**

According to Hamilton (2003), acceptable response rates vary according to how a survey is administered (Hamilton, 2003). A 50% response rate is considered adequate if the survey is sent by mail while a 30% response rate is an average rate if the survey is administered online (Hamilton, 2003). The researcher's target was to reach at least a 30% response rate. To avoid a low response rate, the researcher followed certain recommended steps when he designed the questionnaire. These steps were reported in guidelines to increase the survey's response rate and will be mentioned in detail later in this chapter.

3.3.5. **Research governance ethical considerations:**

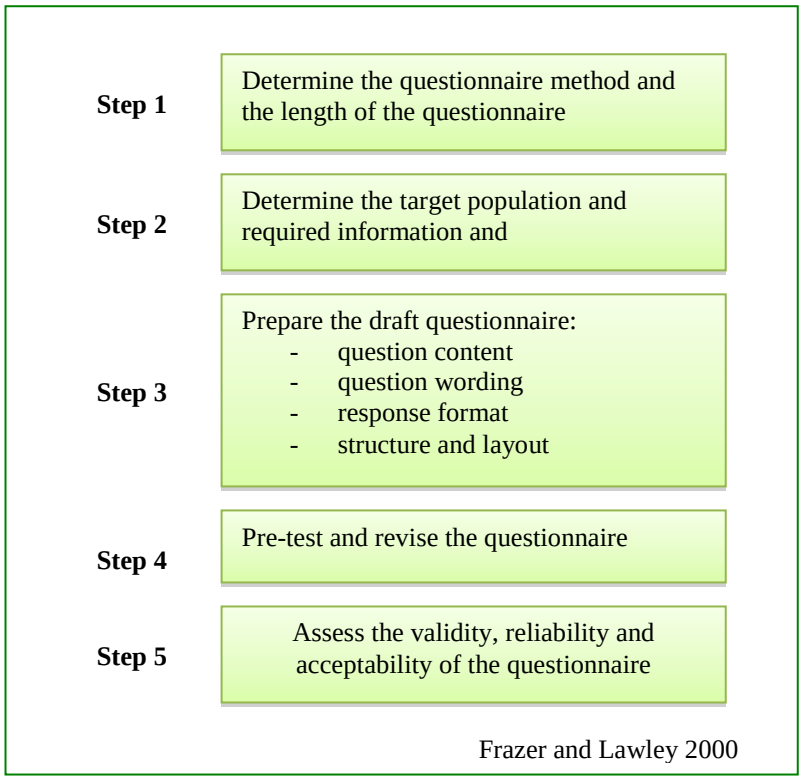
For this part of the study, all necessary governance approvals were obtained prior to starting the data collection process including from the following: the School of Healthcare Studies Ethical Committee, Cardiff University; the South-East Wales Research Ethical Committee; Cardiff & Vale University Health Board Research and Development office (Cardiff) and North-West London Hospitals Research and Development office (London) (See Appendices 2.1; 2.2; 2.3; 2.4 and 2.5 for all approvals).

The researcher only contacted and sent the questionnaire to ACPIN and PABIN members who had already agreed to be contacted for research purposes. Each questionnaire sent out to physiotherapists had a unique code. These codes were connected separately to the physiotherapists' names though the researcher was blinded to who completed the questionnaire**.**

3.3.6. **Questionnaire design process**

The researcher followed five steps to design the questionnaire (see Figure 3-2). These steps were reported by Frazer and Lawley (Frazer and Lawley, 2000). The first step was to identify the best method and type of questionnaire to be used, communication method and the length of the questionnaire. The second step was to determine the target population and to gather all the required information and necessary questions which needed to be answered and from whom it could best be obtained. This step used the information gathered from the literature review and feedback from the interviews conducted with the heads of the rehabilitation teams. After that, the researcher wrote a draft of the questionnaire, paid attention to appropriate questions, their wording and content, as well as the layout of the questionnaire. The questionnaire was then tested to improve its validity and test its reliability and acceptability and, based on this testing, a revision and the final version of the questionnaire was made (Frazer and Lawley, 2000).

Figure 3-2: Questionnaire design process



3.3.6.1. Determine the questionnaire communication method and the length of the questionnaire

Compared to other communication methods, the email and the postal methods were the more favourable in terms of cost, their ability to reach geographically dispersed segments and respondent anonymity. Furthermore, they have less interview bias and do not need interviewer supervision. The researcher decided to use both a postal questionnaire and an electronic Internet questionnaire for this study, depending on individual physiotherapists' preferences (Lboro, 2010).

The length of a questionnaire is usually inversely proportional to the response rate (Lboro, 2010). The researcher spent every effort to eliminate all unnecessary questions. This was applied to all parts of the questionnaire. The questionnaire was given a short and meaningful title to draw the respondents' attention to the questionnaire. Clear and very brief information and instructions

were written for the respondents in the first page of the questionnaire to outline what the purpose of the survey was and why their response was important. The introduction also included a brief summary about the research group and how all answers would be treated with confidentiality and anonymity. The researcher also allowed enough room for the respondents to answer questions and provided plenty of white space between questions so the questionnaire did not look too 'busy' (Lboro, 2010). In order to increase the response rate, the questionnaire was as brief as possible with clear headings and numbering for each section and question (Lboro, 2010).

3.3.6.2. Determine the target population and required information

One of the most important steps of the questionnaire design process was to define the target population clearly. Since the researcher was looking at the physiotherapy process and practice, the best population to seek the information from was the physiotherapists who were treating people with ABI in the United Kingdom. A clear description of the target population allowed the researcher to ask relevant background questions and to formulate the questions in such a way that they were understood by the research population.

It was also very important to have clarity about the research question(s) and intended aims before the main researcher started formulating questions to include in a questionnaire. The second step in designing the questionnaire was to define the research question(s) and aims clearly to make sure that all relevant questions were asked and to know exactly what information needed to be elicited from respondents to meet those goals.

The researcher then gathered together all the questions which had been recognised as needing to be answered in order to develop the documentation method used by physiotherapists who treat people with ABI in an inpatient setting and process map the current physiotherapy service

provided to people with ABI. The skeleton of the questions was informed by the literature review and interview feedback. Each question directly linked back to the research questions and aims, and any question which was not related to any of the research questions and/or aims was excluded. The researcher also tried to exclude any question which had already been answered in the literature or by the heads of the rehabilitation teams in the interview section. The remaining questions were put together to design the original draft of the questionnaire.

The questionnaire was also designed to help the researcher to map the processes of the physiotherapy service. The mapping process helped the researcher to search for opportunities to identify, describe and gain an in-depth understanding of the physiotherapy rehabilitation service provided to people with ABI.

The questionnaire was divided into 5 sections. Each section represented a stage of the rehabilitation service and tried to answer one of the previously mentioned research questions (See Introduction and Aims paragraph on this chapter), except the first section that asked about the respondent's experience and background. The other four sections were organised in a logical order to cover: assessment; analysis and goal-setting; treatment and discharge. The questionnaire began with a one-page general section asking respondents to answer five biographical questions asking about their background experience and workplace. Such questions were very important since they helped to categorise the physiotherapists' responses based on their working experience and workplace to see how these two elements might affect the physiotherapists' responses to other parts of the questionnaire. This section also helped the researcher to know who completed the questionnaire as the researcher could then compare the results. It has also helped the researcher to overcome the difficulties of having control over who filled in the questionnaire, which had been reported in the literature as a limitation of using a self-administered questionnaire (Riette, 2007). Questions asked on this section included the following:

1. Please state the number of months or years you have been treating patients with ABI.
2. What is the best description of your place of work?
3. What is your current band/level?
4. Please state the average number of ABI patients that you treat every month.
5. At what stage do you usually treat patients with ABI?

Section two was investigating the physiotherapy assessment process followed in the inpatient rehabilitation service. This section consisted of nine questions which were informed by the literature review and interview feedback and aimed to answer the following question: What was the physiotherapy assessment process in the inpatient rehabilitation service in the United Kingdom? And what were the documentation processes used by physiotherapists to document the patients' assessment? The first question asked the physiotherapists whether they followed any guideline/s in their assessment process. The next few questions asked the physiotherapists to describe their assessment process and when they completed the patient's initial assessment. It also contained questions about the advantages and disadvantages of using an assessment process. The second section also contained questions asking the physiotherapists about the documentation process for their assessments and its advantages and disadvantages. The last question of the second section asked about the outcome measures the physiotherapists were using to evaluate their patients.

Section three of the questionnaire was focussed on the goal-setting process used in inpatient ABI rehabilitation services. This section consisted of seven questions and aimed to answer the following research questions: What goal-setting processes were used in inpatient ABI rehabilitation services and what documentation method did physiotherapists use to document the patients' goals setting process? This section started by asking physiotherapists whether they regularly met to set goals for their patients, and if yes, who attended those meetings and how

often they met to set goals for each patient. It also included questions asking physiotherapists to describe how they set physiotherapy goals and how often they evaluated the physiotherapy goals set. The last question in this section was about whether physiotherapists were using goals set as potential outcome measures and whether they were using a goal-attainment scale.

The last section of the first draft of the questionnaire was focusing on the physiotherapy treatment and was designed to help the researcher to develop and evaluate the physiotherapy documentation process used by physiotherapists for people with ABI in an inpatient rehabilitation setting. Due to the difficulties in identifying physiotherapy interventions which truly contribute to rehabilitation outcomes, and since most published studies examined physiotherapy on aggregate, as a whole, and the literature reported that individual interventions are rarely examined in the context of the entire array of physiotherapy interventions (DeJong et al., 2004), the need for an accurate and detailed description of physiotherapy interventions using a robust method to document the physiotherapy provided has been reported as it would bring systemisation, greater clarity and more precision to describing, evaluating and quantifying what happens in physiotherapy practice (De Wit et al., 2007, DeJong et al., 2004). This part of the questionnaire was used to build the treatment activity list, which was then used to develop the documentation process and design a new treatment recording tool. The researcher listed an extensive number of treatment techniques, adjuncts, tasks and positions, and asked physiotherapists who completed the questionnaire to specify which of these activities they use with their patients, given their caseload over a period of six months. (See Table 3-2 for the physiotherapy activities included in the questionnaire). These questions were followed by three other questions asking the physiotherapists about the documentation format they were using to document their treatment and its advantages and disadvantages.

Table 3-2: Physiotherapy activities included in the questionnaire.

Physiotherapy techniques		Treatment Adjuncts		Treatment task and positions	
Selective Movement	Manual Facilitation Co-ordination Alignment	Education and advice	Patient Ward staff [Care-giver] Family [Care-giver]	Posture/ position	Lying—supine Lying—Prone Side lying Sitting—supported Sitting—unsupported Standing—stride stand Standing—step stand Standing—single leg stand
Balance	Balance re-education Core stability re-education	Medication	Botulinum Toxin Injection Systematic spasticity medication Pain relief	Transfers	Bed mobility (including rolling) Lying to sitting (vice versa) Sitting to standing (vice versa) Stand and step around Bed to chair/ toilet (vice versa) through sitting Car transfer Floor to chair (vice versa)
Task specific training:	Cognitive strategies Perceptual training Manual cueing & sensory inputs External cueing Demonstration/modelling Soft tissue mobilisation (eg.massage)	Orthotics	Splinting Casting Ankle Foot Orthoses	Tasks	Stepping Up and down stair activities Turning around activity Walking Wheelchair handling and driving Reaching and UL activities Personal ADL Domestic ADL Leisure./ hobbies and sports Work related activities
Musculoskeletal interventions	Joint mobilisation (e.g. PPIVMs,PAIVMs) Strengthening (Resistance from the therapist/ body weight or equipment) Stretching PROM Positioning Electrotherapy techniques (FES, TENS)	Equipment	Plinth Tilt table Electric standing frame Oswestry standing frame Gym ball Sit-fit Parallel bars Free weights Exercise bike Treadmill or other gym equipment Static bike Motor bike Walking stick High walking stick Quad/Tripod Wheeled Rollator Pick up Zimmer frame Elbow crutches Arjo walker Computer games	Class activities	Circuit activities Hydrotherapy
Respiratory Care	Secretion management:- Suction, ACBT, Manual techniques or Positioning Management of lung volumes Hydrotherapy	Specialised Equipment	Mattresses Seating Wheelchair Cushions T-roll		
Exercise	Cardiovascular / Cardio-respiratory Exercise Endurance Exercise				

3.3.6.3. Pre-test and revise the questionnaire

The first draft of the questionnaire was designed and reviewed by expert physiotherapists from the School of HealthCare Studies, Cardiff University, Cardiff, UK. Based on their opinions and feedback, all appropriate changes were made and a second draft of the questionnaire was created. All the changes made related to writing or presentation style. This step was followed by further steps (described below) to improve the validity, and test the reliability and accessibility of the questionnaire.

3.3.7. **Assess the validity, reliability and acceptability of the questionnaire**

3.3.7.1. Questionnaire validity and acceptability

3.3.7.1.1. Introduction

This part of the study was designed to improve the validity of the newly developed questionnaire. Validity is known as the degree to which a questionnaire reflects reality (Damato et al., 2005). The term validation refers to the process by which any data collection instrument, including a questionnaire, is assessed for its dependability (Damato et al., 2005). There are a number of types of validity, including face validity, content validity, criterion validity/predictive validity and concurrent validity. It was very important to understand each type of the aforementioned validity types to decide which type of validity was important to be tested in this study. It has been reported that face validity refers to whether questions appear to be measuring what needs to be measured. This relies on knowledge of the way people respond to survey questions and drawbacks that are common in questionnaire design. However, some researchers believe that face validity is not really validity at all. They think that face validity refers to the appearance of a

questionnaire: Is it carelessly or poorly constructed or does it look "professional"? (Williams et al., 2006). Face validity is closely related to content validity (Burford and Bagnall, 2007). Content validity refers to whether all important aspects of the construct are covered. In most cases, this form of validity is assessed (subjectively) by a panel of experts, who have to reach agreement (Ridley, 2005). Within the criterion of validity, predictive validity, refers to whether scores on the questionnaire successfully predict a specific criterion while concurrent validity refers to whether the results of a new questionnaire are consistent with the results of established measures.

Both face and content validity were evaluated in this part of the study. The questionnaire's face validity was evaluated since it has been reported that face validity is an important consideration for both the pre-test and final draft of the questionnaire and professional-looking questionnaires are more likely help to increase the response rate (Williams et al., 2006). The content validity was also tested, as it was important to know that all important aspects of the research area had been covered.

3.3.7.1.2. Procedure

To improve the validity of the questionnaire, the researcher interviewed expert physiotherapists to reach a consensus. The main purpose of the interviews was to obtain respondent feedback on the questionnaire. The interviews served that purpose very well because they allowed the researcher to hear the respondents' comments on the questionnaire directly and to probe their exact meaning. It allowed both the researcher and the interviewees to raise and explore many useful issues such as how could the researcher increase the response rate. To test and improve the face validity, seven physiotherapists in the Regional Rehabilitation Unit at Northwick Park Hospital, London, UK were interviewed as part of this process. The researcher used a cognitive

testing method, which was a form of structured interviewing designed to improve the face validity of a questionnaire. The cognitive testing method was developed by Willis, Royston and Bercini (1991) and consists of three strategies (Willis et al., 1991). The first was the concurrent think-aloud technique, in which interviewees were asked to verbalise their thought processes as they respond to each question. The second was paraphrasing questions, which involves asking the interviewee to repeat the question using their own words in response to a particular question, "What does this question mean to you?" The third strategy was the use of probes; a set of questions the researcher used to prompt the interviewees to explain their responses further. Examples of probes questions include: "Can you think of a better way to ask this question so that it would be clearer to other interviewees?" and "Are there any words in the question that other clients may find confusing or unclear?" (Willis et al., 1991).

Interviews were organised by the clinical specialist / principal physiotherapist at the Regional Rehabilitation Unit at Northwick Park Hospital, London. Interviews were divided over two days as follows: 3 interviews (physiotherapist bands 7, 7 and 5) on the first day and 4 interviews (physiotherapist bands 6, 8A, 6 and clinical specialist) on the second day. Interviewees were given a copy of the questionnaire and a feedback sheet two days before their interviews and were asked to complete the questionnaire and write their comments on and opinions about the questionnaire on the feedback sheet (See Appendix 4.1). During the face-to-face interviews, the interviewees were given sufficient time to express their opinions and comments about each question of the questionnaire.

The first question in the interview asked the interviewees about the time it took them to complete the questionnaire. This question was important to ensure that the time taken to complete the questionnaire, which the researcher wrote in the questionnaire introduction, was accurate. Brent (2013) has studied the time a respondent would be willing to spend completing a survey (Brent

2013). Brent (2013) emphasises the importance of understanding the audience when constructing a survey as it can help inform decisions on survey length (Brent 2013). He studied how the length of a survey (as measured by the number of questions) impacts on the time respondents spend on the completion of the questionnaire. He reviewed a random sample of roughly 100,000 surveys that were 1-30 questions in length, and analysed the amount of time that respondents spent completing them. He found that the relationship between the time respondents spent answering each question and the number of questions was not linear. The more questions the survey asks, the less time the respondents spend. On average, the researcher found that respondents spent just over a minute to answer the first question of a survey (including the time spent reading the introduction) and then about 5 minutes in total to answer the next 10 questions.

To increase the response rate, it has been reported that the introduction should provide sufficient and concrete information about a study in as short a paragraph as possible. Thinking ahead, it was necessary to ask interviewees about their opinion of the introduction. The researcher then moved to other sections and asked the interviewee whether they had any concerns with any section, in general, before going through all the questions one by one. During the interviews, the participants indicated whether each of the 26 questions was clear or unclear. Furthermore, at the end of the interviews, the participants were asked about questions that were deemed to be missing, irrelevant and/or confusing. This step aimed to identify unclear or redundant questions and to assess the respondents' reactions to the questionnaire format and the ease of response. The primary rationale behind this process was to paraphrase questions that the study participants perceived as being relatively unclear.

In addition, the interviews constituted the content validity judgement, where physiotherapists were asked to give their written comments on the content of each part of the questionnaire and

then rate the acceptability of the questionnaire using a 100-point horizontal visual scale. Each section of the questionnaire had a separate scale.

3.3.7.1.3. Data analysis

Both quantitative and qualitative methods were applied. Qualitatively, the physiotherapists interviewed were also asked to comment on each section's wording, clarity and meaning, including suggestions for refinement and modifications wherever necessary. Quantitatively, the physiotherapists were asked to rank the acceptability of the questionnaire using a 100-point horizontal visual scale. Each section of the questionnaire had a separate scale. The lowest rating (score 0) corresponded to "the questionnaire's section was not acceptable" and the highest rating (score 100) corresponded to "the questionnaire's section was very acceptable". The mean and 95% confidence intervals (95% CI) of the VAS scores were calculated from all feedback. An adequate and acceptable level was set at a mean score of 75% or higher (Chung et al., 2007).

Based on the qualitative comments provided by the participants, additional questions were created. These new questions were generated from the participants' comments elicited during the interviews. Participant comments included various suggestions. All comments and suggestions were considered to improve the questionnaire's structure and questions. Full details of all changes made to the original draft of the questionnaire will be described in details in the results chapter.

3.3.7.2. Questionnaire reliability process

The stability of the final draft of the questions was assessed in terms of intra-rater test retest reliability. Agreement between two different completions of the questionnaire by the same physiotherapist was estimated by calculating the point-to-point percentage of agreement at

category level (Williams, 2003). Reliability testing specifically focused on the treatment activity section.

The questionnaire's reliability was tested in Rookwood hospital, Cardiff. Seven physiotherapists who were working with ABI patients in Rookwood Hospital, Cardiff UK were invited to participate in the process of testing the questionnaire's reliability. The questionnaire was sent to these physiotherapists to complete. Two weeks later, the treatment activity section of the questionnaire was sent to the same physiotherapists again. Each questionnaire had a unique code. These codes were connected separately to the physiotherapists' names to make sure that both sets of feedback were from the same physiotherapist.

3.3.7.2.1. Data analysis

Kappa scores for the intra-rater test retest reliability of individuals were calculated using SPSS version 20 for Windows. The following categories were used to judge the kappa values: kappa <0.00 was considered "poor agreement", 0.00-0.20 "slight agreement", 0.21-0.40 "fair agreement", 0.41-0.60 "moderate agreement", 0.61-0.80 "substantial agreement", and 0.81-1.00 "almost perfect agreement". This method was originally proposed by Landis and Koch in 1977 (Williams, 2003). Although the benchmarks which were used are very familiar and popular, they can be over-simplistic if regarded as being universally applicable. Therefore, the results were also interpreted in percentages. Weighted statistics were calculated to assess the agreement between the 2 ratings for each rater, and for each category of the treatment activity. For each section of the treatment activities (treatment technique, treatment adjuncts, treatment position and task), overall kappa statistics across both completions were estimated with a 95% CI. The reason why the researcher did not calculate the Kappa across each single subcategory of the treatment activity list was because most of the activities had at least one case where the value of the weighted variable

was zero, which made it impossible to calculate Kappa (Portney and Watkins, 2007). The researcher calculated Kappa across the whole section so as to have enough data to fulfil the statistical test assumptions. Any activity, tool or position that was mentioned as being used at least once a week by more than 75% of the physiotherapists would be considered, as it was being used on a regular basis (this will be described in detail later on this chapter) and so could be included in the new developed treatment recording tool. The process of categorising the agreement between the two completions of the questionnaire was based on the physiotherapists indicating that he/she used the activity either regularly (once, or more than once a week) or rarely (less than once a week) in both completions. To simplify the process, take an example where the physiotherapist indicated that he/she used activity (A) very regularly (more than once a week) in the first completion of the questionnaire and regularly (once a week) in the second completion, then this would be considered as an agreement between the two completions; and if, for example, the physiotherapist indicated that he/she used activity (B) regularly in the first completion and less regularly (more than or equal to once a month) in the second completion, then this would considered as no agreement between the two completions.

3.3.8. **Building the questionnaire**

Once the final draft of the questionnaire had been tested and proven by the research team, the researcher designed two versions of the questionnaire: paper-based and electronic. The paper-based questionnaire was designed using Microsoft Publisher 2010 software. The questionnaire was seven pages long, plus an introductory cover sheet (see Appendix 3.2) and the researcher gave careful consideration to the questionnaire's appearance. The researcher used the Bristol Online Survey Tool to build the questionnaire electronically. Bristol Online Surveys (BOS) is a service that allows a researcher to develop, deploy and analyse surveys via the Bristol University

website. The researcher attended a comprehensive course to learn how to use the Bristol online surveys website to design a questionnaire and obtained the licence to use it.

3.3.9. **Sending the questionnaire out**

The questionnaire was sent to three different groups of physiotherapists: The Association of Chartered Physiotherapists Interested in Neurology (ACPIN), the Physiotherapy Acquired Brain Injury Network (PABIN) and physiotherapists in Rookwood hospital, Cardiff, UK.

One hundred and five physiotherapists who were members of the Association of Chartered Physiotherapists Interested in Neurology (ACPIN) stated that they worked with people with ABI and all of them consented to be contacted for research purposes. ACPIN members who did not agree to be contacted for research purposes did not participate in this study. ACPIN members were contacted by email or by post, according to their preference. A prepaid return envelope was sent with all posted questionnaires (see Appendix 6.1 for the distribution of the questionnaire sent out to ACPIN members across the whole of the UK). The questionnaire was electronically sent to another 105 physiotherapists registered on the Physiotherapy Acquired Brain Injury Network (PABIN). Two weeks later, a reminder email or letter was sent to all the physiotherapists who had been contacted electronically and to all the physiotherapists who were contacted by post and did not respond to the first contact to remind them to complete and return the questionnaire. A further copy of the questionnaire and a prepaid return envelope were sent with reminder letters. The questionnaire did not include any data that could identify the physiotherapist who completed it. Each questionnaire sent by post was given a unique number. This number was linked to the address of the physiotherapist to whom the questionnaire was sent. This helped the researcher to ascertain which physiotherapists had responded and thus avoid duplication. If necessary, a further reminder was sent two weeks after the first reminder.

3.3.10. Questionnaire's Data Analysis

Once the questionnaire data had been collected, the researcher started the analysis process. Different methods of data analysis were used in order to address the initial propositions of the study, which included examining, tabulating, categorising or otherwise recombining the evidence (Shuttleworth, 2008). In this current research study, the data obtained were both qualitative and quantitative; therefore, Microsoft (MS Excel) and SPSS version 20 (Statistical Package for the Social Sciences) were used for data entry and analysis. The questionnaire consisted almost entirely of closed pre-coded questions and some attitude scales. Some questions were not pre-coded, such as the length of the physiotherapists' experience and the description of their place of work, etc. For such questions, appropriate grouping was decided on and given numerical values. All the categories were assigned numerical values. Descriptive statistics were used to analyse the data for all open-ended questions (Shuttleworth, 2008).

3.4. Process Mapping the service

The researcher used a triangulation analysis to describe the healthcare that patients would receive if they had an ABI in the United Kingdom. Triangulation analysis is a methodological approach to analyse research results when multiple methods, theories, sources, and/or investigators are used (Farmer et al., 2006). Hence, many researchers who deal with qualitative methods of investigation within the health and social sciences have reported the importance of triangulation (Farmer et al., 2006, Flick, 2002). Since this study used three different sources of information – literature, feedback from the heads of rehabilitation teams who were interviewed and feedback from the physiotherapists who completed the questionnaire – a triangulation method was used to analyse the data for this part of the study. This is a simple method of analysis to determine the position of a third point using observations from two other points (Farmer et al., 2006). Hence, the results in this part of the study were structured based on the feedback received from the heads

of rehabilitation teams and each point was compared and contrasted with the feedback received from the physiotherapists who completed the questionnaire and the literature. Any additional information which was received from physiotherapists but not reported by the head of a rehabilitation team was considered and compared and contrasted with available information in the literature.

3.5. Treatment Recording Tool

The main aim of this study was to develop and evaluate the physiotherapy documentation method used by physiotherapists for people with ABI in an inpatient rehabilitation setting by developing a new treatment recording tool. To achieve this aim, the researcher used the information gathered from the literature reviewed to build the layout and sections of the treatment recording tool. The researcher considered all previous studies which aimed to improve the documentation method in an inpatient setting and provide an in-depth view of rehabilitation practices such as the PSROP, CERISE and SPIRIT studies (Gassaway et al., 2005; de Wit et al., 2006 & Tyson and Selley, 2004). The researcher also used the feedback from both the heads of the rehabilitation teams who were interviewed and the physiotherapists who completed the questionnaire to identify all the key attributes which might affect the rehabilitation process and gather in-depth information about the physiotherapy service and documentation, and the advantages and disadvantages of the documentation methods used in inpatient ABI rehabilitation settings. All the advantages and disadvantages were considered when building the new treatment recording tool. The researcher's plan was to develop a new treatment recording tool which would retain all the reported advantages and apply them to the new developed treatment recording tool to build a documentation method which is structured and patient-centred, standardised, flexible, comprehensive, systematic, organised, concise, quick and easy to read and fill in, and allows less writing. The treatment recording tool developed was designed to avoid repetition (Health

Professions Council, 2008). All the policy, ethical and legal issues in physiotherapy documentation were therefore relevant to the development process. The result sections will describe in detail the newly developed treatment recording tool.

3.5.1. **Piloting of the treatment recording tool**

This part of the study aimed to:

1. determine whether physiotherapists agree that the record of the treatment generated using the treatment recording tool is accurately describing the treatment activities provided to patients with ABI in inpatient setting.
2. determine whether individual physiotherapists provide a similar list of treatment activities when, on two separate occasions, they view video tapes of the same treatment sessions provided for the same patient on previous occasion (intra-rater reliability).
3. determine whether two different physiotherapists provide a similar list of treatment activities when they view video tapes of the same treatment sessions provided for the same patient (inter-rater reliability).

3.5.1.1. Participants

Once the final draft of the treatment recording tool was developed, the piloting process began. Piloting the draft treatment recording tool in clinical practice took place at Rookwood Hospital Cardiff, UK. Physiotherapists (n=6) who were treating ABI at Rookwood Hospital were invited to pilot the draft recording tool in their clinical practice. All patients (n=9) who agreed to take part in this study were recruited for this purpose.

3.5.1.2. Research governance ethical considerations

Written permission was obtained from all the physiotherapists who were asked to complete the treatment recording tool after randomly selected sessions with their patients who also agreed to take part in this study. The researcher made sure that each treating physiotherapist made the initial contact with their patients and/or their carers and provided potential participants with an invitation letter and information sheet, which was given to them by the researcher (see appendix 1.1 for the invitation letter, Appendix 1.5 information sheet for patient able to consent and Appendix 1.6 for patients who were unable to consent). Patients were given sufficient time to consider whether they wished to participate in the study (approximately two weeks). If they agreed, the researcher then sat with each potential participant and/or his/her carer to separately describe the study procedures, answer all questions, and obtain the consent of the patient or carer if the patient was unable to give their consent.

All necessary governance approvals were obtained prior to starting the data collection process including from the following: the School of Healthcare Studies Ethical Committee, Cardiff University; the South-East Wales Research Ethical Committee and Cardiff & Vale University Health Board Research and Development office (Cardiff) (See appendices 2.1; 2.2; and 2.4)

3.5.1.2.1. Recruiting patients unable to give consent

Due to the severity of the condition, some of the patients recruited to test the treatment recording tool were unable to give consent. The treating physiotherapist initially took the decision of whether or not the participants had the capacity to give consent based on a two-stage test:

1) Does the participant have an impairment or disturbance in the functioning of their mind or brain?

2) Does such an impairment/disturbance mean that the person is unable to make a specific decision when they used to be able to?

The final decision as to whether a person was able or unable to make a decision was based on:

− Whether the person understands the information relating to the decision;

− Whether the person can retain that information;

− Whether the person can use or weigh that information; and

− Whether the person can communicate his/her decision.

If it was deemed that the person was unable to decide to give/refuse consent, a personal or nominated consultee was approached.

The researcher made every effort to communicate with participants with special communication needs. This included asking people who know the patient well about the best form of communication and using that. It also included using simple language and, where appropriate, using pictures, objects or illustrations to demonstrate ideas. The researcher was also careful to speak at the right volume and speed, with appropriate words and sentence structures, pausing to check understanding, and breaking down difficult information into smaller points that were easier to understand. Also, the researcher allowed each patient to consider and understand each point before continuing. He was also prepared to repeat information or go back over a point several times if necessary. However, if communication difficulties were due to the patient's mental incapacity, then the treating physiotherapist nominated a personal consultee or identified a nominated consultee to act on the patient's behalf.

The treating physiotherapists made every effort to take into account the wishes of a patient who lacked the capacity and was unable to give consent themselves or about whom to consult, and to act in accordance with any relevant statement or wishes. They were able to nominate a close relative or friend to act as a personal consultee and to be sure that he/she was someone whom the person who was unable to give consent themselves would trust with important decisions about their welfare. Their decisions were based on discussion with carers and/or medical staff. In the case of no personal consultee being available, the nominated consultee was identified through discussion with carers and/or medical staff. This consultee was given an information sheet and only contacted to discuss such patients' involvement in the study once they have had sufficient time (up to two weeks) to consider the information provided. Once informed consent was obtained, the researcher met with the consultee to discuss the study and consult with them. The consultees were asked to be present during data collection sessions to ensure that the wishes and feelings of all participants were respected. The researcher used special information sheets and consent forms for patients unable to give consent (see Appendix 1.6 and 1.11).

3.5.1.2.2. Data protection

All collected data was stored electronically on a secure password-protected external hard drive located in the School of Healthcare Sciences (SOHCS), Cardiff University. No collected data were held with any personal identifiable information. The saved files did not include any data that could identify any study participant. A unique code was given to each subject. The links between codes and patients' personal details were held in paper format in a locked filing cabinet.

Physiotherapy treatment sessions were video recorded as part of the piloting process and prior to video recording patients, the researcher arranged a time with a member of the medical imaging department at the University Hospital of Wales so that patients' and therapists' faces could be

masked, so that they would not be identified, before putting the sessions onto videotape and onto a password-protected external hard drive.

3.5.1.3. Treatment recording tool's validity and acceptability process

This part of the study aimed to test the validity and acceptability of the final draft of the newly developed treatment recording tool. Physiotherapists who treated ABI in Rookwood hospital (n=6) were invited to use the recording tool and provide their opinions on it.

Full definitions of the terms used along with a training manual that included instructions for completing the treatment recording tool were provided and explained to each physiotherapist (See Appendices 5.1 and 5.2). Each physiotherapist was given sufficient time to become familiar with the treatment recording tool, definitions of the terms used, an associated manual and the method for completing the recording tool. Immediately after the treatment sessions, physiotherapists were asked to complete the treatment recording tool for each treatment session provided to any of the patients recruited to the study.

Following the physiotherapists' completion of the treatment recording tool, they were asked to write their comments on and opinions about the treatment recording tool's description of the treatment they had provided to their patients using a special form provided for them (see Appendix 4.2). Physiotherapists were also asked to rate the adequacy of treatment recording tool using a 100mm horizontal visual analogue scale (VAS). The feedback form consisted of four different sections and scales: one to give feedback and rate the time that the physiotherapist spent to complete the treatment recording tool; one for the accuracy of the treatment recording tool to describe the treatment session; one for the comprehensiveness of the treatment activity's list; and the last one was for overall feedback on the treatment recording tool. The lowest rating (score 0)

corresponded to the time spent on completing the treatment recording tool, the accuracy of the treatment recording tool to describe the treatment session, the comprehensiveness of the treatment activities list and/or the overall acceptance of the treatment recording tool being unacceptable, and the highest rating (score 100) corresponded to the time spent on completing the treatment recording tool, the accuracy of the treatment recording tool to describe the treatment session, the comprehensiveness of the treatment activities list and/or the overall acceptance of the treatment recording tool being highly acceptable.

3.5.1.3.1. Data analysis

The mean and 95% confidence intervals (95% CI) of the VAS scores were calculated from six separate ratings. An adequate and acceptable score was set at a mean score of 60% or higher, based on Chung, Wong and Griffiths' (2007) study. Feedback from physiotherapists was used to improve the treatment documentation tool (Chung et al., 2007).

3.5.1.4. Treatment recording tool reliability process

The treatment recording tool's reliability was tested by video recording the same physiotherapy sessions which were provided to the same patients during the validity study of the treatment recording tool. The researcher obtained written permission from the physiotherapists (n = 6) and all recruited patients (n = 9) to videotape the treatment sessions provided to each patient. A total of 18 treatment sessions were thus recorded (two treatment sessions for each recruited patient). The recording of each treatment session started from the moment of first contact between the physiotherapist and patient and lasted until the final contact between them. The treatment sessions lasted for about 30 minutes and the researcher told the physiotherapist and patient when

the recording started and stopped. Two digital video cameras were used to record treatment sessions from two different directions to make sure that the video recording showed all aspects of the treatment provided to the patient.

The medical imaging department at the University Hospital of Wales spent about 6 months to obscure the patients' and therapists' faces so that they could not be identified in the video recordings. Since the process of shading faces was delayed, and in order to expedite the process, the researcher purchased editing software and learnt the processing skills himself to help in the process.

Once the face obscuring process was finished, the researcher and another experienced physiotherapist working at the School of Healthcare Studies independently completed the treatment recording tool for all 18 video-recorded treatment sessions in order to evaluate the inter rater reliability of the treatment schedule. To test intra-rater reliability, the researcher completed the treatment recording tool (based on the video recordings) for all treatment sessions on two separate occasions, one was on the same day of treatment and another one was two weeks after the first completion.

3.5.1.4.1. Data analysis

The treatment recording tool's reliability was tested using point-to-point percentages of agreement at category and subcategory levels between the two sets of scores. The weighted Kappa statistic, standard error and the 95% confidence interval were also calculated. To estimate both inter and intra-rater reliability for each pair of treatment recording tools, all reported treatment tasks, treatment positions, intervention codes and/or treatment adjuncts for the activities section of the treatment recording tool were allocated a code of '100' if reported or not reported

on both occasions, i.e. in agreement. On other hand, a code of '0' was allocated if any activity was mentioned on one occasion but not on another, i.e. not in agreement. This method was used by Donaldson, Tallis and Pomeroy in 2009 (Donaldson et al., 2009).

3.5.1.5. Describing the physiotherapy service using the treatment recording tool

The researcher used the recording tool which was completed by the physiotherapists to describe and summarise the physiotherapy activities provided for people with ABI in Rookwood hospital. The aim of this part of the study was to evaluate the possibility of using the treatment recording tool to describe the physiotherapy service. This would consequently help to evaluate the services provided to patients and facilitate a better understanding of which activities benefit recovery for which types of patients and how physiotherapy aids recovery (Bode et al., 2004).

The combination of physiotherapy interventions (treatment packages) was also investigated using geometric coding. Each treatment activity was assigned a unique code from numbers in the sequence: a (n) = 2^n (1, 2, 4, 8, 16, 32, 64, 128…). This geometric coding process was used by Tyson and her colleague (2009) to identify treatment packages used to treat postural control and mobility problems for patients with stroke using the SPIRIT tool (Tyson et al., 2009). This geometric progression is a sum-free sequence which means that the summated number can only come from one combination of numbers that are added together to produce that number. Treatment activities can be identified using the geometric code. To give an example to illustrate the process, the treatment task "reaching and upper limb activity" was coded as "1", "lower limb activity" was coded as 2, "Bed mobility" was coded as 4, etc. If, for example the therapist used all the aforementioned treatment tasks in one session, then the treatment task numbers summated would give a geometric code of 7. The only possible combination of code numbers (treatment tasks) that could give a geometric code of 7 is 4, 2 and 1. This method of descriptive analysis

enabled the most frequent combinations of treatment activities or 'treatment packages' to be identified. Each part of the treatment activity list was assigned separate codes (see table 6-12 in result chapter for all codes located for all selected treatment activities).

3.5.1.6. Treatment recoding tool versus Physiotherapy SOAP notes

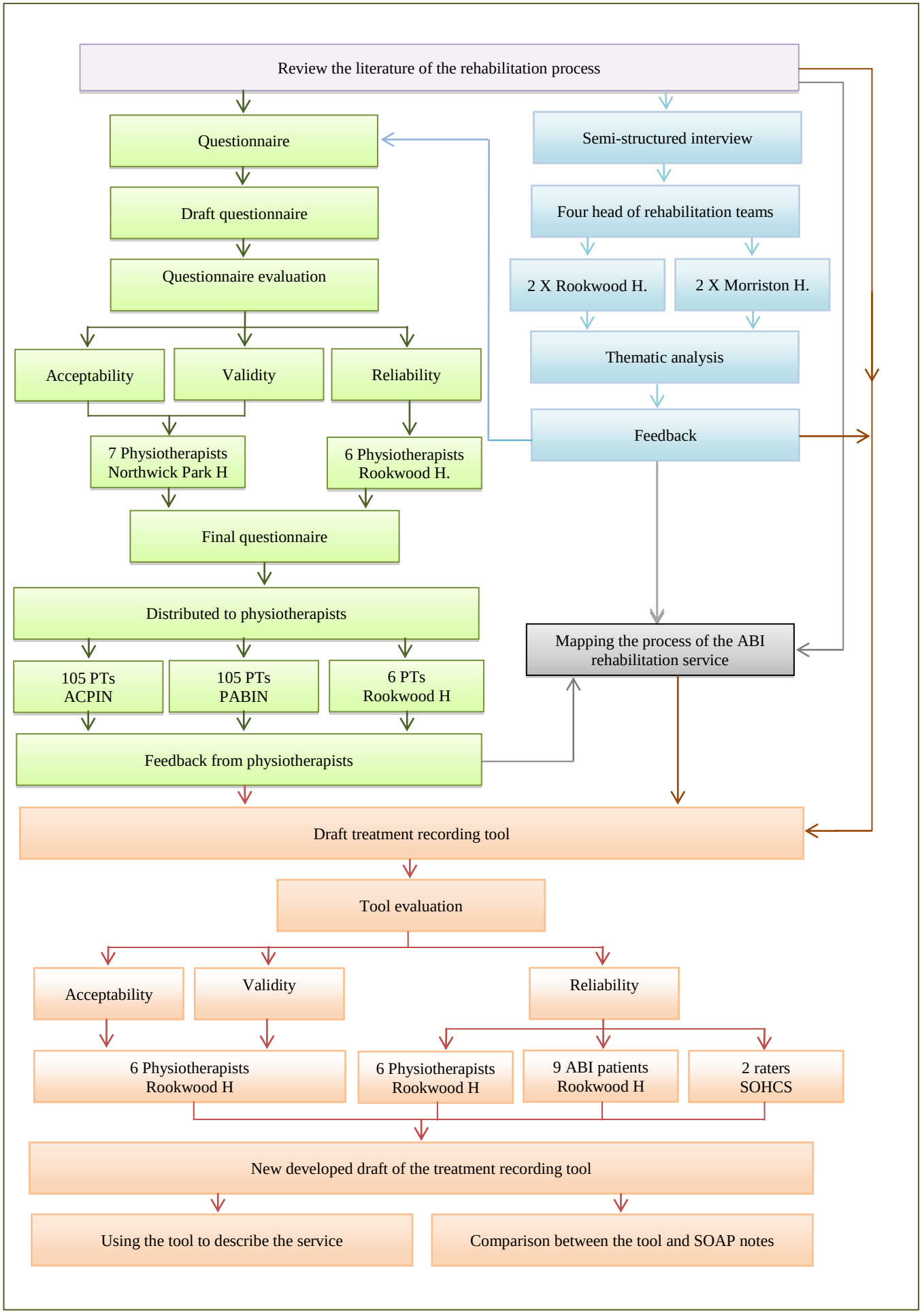
This part of the study aimed to help the researcher evaluate how comprehensive the treatment recording tool was, by reviewing the regular physiotherapy SOAP notes which were completed after each physiotherapy session and compared them to the treatment recording tool which was completed by the same physiotherapists for the same treatment sessions. The researcher used the treatment recording tool to report all the information about the patients' physiotherapy rehabilitation processes which were written and could be extracted from the physiotherapists' daily notes. All additional information which was reported in the SOAP notes and not reported in the treatment recording tool was added as general comments and considered when the two documentation methods were compared. This analysis helped the researcher to know what information the physiotherapists might usually report in their notes and not report in the treatment recording tool. Descriptive analysis was applied to compare the treatment recording tool and physiotherapy SOAP notes.

3.5.1.7. Summary of the Method

The researcher sought in-depth details of the service from the heads of rehabilitation teams and physiotherapists who were treating people with acquired brain injury in inpatient rehabilitation settings in the UK. Four heads of rehabilitation teams working in inpatient ABI rehabilitation services in Wales, UK were interviewed in this study. A self-administrated questionnaire was sent to 217 physiotherapists treating patients with ABI in the UK. The questionnaire's validity,

reliability and acceptability were evaluated before it was sent to the physiotherapists. Seven physiotherapists working in Northwick Park Hospital were interviewed in order to improve the validity of the questionnaire and test its acceptability. Six physiotherapists working in Rookwood hospital, Cardiff, participated in the process of evaluating the reliability of the questionnaire. Feedback from the heads of the rehabilitation teams and physiotherapists as well as the reviewed literature helped the researcher to describe the rehabilitation service provided to people with ABI in inpatient rehabilitation settings in the UK. It has also helped the researcher to design a treatment recording tool to develop and evaluate the inpatient physiotherapy documentation method used in inpatient settings. The treatment recording tool's validity, reliability and acceptability were evaluated in Rookwood hospital, Cardiff, UK. Six physiotherapists, 9 patients and two independent raters (the main researcher and an expert physiotherapist from the School of Healthcare Sciences, Cardiff University) were involved in the evaluation process. Eighteen physiotherapy treatment sessions were video recorded to be used to evaluate the treatment recording tool. The treatment recording tool's comprehensiveness and ability to describe the physiotherapy service were evaluated. The study methods are illustrated in figure 3-3.

Figure 3-3: An overview view of the research methods



CHAPTER FOUR

RESULTS and DISCUSSION

QUESTIONNAIRE PILOTING

Chapter 4. Questionnaire piloting – Result and Discussion

4.1. Overview

Part of the data collection processes was to design a self-administered questionnaire and to evaluate its validity, reliability and acceptability before it was sent out to physiotherapists who treat ABI patients in an inpatient setting in the UK. Piloting a questionnaire is considered to be a very important process which the researcher should consider before sending a questionnaire to the target population (Rattray and Jones, 2007). According to Rattray & Jones (2007), the process of questionnaire development requires considerable piloting work in order to evaluate and refine the questionnaire's wording and content (Rattray and Jones, 2007). The analysis, according to previous goals, helped the researcher to understand to what extent the data elicited from the questions being asked were representing real practice. The next paragraphs will describe the results of the tests of the questionnaire's validity, reliability and acceptability in detail.

4.2. Questionnaire's piloting process participants

A total of 7 physiotherapists working in the Regional Neuro-rehabilitation Unit in Northwick Park Hospital, London were interviewed in March 2011. All the interviewees were expert neurology physiotherapists and their experience varied from 14 months to 17 years. Table 4-1 gives more details about the interviewees and their experience.

Table 4-1: Details of the interviewed physiotherapists in the questionnaire's validation process

Interviewee	Band	Years of experience	Average number of ABI patient treat every month
Interviewee 1	6	6 years	3
Interviewee 2	7	6 years	10
Interviewee 3	5	14 Months	15
Interviewee 4	6	4 years	5
Interviewee 5	8A	11 years	5
Interviewee 6	6	5 years	8
Interviewee 7	Clinical Specialist	17 years	40

Seven physiotherapists who work with ABI in Rookwood hospital, Cardiff, UK were also recruited to evaluate the reliability of the questionnaire. Six of them completed both questionnaires on two different occasions. All participants were specialist neurology physiotherapists and their experience varied from 2 months to 8 years. Table 4-2 gives more details about the physiotherapists and their experience.

Table 4-2: Details of physiotherapists who participated in the questionnaire's reliability study

Interviewee	Band	Years of experience	Average number of ABI patient treat every month
Physiotherapist 1	7	7 Years	11
Physiotherapist 2	5	2 Months	15
Physiotherapist 3	6	4 Years	8
Physiotherapist 4	6	5 Years	20
Physiotherapist 5	6	3 Years	16
Physiotherapist 6	6	8 Years	12

Although in this current study, physiotherapists were only recruited from two rehabilitation centres, they were from different trusts and represented two different rehabilitation settings, a rehabilitation hospital and a hospital ward. They were expert physiotherapists who were involved in research, education and training programmes in neuro-rehabilitation for people with ABI and their feedback was very valuable and made a robust contribution to the process of developing and evaluating the questionnaire. The literature has reported that there are no rules for how many subjects should be recruited for a qualitative study and the sample size depends on the study's aims, value of the data generated, purpose of the inquiry, and available time and resources (Patton, 2002). Some articles have recommended the number of participants for a pilot study (Johanson and Brooks, 2010). In the social sciences, Hill (1998) suggests that 10 participants for piloting a survey research is sufficient (Hill, 1998). In the medical field, Hertzog (2008) makes different recommendations for the sample size depending on the purpose of the pilot study (Hertzog, 2008). For a feasibility study, she suggests that a sample as small as 10-15 is sometimes sufficient. Thus, it was expected that fourteen physiotherapists as a sample size used in the piloting process of the questionnaire in this study would be a sufficient number.

1.1. Questionnaire's validity and acceptability

This part of the study was to improve the validity of the questionnaire and test its acceptability.

4.2.1. **Questionnaire's completion time and introduction**

The researcher found that the average time that all interviewees took to complete the questionnaire was 15 minutes and varied between a minimum of 10 minutes and a maximum of 20 minutes. According to the literature, fifteen minutes would be an appropriate length of time to complete a questionnaire consisting of about 32 questions (Brent 2013). Reporting an accurate time to complete the questionnaire was reported as it should have increased the response rate

(Frary, 1996). Hence, knowing that physiotherapists can complete the questionnaire in 15 minutes will allow the researcher to be confident enough to write this in the questionnaire's introduction.

In terms of the introduction in general, most interviewees felt that the introduction was very brief, clear and gave sufficient information about the study and what the researcher needed them to do

> (Interviewee 1) *"I thought it was quite succinct. Described what you have to do. I thought it was OK*".

A comprehensive and concrete questionnaire introduction which provides information about a study in as short a paragraph as possible has been reported as helping to increase the questionnaire response rate (Lboro, 2010). The feedback from physiotherapists helped the researcher to make sure that the comprehensiveness of the questionnaire's introduction was accurate and that no changes were required to this part of the questionnaire.

4.2.2. **Section one: Basic information about the physiotherapist's working experience**

In regard to section number one, the researcher has received some different opinions. Interviewee 3 commented on question number one, which was: *"Please state the number of years you have been treating patients with acquired brain injury"*, suggesting that the researcher add months as well as years.

> (Interviewee 3) "*It might be worthwhile putting months as well as years... "*

The researcher thought it would be necessary to add that as the research aim was to recruit any physiotherapists who treat patients with ABI, whatever their experience.

Interviewee 1 commented on question number 2, which asked about the working place, thus;

> *" ...perhaps you might want to split up question two further and ask how many years the respondent had worked in a main centre, regional unit or district unit… "*.

Interviewee 1 had a few other comments about question number 2, such as the possibility of ticking more than one box if the physiotherapist worked in a rehabilitation centre which combined two of the categories. The researcher agreed with the physiotherapist's opinion. However, if the physiotherapist ticked more than one box, the decision to choose any of them would be difficult as the researcher could not decide under which category this hospital should be listed. Hence the researcher decided to change this question to be an open-ended question and this gave the respondents more flexibility to describe their workplace so that all respondents would be considered.

4.2.3. **Section two: Assessment**

In terms of the assessment section, the first question asked the physiotherapists about the assessment guidelines that they used to assess patients. When the researcher reviewed the interviewees' responses to this question and compared them with their answers in the interviews, he found that some interviewees ticked to indicate that they used guidelines on their assessment process while they in fact knew nothing about these guidelines. To take an example, Interviewee 1 ticked that he used both CSP and ACPIN guidelines to assess his patients, and in the interview, he stated that:

> *"To be honest with you, I have not formally read the CSP things and the ACPIN which were very interesting. Perhaps I should have read them before. My knowledge comes from college, clinical placement, reading up and working with clinicians. Obviously, what I have been taught at college is based on them, but I have not actually formally read the guidelines."*.

Interviewee 4 indicated that she used the CSP guidelines, and in the interview, she said that:

> *"Interesting, because I hadn't seen one of these [sets of] guidelines before"*.

When the researcher discussed this with the interviewed physiotherapists, he had feedback from some interviewees saying that it would be better if the researcher relied on the physiotherapists to write the guidelines that they were using in their assessments rather than giving them options to choose from:

> (Interviewee 2) *"I guess you might find some people following a lot of them without being aware that they are in the guidelines. I guess you need to rely on people to write whether they use them or not"*.

From the above, the researcher thought that this question should be modified and the decision was to make it an open-ended question and to rely on the physiotherapists to tell the researcher what guidelines they were using. The researcher expected that open-ended questions would help him to collect additional information from the physiotherapists (Richardson, 2004). However, since the researcher knew that there were some physiotherapists who were not following any guidelines, he thought it necessary to add an open-ended question to ask the physiotherapists to describe their assessment process and when they complete their initial assessment. These questions were added to elicit more information about the assessment process and to avoid missing important data about this part of the study from the physiotherapists who were not using any guidelines.

The following questions were asking about the advantages and disadvantages of the assessment method that the physiotherapists were using. Some interviewees found these questions were difficult to answer because of the way that they were written. The questions were written as follows: *"What are the advantages..."* or *"What are the disadvantages…* ?", though some interviewees felt that they had to know exactly what the advantages/disadvantages of the

currently used methods which have been reported in the literature were, while the researcher was asking about their opinion of the current process:

> (Interviewee 3) *"Using the phrase 'what are the advantages of the current processes?' might make the question more explicit in my view. You might phrase it to be 'what is your opinion of the advantages of the... ' or 'what do you think about the current process… .' Asking directly for my opinion would be better."*.

On reflection, these questions were changed to begin with the statement: "What do you think are the advantages?" This change was to make it clearer to physiotherapists what the researcher meant by this question, i.e. to give their opinion about the assessment method they were using, not to write about what has been reported in the literature about the assessment methods they used.

Highlighting the keywords in the question was suggested by many interviewees on different occasions:

> (Interviewee 7) *"I think the questions were worded relatively clearly. Again, you could highlight the important words"*.

The literature has reported the benefits of highlighting individual words and phrases that introduce something important in a survey's questions. However, too much highlighting can increase the clutter on the page and may cause respondents to focus only on the words and phrases which are highlighted and/or ignore them altogether (Statistics New Zealand, 2009). Thus the researcher highlighted only very important key words and/or phrases, which was necessary to draw the respondents' attention to them.

4.2.4. **Section three: Analysis and Goal Setting**

Section 3 on the questionnaire was about goal-setting. The first question asked whether the physiotherapists met to write the goals set for each patient. Most of the interviewees stated that the physiotherapists were meeting to set goals. During the interviews, the researcher knew that the physiotherapists were meeting with other disciplines to set MDT goals, and that the physiotherapists were not meeting with each other to set and review physiotherapy goals:

> (Interviewee 2) *"I ticked yes since we meet as an MDT to set goals, rather than as physiotherapists"*.

To avoid this misunderstanding, some interviewees suggested that it would be much better if the research split the question into two questions and asked a general question like: *"Do you regularly have a meeting to set the goals for each patient?"* and if yes, this question could be followed by another question asking: *"Who usually attends these meetings?"* the researcher showed these questions to the rest of the interviewees and all agreed that this would help them to understand the question much better. The researcher decided that this question should be split into two questions in the new version. All the other questions in that section have been slightly reworded to cover both the MDT goals and the physiotherapy goals. The interviewees felt that all the questions were clear and straightforward.

4.2.5. **Section four: Treatment**

With regard to the treatment section, the interviewees were confused as they thought that their responses to this question would be highly dependent on the caseload at the time of completing the questionnaire:

> (Interview 2) *"My thought when I was deciding which boxes to tick was actually about the different treatments that I would try if I had a different caseload and this amount of time... "*.

After consideration, this problem was solved by rewording the question thus: *"With respect to your patients' treatment and considering your caseload during the last six months… ".*

The interviewees were also confused about the timescale (daily, weekly, monthly and never used) and they felt that there were some treatments which they use but less than once a month:

> (Interviewee 1) *"[What] I found a bit hard to do was tick the daily, weekly, monthly and never used boxes"*, and
>
> (Interviewee 5) *"there are [a] few things that I have ticked that I don't use monthly but I have used them"*.

For this, it was important to change the timescale wording to make sure that it covered all the options. It has been suggested that the words 'very regularly', 'regularly', 'less regularly', 'rarely' and 'never used' should be incorporated. However, the researcher believed that some physiotherapists might be confused by these wordings as well since, according to Frary (1996), such point proliferation scales increase the risk of confusing the respondent who may have difficulties in differentiating between the response levels (Frary, 1996). The researcher thought that it would be better if he described what he meant by each timescale and added more description to each scale to make them clearer to the respondents and easier to differentiate between the response levels. The wording of the final version was: very regularly > 1 a week, regularly <= 1 a week, less regularly > 1 a month, rarely <= 1 a month and never used. When the researcher discussed these changes with the interviewees, they were very happy with these timescales and thought that they would be much easier and clearer for them to complete.

In interviews, the physiotherapists also suggested that a few additional treatment activities could be added to the treatment activity list that the researcher had, such as the exercise bike, motor-mate, Wii and electronic games. Questions about treatment documentation were very clear

according to the interviewees. In terms of questionnaire fluency, most of the interviewed physiotherapists though that the questionnaire was easy to complete and flowed nicely:

> (Interviewee 7) *"It flowed nicely. I think it was good that you split it into sections. It wasn't too long or mentally taxing"*.

The researcher also realised that it would be better if he added one more section about patient discharge. This section was not included in the original questionnaire. It had 5 questions asking the physiotherapists about what they considered when they decided to discharge any patient from the service, and what outcome measures they used to guide them to discharge a patient. It also asked the physiotherapists about the documentation format they use to document their discharge and what its advantages and disadvantages are.

Considering all the above, a new, valid and updated version of the questionnaire was created. This version was the one which, it was decided, would be sent out to the physiotherapists (See Appendix 3.2 for the last version of the questionnaire).

After each interview, the interviewees were asked to rank the acceptability of the questionnaire using a 100-point horizontal visual scale. Each section of the questionnaire had a separate scale (see Appendix 4.1). All interviewees completed this part (n=7). The mean and 95% confidence intervals (95% CI) of all scores were calculated from all feedback. Table 4-3 shows the results for each section.

Table 4-3: Mean and 95% confidence intervals for interviewee ranking of the acceptability of each part of the questionnaire

	Section 1	Section 2	Section 3	Section4
Mean (± 95 CI)	85% (78.6 - 91.4)	85% (79.3 - 90.7)	90% (80.7 - 99.3)	82.1% (72.1 - 92.1)

All sections of the questionnaire, including basic information about the physiotherapists and their work experience, assessment, analysis, goal-setting and treatment sections, were highly acceptable to the interviewees. According to Chung, Wong and Griffiths (2007), a higher acceptability of a questionnaire will increase the response rate (Chung et al., 2007).

4.3. Questionnaire's reliability results

Physiotherapists (n=6) who worked in Rookwood hospital completed both questionnaires on two different occasions. Intra-rater agreement analyses were performed for all the raters who did so. The percentage of agreement between the two completions of the questionnaire was varying between 72.2% and 100% and the overall Kappa result was varying between 0.583 and 0.681. See Table 4-4 for all percentage of agreements, overall Kappa and the 95% CI.

Table 4-4: The percentages agreement between the two completion for each rater

		(The agreement between the two completion for each rater)						Overall percentage	Overall kappa (*k*)	95% CI
		Raters (%)								
		1	**2**	**3**	**4**	**5**	**6**			
Treatment technique	Selective Movement	100	100	100	100	100	100	100%	0.681	0.481–0.881
	Balance	100	100	100	100	100	100	100%		
	Task specific training	83.3	83.3	66.7	100	83.3	66.7	80.55%		
	Musculoskeletal interventions	100	83.3	100	100	83.3	100	94.4%		
	Respiratory care	0	66.7	66.7	100	100	100	72.2%		
	Exercise	100	100	100	100	100	100	100%		
Treatment Adjuncts	Education and advice	100	100	66.7	100	100	100	94.45%	0.583	0.436 – 0.73
	Medication	100	33.3	66.7	66.7	100	100	77.8%		
	Orthotics	66.7	33.3	100	100	100	100	83.3%		
	Equipment	85	70	95	85	80	100	85.8		
	Specialised equipment	100	100	100	100	100	100	100%		
Task & Position	Posture/Position	100	100	100	100	100	100	100%	0.617	0.45 – 0.784
	Transfers	71.5	85.7	85.7	100	100	100	90.48%		
	Tasks	70	50	100	80	50	100	75%		
	Class activity	100	100	50	100	100	100	91.7%		

The above results shows that the intra-rater reliability of the questionnaire was acceptable in all sections of the treatment activity list. The overall percentages of agreement between the two completions of the questionnaire were very high in all categories and subcategories. The results of the intra-rater analysis of Kappa for all three sections indicated that the level of agreement between the two completions of the questionnaire was between moderate and substantial. Although most statisticians prefer Kappa values to be at least 0.6 before claiming a good level of agreement, the only section of the treatment activities in the questionnaire which had less than a 0.6 Kappa score was the treatment adjuncts. However, for the level of agreement, the Kappa score for the treatment adjuncts section was 0.583, which is considered a marginally convincing score.

By the end of the piloting process, the researcher assumed that the final version of the questionnaire would help him to collect robust feedback from the physiotherapists which would reflect the reality of the physiotherapy practice and cover all the important aspects of the research area, as the questionnaire was valid and had very good stability in terms of the agreement between the two different completions of the questionnaire by the same physiotherapist. Finally, the researcher expected a good response rate as the questionnaire was acceptable to the physiotherapists.

CHAPTER FIVE

RESULTS and DISCUSSION

ABI HEALTHCARE SERVICE

IN THE UK

Chapter 5. ABI healthcare service – Result and Discussion

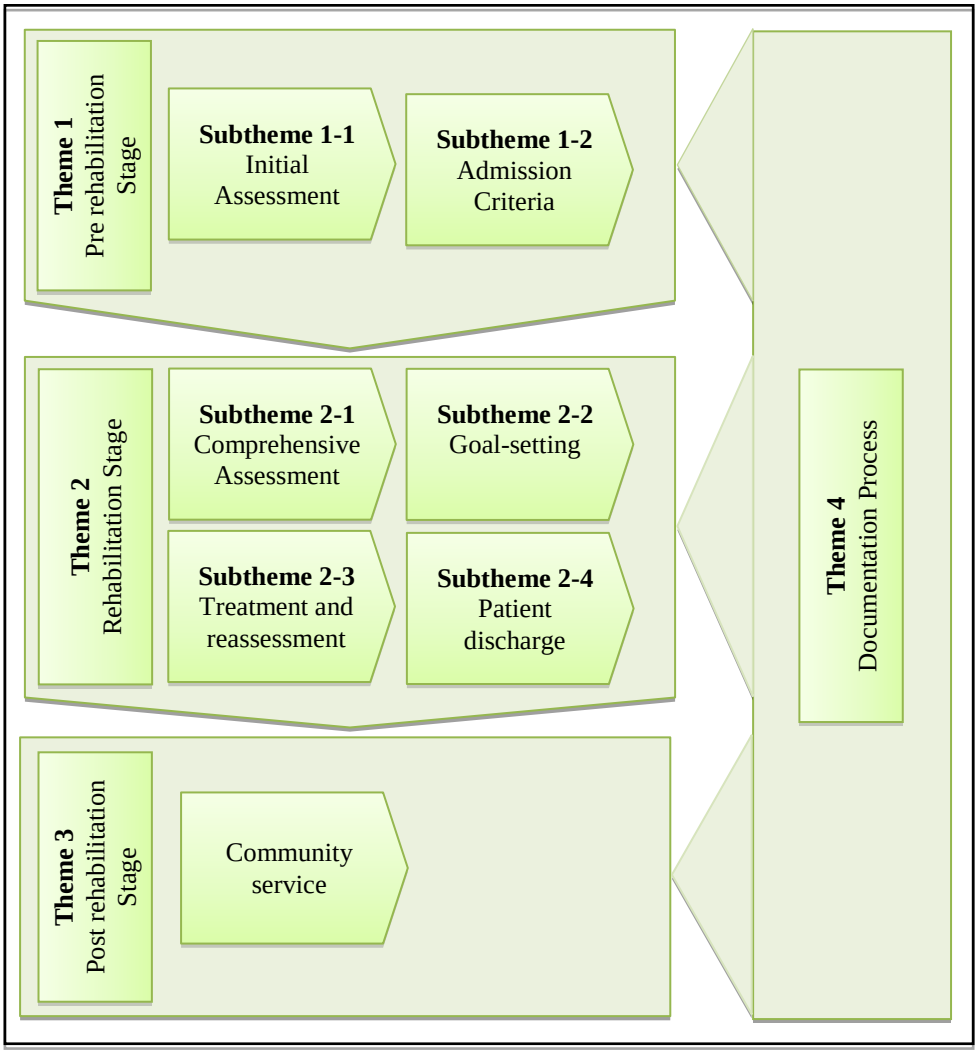
5.1. Overview

This chapter is intended to describe the healthcare that patients receive if they have an ABI in the United Kingdom. Since no other study has described the ABI rehabilitation service in the UK, the findings of this chapter helped the researcher to understand the service provided for this population, and use these findings to develop a method of physiotherapy documentation process in an inpatient setting.

This chapter of results is structured based on the feedback received from the heads of the rehabilitation teams and each point is compared and contrasted with the feedback received from the physiotherapists who completed the questionnaire and the literature. Any additional information which was received from the physiotherapists but not reported by the head of a rehabilitation team was considered and compared and contrasted with the available information in the literature. The general layout of this chapter is based on the feedback from the heads of the rehabilitation teams who responded to the question asking them to describe the pathway(s) that patients follow if they have an ABI. It was, however, generally divided into four main parts: pre-rehabilitation, rehabilitation, post-rehabilitation stages and documentation process. Hence, the three stages of the rehabilitation process as well as the documentation process were the main themes identified from the interviewees' feedback. Each theme had different sub-themes. According to the pre-rehabilitation stage, the initial assessment and admission criteria were the only two sub-themes defined under this main theme. The assessment process, goal-setting, treatment and reassessment process, and patient discharge were all considered as sub-themes under the rehabilitation theme. However, since this study was focusing on the inpatient rehabilitation service, the post-rehabilitation stage was not considered in this part of the study. Feedback from the heads of the rehabilitation teams and physiotherapists was used to gain an

overall understanding and in-depth details of these themes and sub-themes which will be described and discussed in this chapter (Figure 5-1 summarises the themes and subthemes found in this study).

Figure 5-1: An overview of the themes and sub-themes based on the feedback from the heads of the rehabilitation teams



5.2. Participants response rate

5.2.1. **Interviewee participants**

A total of four consultants working in neuro-rehabilitation services in the only two hospitals which provided a rehabilitation service for people with ABI in Wales, UK, were interviewed between October 2010 and February 2011. All the interviewees were expert neurology

consultants and their experience varied from 3.5 to 6 years. Table 5-1 provides more details about the interviewees and their workplaces. The literature has reported that there are no rules for how many subjects should be recruited for a qualitative study and the sample size depends on the study aims, value of the data generated, purpose of the inquiry, and available time and resources (Patton, 2002). However, since it was very difficult to interview the heads of the rehabilitation teams working in different rehabilitation centres from all across the UK, the information was gathered by interviewing all the heads of the rehabilitation teams from the only two rehabilitation centres in Wales, UK. This was representative of the rehabilitation service provided for patients with ABI in a large geographical area.

Table 5-1: Details of the heads of rehabilitation teams interviewed in the developmental phase

Interviewee	Position	Hospital	Location	Consultant's experience
Interviewee 1	Neurology consultant	Morriston H	Rehabilitation Ward	6 years
Interviewee 2	Consultant in Rehabilitation Medicine- Lead consultant	Morriston H	Rehabilitation Ward	3.5 years
Interviewee 3	Neurology consultant	Rookwood H	Regional neuro-rehabilitation hospital	5.5 years
Interviewee 4	Consultant in Rehabilitation Medicine	Rookwood H	Regional neuro-rehabilitation hospital	3.5 years

5.2.2. **Questionnaire's response rate**

The questionnaire was sent to 105 physiotherapists from ACPIN, 105 registered physiotherapists from PABIN and 7 physiotherapists working in Rookwood Hospital and the response rates were different between the three groups. The researcher believed that some of the physiotherapists who were registered with PABIN were already registered with ACPIN; unfortunately, due to data protection policies, it was very difficult to know how many of these PABIN physiotherapists were already registered with ACPIN, since the questionnaire was sent via PABIN's

administration. Thirty two physiotherapists from ACPIN completed the questionnaire. This equates to a 30.5% response rate. Eleven physiotherapists from PABIN completed the questionnaire, a response rate of 10.5%. The researcher had a 100% response rate from the physiotherapists working in Rookwood Hospital (n=7).

The literature reveals that an acceptable response rate for any questionnaire varies according to how the questionnaire is administered (Hamilton, 2003). A 30% to 50% response rate is considered to be adequate (Hamilton, 2003). The total response rate of this current study was 23%. The researcher believes that the response rate to the questionnaire was higher than this, as it appears that some physiotherapists who were registered with PABIN were already registered with ACPIN, and if the researcher could exclude them from the list, then the response rate would be higher.

5.2.3. **Physiotherapists who completed the questionnaire**

A total of 50 physiotherapists completed the questionnaire. The majority of respondents were experienced senior physiotherapists from Band 7 (50%) and Band 6 (18%). They worked in different rehabilitation settings and their experiences varied from 14 months to 30 years, with a mean of 10.5 years and a standard deviation of 6.2 (see Table 5-2 for more details).

Table 5-2: Physiotherapist bands, experience, workplaces and the average number of ABI patients they treat every month

Band/Level	Number of therapists (%)	Average months of experience (SD)	Workplace	Average (SD) number of patients/month
5	2 (4%)	84.7 (117.7)	1X Hospital inpatients (acute, chronic) 1 X Regional Rehabilitation Unit	15 (0)
6	9 (18%)	27 (7.2)	5X Hospital inpatients (acute, chronic) 3 X Regional Rehabilitation Unit 1 X Private care setting	7 (2.8)
7	25 (50%)	162 (8.5)	14X Hospital inpatients (acute, chronic) 8 X Community rehabilitation 2 X Regional Rehabilitation Unit 1 X Private care setting	8.5 (9.2)
8	6 (12%)	150 (42.5)	3X Hospital inpatients (acute, chronic) 2 X Regional Rehabilitation Unit 1 X Private care setting	11 (1.4)
Other, including private care unit and non-applicable bands and levels	8 (16%)	318 (59.4)	2X Hospital inpatients (acute, chronic) 2 X Community rehabilitation 4 X Private care setting	13 (9.9)

5.3. ABI healthcare Service in the UK

The first question of the interview was to ask the heads of the rehabilitation teams to describe the pathway(s) that patients follow if they have an ABI. Identifying and describing the rehabilitation pathway helped to provide a resource that offers a summary of the key aspects of inpatient neuro-rehabilitation for people with ABI in an inpatient setting. It also helped to evaluate the service and ensure that the patients and their families receive the most appropriate service/intervention at the appropriate time. It is facilitating the provision of high quality, timely and effective assessment and rehabilitation to meet the needs of the person with ABI. The interviewees were willing to answer this question and clearly described the pathway(s) of a patient from the first day of injury until discharge from the service and transfer to community services. The pathways described by the heads of the rehabilitation teams were almost similar in both rehabilitation centres. Generally, the pathway was divided into three main stages, and it was decided that each of them would be a main theme in this study: pre-rehabilitation stage, rehabilitation stage and post-rehabilitation stage. The questionnaire did not contain any questions which asked the

physiotherapists about the pathway that a patient would follow if they had an ABI since the rehabilitation process is a multidisciplinary decision which is led by the head of the rehabilitation team, the only team member who can provide accurate and comprehensive information about rehabilitation pathways (Donnelley, 2007).

The identified pathway in this study was similar to almost all the other pathways described in the literature. Generally, the Health and Social Care Board (2008) divides the rehabilitation pathway of the inpatient rehabilitation process into four main phases, as follows: initial presentation;; inpatient rehabilitation ; discharge and follow-up (Health and Social Care Board, 2008). In addition, the BC Stroke Strategy (2010) supports this categorising of the rehabilitation process as it reported that inpatient rehabilitation processes can be divided into two main stages: pre-admission and rehabilitation (BC Stroke Strategy, 2010).

The feedback from the head of the rehabilitation team has also revealed that each stage (theme) has different sub-stages (sub-themes). The following paragraphs will describe these themes and subthemes in detail.

5.3.1. **Pre-rehabilitation stage (theme one)**

According to the interviewees' feedback, the pre-rehabilitation stage is one of the most important stages of the rehabilitation process. This stage was reported as it was started by an initial assessment. The initial assessment is considered to be the most important step in the pre-rehabilitation stage, as the patient's next steps would be decided based on this assessment. The Health and Social Care Board (2008) support this finding as they described the first phase of their pathway which is the referral and initial assessment stage. The initial assessment was one of the sub-themes under the pre-rehabilitation theme and will be described in detail in the following paragraphs.

5.3.1.1. Initial assessment (sub-theme one)

An initial assessment is the first step in the rehabilitation process. McMillan et al. (2003) support the importance of the initial assessment stage as they stated that a comprehensive method to assess patient problems and needs before admission is an important stage in establishing baseline data and understanding the patient's limitations and his/her need for intensive rehabilitation input before accepting the patient for admittance (McMillan et al., 2003). The ICF framework supports this finding as well, as according to the World Health Organisation (2001), the patient assessment is one of the most important attributes of the rehabilitation process and is categorised within the biological (health condition) domain (WHO, 2001). The Health and Social Care Board (2008) emphasises the importance of initial assessment at an early stage after injury (Health and Social Care Board, 2008). According to the feedback from the head of the rehabilitation team in Morriston hospital, the consultant was the only member of the multidisciplinary team who assessed the patient. This was because of the limited resources in the hospital since they did not have many therapists working there. Sometimes they take referrals from hospitals far from Morriston hospital which makes it difficult for the therapists to travel and see the patient

> (Interviewee 2 – Morriston Hospital)*"they will send the referrals to me and I will go to Cardiff and assess the patients myself with regard to suitability and transfer and bring all the information to the team"*.

The literature supports the need for comprehensive initial assessment by different members of the rehabilitation team and not only by the consultant. According to the Health and Social Care Board (2008), the referral and initial assessment phase of the rehabilitation pathway includes the process of referring the patient to rehabilitation medicine for assessment and this should be carried out by the head of the rehabilitation team and members of inpatient teams as appropriate.

However, the interviewee mentioned that if a second opinion is needed from a different profession, the consultant arranges to visit the patient with a nurse or therapist to reassess the patient

> (Interviewee 2)*"The first assessment has to be done by the consultant because there are not many resources and we have only a few therapists, … If we need somebody inside, from a different profession, then we can arrange to go with one of the nurses or the therapists …".*

In contrast, in Rookwood Hospital, a patient was assessed in the pre-rehabilitation stage by a team consisting of two consultants, a neurology registrar, a physiotherapist and one or more nurses

> (Interviewee 3 - Rookwood Hospital)*"There is myself, my colleague Dr. XXX, another colleague Dr. XXXXX with a neurology registrar who is with us, and a physiotherapy colleague on the ward… and the nurses will be there …"*

The literature supports the importance of the multidisciplinary team assessment. McMillan and his colleague (2003) stated that a multidisciplinary team assessment before admission would help the therapists to make the right decision to accept the patient for admission (McMillan et al., 2003). According to the biological (health condition) domain of the ICF, the assessment process should be comprehensive and cover the body's functional and structural deficits, activity limitations and participation restrictions.

It was clear that all members of the teams worked together to evaluate the patient and decided whether they would admit him/her for rehabilitation in Rookwood Hospital and Morriston hospital. In both rehabilitation units, the assessment stage was followed by a discussion with the multidisciplinary team to decide whether to accept the patient or not.

> (Interviewee 2 – Morriston Hospital) *"We have a team meeting once a week at which I discuss all the patients referred to me and, if everyone agrees that YES a patient will benefit*

from coming to us, then we put that patient's name on our waiting list"

Hence, although not all members of the multidisciplinary team were involved in the initial assessment process, they made some contribution to the decision to accept a patient to be admitted to the rehabilitation centre via the weekly team meetings.

5.3.1.2. Admission Criteria (Subtheme two)

Feedback from the heads of the rehabilitation teams showed that accepting any patient to be admitted into any of the rehabilitation centres depends on the patient's meeting the admission criteria, which was the second sub-theme of the pre-rehabilitation theme.

(interviewee 4- Rookwood Hospital) *"It is highly dependent on what that patient's needs are and what resources we have within the unit"*.

The BC stroke Strategy (2010) has supported this finding, since they reported that at the pre-admission stage, patients will be assessed to determine whether they might benefit from the inpatient comprehensive rehabilitation input and, if so, when they will be ready to begin their rehabilitation programme (BC Stroke Strategy, 2010).

The admission criteria are categorised within the environment factors domain of the ICF framework. It has been agreed in the literature that before a patient is accepted for admission to any inpatient rehabilitation service, he/she has to meet a set of admission criteria (Hornby, 1995), and each inpatient rehabilitation facility has to have very specific admission criteria to maximise the effectiveness of its services (Salter et al., 2006).

The admission criteria were different from one centre to another. Table 5-3 shows the admission criteria reported by the head of the rehabilitation team as followed in both Morriston and Rookwood hospitals. They were ordered in terms of importance. It was very difficult to prioritise

the list as the admission criteria given by the heads of the rehabilitation teams were different. A simple calculation was made to prioritise the admission criteria and put them in order. Since each interviewee was asked to rank his/her list in terms of importance, the researcher gave the most prioritised criterion a score of 1, the second a score of 0.90, the third 0.80, and so on. Criteria not mentioned by any of the two interviewees were given a score of 0. The researcher added all the scores together and divided them by 4 (number of interviewees) and prioritised the criteria based on those scores (Table 5-3 demonstrates the process) (Botta and Bahill, 2007).

Table 5-3: How admission criteria are prioritised

Criterion	Interview 1	Interview 2	Interview 3	Interview 4	Average score
Medically stable	5 (60%)	4 (70%)	1 (100%)	4 (70%)	**75%**
Acute ABI	1 (100%)	2 (90%)	0 (0%)	2 (90%)	**70%**
Patient able to participate	4 (70%)	5 (60%)	3 (80%)	6 (50%)	**65%**
Specialist MDT service required and MDT team agrees	7 (40%)	3 (80%)	0 (0%)	1 (100%)	**55%**
Age	0 (0%)	1 (100%)	0 (0%)	3 (80%)	**45%**
No neuropsychiatric or neuro-behavioural problems	6 (50%)	6 (50%)	4 (70%)	0 (0%)	**42.5%**
No need for medical cover overnight	0 (0%)	0 (0%)	2 (90%)	5 (60%)	**37.5%**
No previous rehabilitation input	2 (90%)	0 (0%)	0 (0%)	0 (0%)	**22.5%**

The most important criterion to accept any patient for admittance to an inpatient rehabilitation centre was that the patient should be medically stable. Several studies have reported the influence of the patient's medical status and the severity of a patient's condition on the rehabilitation outcome (Alexander, 1994, Stineman et al., 1998, Hakkennes, et al., 2013). Ween et al. (1996) reported that stroke severity has a great impact on a patient's progress and discharge destination (Ween et al., 1996). Jorgenson et al. (2000) conducted a prospective analysis of 1,197 patients admitted to a stroke unit (Jorgenson et al., 2000). The researchers used the Scandinavian Neurological Stroke Scale (SSS) to measure stroke severity on admission (Scandinavian Stroke Study Group, 1985) and rehabilitation outcomes. The researchers concluded that the severity of the stroke is the most powerful predictor of the ability to participate in and benefit from stroke

rehabilitation. Alexander (1994) found that those patients who are medically stable and have less severity of injury are generally able to participate fully in the rehabilitation programme, will show substantial improvement during rehabilitation, and have a high probability of being discharged to go home (Alexander, 1994). In addition, patient medical stability was identified as an important factor much considered during the process of making a decision regarding the suitability of stroke patients to be admitted for inpatient rehabilitation (Hakkennes et al., 2013).

According to the interviews, this criterion was followed by others including: the patient should have ABI; the patient is able to participate in rehabilitation. Another criterion which was reported by the interviewees was that the patient required a specialist MDT service; the MDT agrees to accept the patient being admitted to the rehabilitation service and patients' age. Gresham et al. (1997) support these admission criteria as they reported that admission to an intensive inpatient rehabilitation service should be limited to patients who require two or more rehabilitation disciplines. Patients with a single disability do not usually require an interdisciplinary programme as their needs can be met by individual services (Gresham et al., 1997). While a patient's age was fifth on the list of admission criteria, some studies have emphasised the importance of patient age as a critical factor, as this has a huge influence on rehabilitation outcomes (Kalra et al., 1993, Kammersgaard et al., 2004). Although age has been reported as being associated with poorer outcomes, its influence can be overestimated. Bagg et al., (2002) suggest that advanced age alone is not a sufficient reason not to grant patients access to a rehabilitation service, given the questionable clinical relevance of that factor (Bagg et al., 2002). A cohort study of 2,219 patients was studied for the effect of patient age on early stroke recovery. Even though the researchers stated that a patient's improvement decreases with increasing age, their conclusion was that, although age had a significant impact on patient outcomes, it was a poor predictor of individual functional recovery after stroke and cannot be used as a limiting factor to deny any patient being admitted to a rehabilitation service (Kugler et al., 2003). Hakkennes et al. (2013) conducted a

study to identify the factors considered as important in making decisions regarding patient admission for inpatient rehabilitation and found that the patient's age was among the lower-ranked items in terms of importance.

To determine the most important criteria which might cause a patient not to be admitted to a rehabilitation centre, the researcher asked the heads of the rehabilitation teams, "If one of your patients meets all the admission criteria, is there any reason for not accepting that patient in your unit?" Some of the interviewees (interviewee 1 and 2 – Morriston hospital) mentioned one or two key criteria which prevent acceptance if not met by a patient. In Morriston Hospital, age was the most important criterion; if a patient meets all other admission criteria but was under 16 years of age then the patient would not be accepted

> (Interviewee 1- Morriston Hospital) *"We do not take children because their needs cannot be met by our service. There are some specific regulations regarding bringing children into hospital. So if anybody is below 16, that person is not eligible for our service."*

As has been mentioned before, a patient's age is an important critical factor, which has an influence on rehabilitation outcomes (Kalra et al., 1993, Kammersgaard et al., 2004). Although the literature reports that age alone is not a justifiable reason not to grant patients access to a rehabilitation service (Kugler et al., 2003), most studies consider advanced age to mean any patient who is over 60 years old and that it would be acceptable not to accept any patient under 16 if the service could be provided for them in a different rehabilitation facility (Kalra et al., 1993, Kammersgaard et al., 2004).

The two heads of the rehabilitation teams interviewed in Morriston Hospital said that the admission criteria were quiet rigid

> (Interviewee 2 – Morriston Hospital) *"We have to be very, very strict. If we have 50 beds then it does not matter, we can be a bit more flexible with our admission criteria. Given*

> *the small number of beds, we have to be very strict with the admission criteria and if somebody does not meet the criteria, unfortunately we have to say no."*

It has been agreed in the literature that due to the shortage of available inpatient rehabilitation services for people with ABI and the importance of admitting patients to a rehabilitation service as soon as possible, admission criteria should be established to ensure that only patients who require the intensity of an inpatient rehabilitation facility should be admitted to the service (Hornby, 1995, Putman et al., 2007, Salter et al., 2006).

However, in Rookwood hospital, the admission criteria are more flexible, except for the criteria that the patient should be medically stable and there be no neuropsychiatric or neuro-behavioural problems

> (Interviewee 4 – Rookwood Hospital) *"I think you have to have some rule if you like, … but I think if it is too rigid then it's gonna be that people don't get in because they didn't meet this criterion and they would get stuck somewhere else. I think they should be flexible"*

Putman et al. (2007), justified this finding as they reported that the admission criteria are based on several key principles, including that a rehabilitation service system exists to meet a patient's individual needs, rather than trying to fit patients into predetermined services (Putman et al., 2007). The facility in Rookwood Hospital was not designed to help those patients who are medically unstable or who have neuropsychiatric or neuro-behavioural problems, thus not accepting such patients would be acceptable.

In term of the advantages of having such criteria, Interviewee 1 stated that the criteria help them to: prioritise the patients who really need to come to Morriston Hospital for rehabilitation after injury; use the beds to maximum efficiency and ensure that those who are admitted will benefit most from the service. The admission criteria also ensure the hospital is not overrun with

referrals. In Rookwood Hospital, the heads of the rehabilitation teams reported that the admission criteria allow the consultant to consider most individuals and make sure that the resources they have are kept for those people who really need them.

The advantages of having standardised admissions criteria are frequently reported in the literature. According to Putman et al., (2007) who support this study's findings, an effective admissions criterion allows the patient to be quickly matched with the appropriate intensity of service (Putman et al., 2007). Salter et al.,(2006) report that admission criteria help to maximise the effectiveness of services and to minimise any possible problems (Salter et al., 2006). Admissions criteria help to admit the right patients to the right facilities (Putman et al., 2007). The literature has also reported that admissions criteria encourage the therapist to set out a rehabilitation plan that focuses on meeting patient needs, and determines the intensity, level and types of intervention that patients need throughout their treatment. This helps patients to benefit from the service and receive appropriate help, rather than having prescribed lengths of treatment time.

According to the heads of the rehabilitation team, if the patient did not meet any of the admission criteria and the multidisciplinary team decided not to accept him/her at this stage, then a process of reassessment was undertaken on a regular basis until the patient was either discharged to a community service or transferred to an inpatient rehabilitation centre:

> (Interviewee 3- Rookwood Hospital) *"We will then review them on a weekly basis, make amendments to their care and be involved with the rehab care and plan for them to be moved to either another facility, to Rookwood, to their home, or wherever it is appropriate for their level of improvement".*

This process allows the patient to benefit from the service once he/she is ready to start rehabilitation. However, if the patient is discharged from the service then the access to an

intensive inpatient rehabilitation service would be limited, which might affect the patient's improvement.

Once the multidisciplinary team has decided to accept a patient, he/she is added to a waiting list until a bed is available for him to be transferred to:

> (Interviewee 1 – Morriston Hospital) *"it may take several weeks before they get to our unit."*.

According to the Health and Social Care Board (2008) which support this study's finding that patients who require specialist inpatient rehabilitation might be placed on the waiting list for the unit that will best serve their needs and the needs of their family (Health and Social Care Board, 2008). The correct timing of admission to an inpatient rehabilitation service is reported in the literature as this is critical, since it influences the functional rehabilitation outcome (Biernaskie et al., 2004, Salter et al., 2006). There is evidence that a shorter time from injury onset to rehabilitation admission results in improved functional outcomes (Tepas et al., 2009). Meeting the admission criteria and the availability of a bed in the rehabilitation centre allows a patient to be transferred to the next stage of his/her treatment which is the rehabilitation stage.

5.3.2. **Rehabilitation stage (Theme two)**

According to the interviewees' feedback, the next stage of the pathway was the rehabilitation stage. This stage started the moment the patient was admitted to an inpatient rehabilitation service until he/she was discharged from the service. The interviewees' feedback revealed that there were four different key rehabilitation activities in this stage, including: patient assessment; analysis and goal-setting; patient treatment and reassessment and the discharge process. In line with the ICF framework, this stage of the rehabilitation process covers all domains of the ICF framework, including health conditions (biological), environment (social) and psychological (personal

factors) domains. The assessment process resides within the health condition domain while goal-setting is considered to be a personal factor and the intervention and discharge plan are environmental factors. Donnelley (2007) has also supported these steps of the rehabilitation stage as he reported that any rehabilitation service comprises several critical key components which include: patient assessment; goal setting; intervention and a discharge plan (Donnelley, 2007)

The next paragraphs will describe the feedback from the heads of rehabilitation teams and physiotherapists in detail.

5.3.2.1. Patient assessment (Sub-theme three)

According to the feedback from the heads of the rehabilitation teams and physiotherapists, the rehabilitation stage usually starts with a comprehensive assessment process. The importance of the assessment stage of the rehabilitation process has been widely reported in the literature (Rauch et al., 2008). According to McMillan et al. (2003a) and Rauch, Cieza and Stuchi (2008), a comprehensive method for assessing a patient's problems and needs is critical to the rehabilitation process, since it provides the raw material from which goals and a treatment plan can be devised. It has been reported that the assessment process should cover all critical areas, be valid and sensitive to any change in the patient's condition, and be clinically feasible (McMillan et al., 2003, Rauch et al., 2008).

The heads of the rehabilitation teams could not give in-depth details about the assessment that each discipline performs in their department. The complexity of ABI conditions and the lack of standardised written documentation, as a communication method between the multidisciplinary team, could be reasons that caused difficulties for the heads of rehabilitation teams in describing the assessment methods followed in each rehabilitation centre.

(Interviewee 2 - Morriston) *"some disciplines have in-depth assessment and have separate documentation …"*.

Feedback from the heads of the rehabilitation teams showed that physiotherapists, along with all the other therapists in the multidisciplinary team, spent about two weeks comprehensively evaluating the patient's status.

(Interviewee 1-Morriston Hospital) *"the patient enters the assessment phase where everybody gets to know him or her. This phase usually takes about 2 weeks"*

(Interviewee 4 – Rookwood Hospital) *"That would give the therapists some time to do their assessments"*.

In contrast with the feedback from the physiotherapists, twenty one (42%) physiotherapists who completed the questionnaire stated that they completed the patients' initial assessments within the first 48 hours of patient admission while 12 (24%) took up to one week to complete it. Eleven (22%) physiotherapists completed the patient assessment within the first two weeks compared to only 6 (12%) physiotherapists who took more than two weeks to complete this task.

Not many researchers reported the time that therapists should take to complete their assessment. The National Clinical Guidelines for Rehabilitation and those of the National Institute for Health and Clinical Excellence (NICE) are the only institutes which state the time that physiotherapists should take to complete the initial assessment, as it has been reported that the initial assessment should ideally be completed in one session, within 24 hours of admission, although in practice and according to British Society of Rehabilitation Medicine (2003) the initial assessment may sometimes take more than one session (British Society of Rehabilitation Medicine, 2003). Hence, a comprehensive assessment in the rehabilitation stage is a very important and critical stage of the rehabilitation process; however, the time physiotherapists spend completing an assessment varies

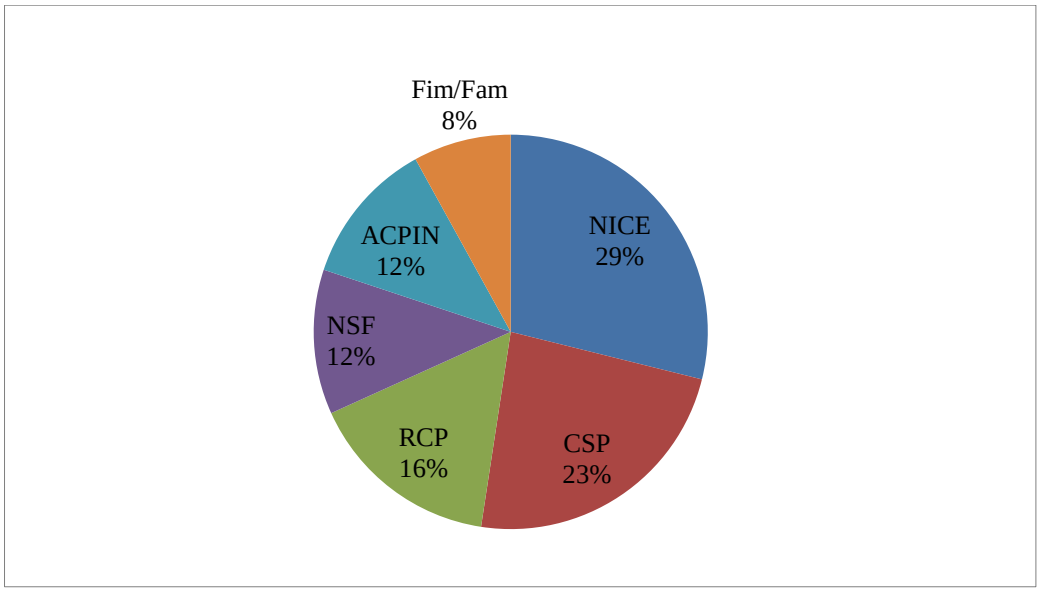
from one rehabilitation centre to another and there is no rule reported in the literature concerning how long physiotherapists should take to complete their assessment. This study finding confirms that the majority of physiotherapists complete the patient's assessment within the first 48 hours after admission.

According the feedback from the heads of the rehabilitation teams in Morriston Hospital, FIM & FAM assessment was a multidisciplinary assessment, which was completed during the patients' admission and before a patient was discharged

> (Interviewee 2 – Morriston Hospital) *"So over two weeks, the patient will be assessed by all members of the team and then what we do is we arrange a family meeting for the patient and also do a baseline FIM & FAM assessment."*

In contrast, the feedback from physiotherapists who completed the questionnaire showed that only 7.5 % of the physiotherapists were using the UK Functional Assessment Measure/Functional Independence Measure (FIM/FAM). The feedback from the physiotherapists showed that 54% of the physiotherapists used a guideline to structure their assessments. The most commonly used guidelines were those from: the National Institute for Health and Clinical Excellence (NICE) (27%); the Chartered Society of Physiotherapy (CSP) (22%); the Royal College of Physicians (RCP) (14.8); the National Service Framework (NSF) (11.1%); and the Association of Chartered Physiotherapists Interested in Neurology (ACPIN) (11.1%). (See figure 5-2) (Association of Chartered Physiotherapists Interested in Neurology, 1995, the British Society of Rehabilitation Medicine, 2003, the Chartered Society of Physiotherapy, 2005, Rentsch et al., 2003).

Figure 5-2: Guidelines used by physiotherapists on patients assessment



Several sets of guidelines have discussed physiotherapy assessment in inpatient settings (Association of Chartered Physiotherapists Interested in Neurology, 1995, the British Society of Rehabilitation Medicine, 2003, the Chartered Society of Physiotherapy, 2005, Rentsch et al., 2003). To the best of the researcher's knowledge, to date there is no other study that has discussed the physiotherapists' use of guidelines in their assessment process to compare with this study's findings.

Physiotherapists who did not follow any guidelines in assessing their patient were asked to describe their assessment process. Some physiotherapists stated that they were following an assessment process that they learned at university, on clinical placement, during placement rotation, from background reading and/or provided by the trust. Generally, the assessment process was divided into two main parts: subjective and objective assessments. Subjective information included demographic data, past history, career, past history of medication, family, dependents and the patient's own concept of their functional ability. This information was usually

obtained from the patient's medical file, the patient themself and/or their family. Objective assessment included an assessment of upper and lower limbs and the trunk and covered all of the following: respiratory assessment, range of motion (ROM) measurement, muscle power, muscle tone, spasm and spasticity, an body posture assessment, pain, static/dynamic sitting/standing balance, coordination, sensation, gait analysis, mobility, pattern of upper and lower limb movements and manual handling.

To find out how the assessment methods followed by physiotherapists are supported by the literature, the researcher compared the reported assessment processes with all available guidelines which describe the physiotherapy inpatient assessment process. Comparing the assessment methods followed by physiotherapists working in an in-inpatient rehabilitation setting in the UK with the ACPIN guidelines, it can be clearly seen that the two assessment methods are broadly similar and have the same assessment components. ACPIN has an assessment tool which divides the physiotherapy assessment processes into three main categories: general information, subjective assessment and objective assessment (Association of Chartered Physiotherapists Interested in Neurology, 1995). However, the ACPIN guidelines provide better organisation of the physiotherapy assessment. Other guidelines, such as the National Clinical Guidelines for Rehabilitation, describe the assessment process in a more general way and mention that the initial assessment should indicate the level of patient impairment, limitations on activity, and any restrictions on participation as determined by the physiotherapist (British Society of Rehabilitation Medicine, 2003). No specific details are provided about patient assessment in this guideline. The International Classification of Functioning, Disability and Health (ICF) offers a different framework for patient assessment. The ICF domains are classified for bodily, individual and societal perspectives by the means of two lists: body functions and structures, and activity and participation. The ICF also includes a list of environmental and personal factors.

Physiotherapists were also asked to mention what they thought were the advantages and disadvantages of the assessment method and the guidelines that they followed in an inpatient setting. The most common advantages mentioned were that the assessment guidelines are flexible, easy to complete and objective, robust and comprehensive. The most common disadvantages were that the guidelines are time-consuming and clinician-led (see Table 5-4 for more details of all the advantages and disadvantages).

Table 5-4: Advantages and disadvantages of the assessment guidelines used

Assessment Guidelines	Advantages	Disadvantages
NICE	- Thorough - Flexible - Easy to complete - Robust - Objective	- Tend to be clinician led - Time constraints - Patients tire easily during assessment
CSP	- Standardised - Systematic - Comprehensive - Easy to complete - Flexible - Robust - Objective measure	- Too structured - Time constraints - Differences between therapists - Tend to be clinician led
ABI RCP guidelines	- Systematic - Comprehensive - Give sufficient time to complete the assessment and ensure the maximum amount of information can be gained - Easy to complete	- Lengthy. - Not appropriate for all patients.
NSF	- Flexible - Allow for team discussion - Physiotherapist involved in assessment	- Patients tire easily during assessment
ACPIN	- -Easy to complete	- Tend to be clinician led

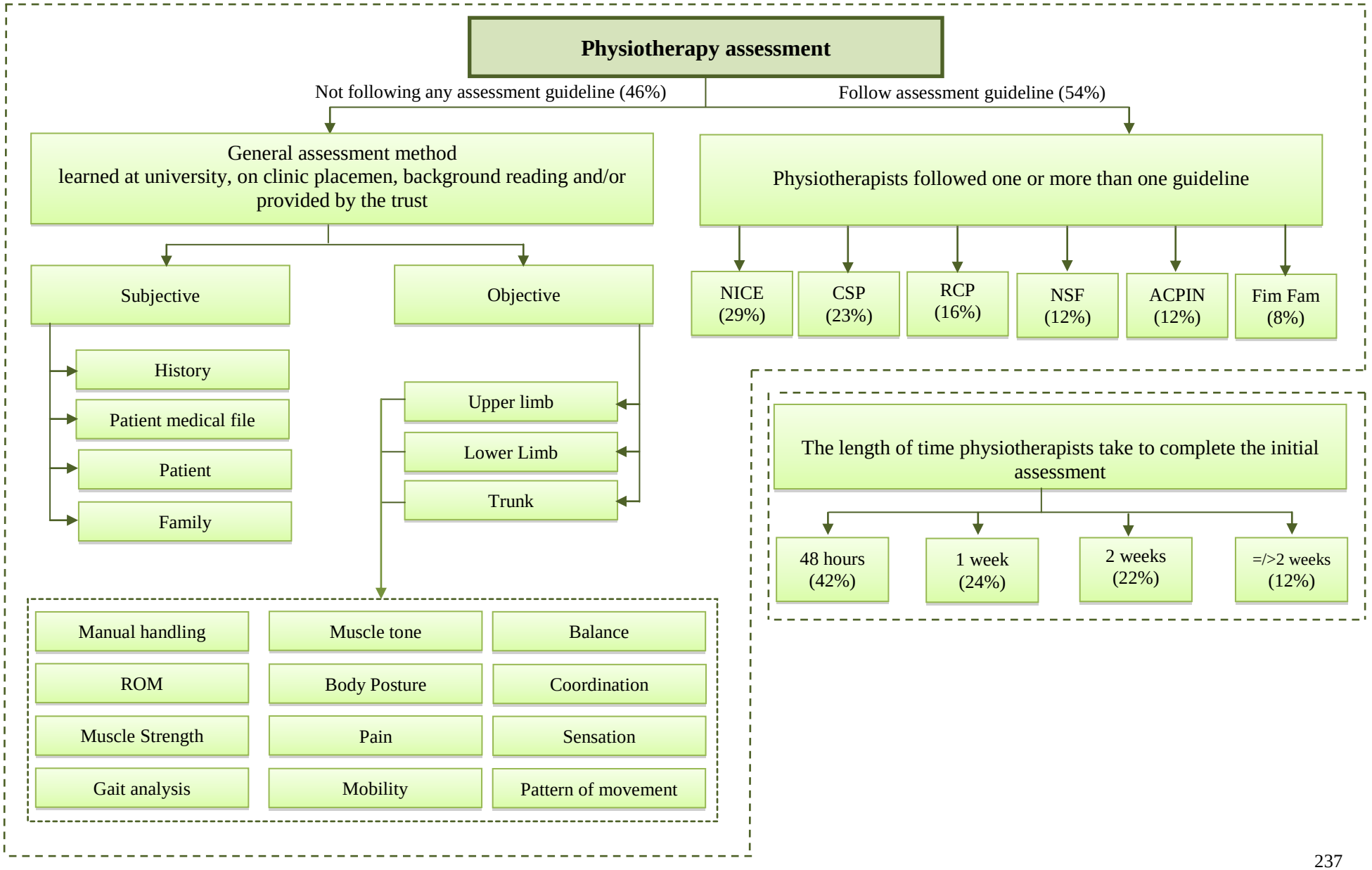
Although patient assessment is an essential process of patient care which takes into account items of patient impairment and disability relevant to the physiotherapy aims, the literature has reported some disadvantages of the assessment which were reported by the physiotherapists. This included physiotherapists finding that some measures are too time-consuming and too specialised for

routine clinical use, even if they are only measured on initial assessment and on discharge from an inpatient rehabilitation setting (Lennon and Hastings, 1996).

In terms of outcome measurements, the physiotherapists were asked to list the most commonly used ones in their clinics. Forty one (82%) of the physiotherapists stated that they use the Berg Balance Scale, which is considered the most commonly used outcome measure. Twenty nine (58%) of the physiotherapists stated that they used the 10 meter timed walk and sixteen (32%) used the Ashworth/Modified Ashworth scale. Many other outcome measurements were listed, including: the Rivermead Mobility Assessment; Functional Assessment Measures/ Functional Independence Measure (FIM/FAM); Goal Attainment Scaling (GAS); Range of Motion (ROM) measurement; Northwick Park Therapy Dependency Scale; Video and Photography; Goniometry; Wessex Head Injury Matrix (WHIM); Oxford Scale; VAS; Physiological Cost Index; Trunk Impairment Scale; 9 hole peg test; Therapy Outcome Measures (TOMS) and High Level Mobility Assessment Tool (HiMAT) (Mathiowetz et al., 1985, Gajdosik & Bohannon 1987, Riddle et al.,1987, Collen et al., 1991, Hall et al., 1993, Bailey & Ratcliffe 1995, Berg et al., 1995, Turner-stokes et al., 1998, Majerus et al., 2000, Kelly 2001, Mossberg, 2003, Perry et al., 2004, Verheyden et al., 2004, Ansari et al., 2006, Williams et al 2006, Mehrholz et al., 2007, Bouwens et al., 2009) (physiotherapists were allowed to report more than one outcome measurement). It can be clearly stated that balance and walking activities are the activities most commonly used by physiotherapists in an inpatient setting as the outcome measurements which monitor these two activities. The literature has numerous studies which examine the validity and reliability of using these outcome measurements with neurology patients (Mathiowetz et al., 1985, Turner-stokes et al., 1998, Ansari et al., 2006, Berg et al., 1995, Mehrholz et al., 2007, Mossberg, 2003). Systematic and repetitive re-assessment is an essential part of rehabilitation and requires input from each member of the multidisciplinary team to ensure that all patients' problems are evaluated (Turner-Stokes, 2008). A standardised measurement outcome has been reported as one

that should be used to facilitate a systematic approach to patient evaluation and to enable progress to be monitored, as stated in the CSP's Core Standards (Chartered Society of Physiotherapy, 2000). It is a concern that the literature suggests that 22% of therapists are not measuring outcomes and that many are using measures that have not been tested for reliability and/or validity (Waddell and Burton, 2004). There is a debate in the literature, and little consensus about the selection of appropriate outcome measures for routine use in inpatient clinical practice. However, there are measures for which evidence of validity, reliability and sensitivity has been emphasised and recommended in the literature (Wade, 1992). Although the measurement tool and outcome measure should be relevant to the patient's problem and condition, and appropriate to the treatment intervention and relevant to the patient, different outcome measures and measurement tools are available and recommended according to the measure of impairment. It has been reported in the literature that the outcome measure used may change over time as the focus in the early ABI phase may be primarily on impairment, and the later stages of treatment and measurement may be more appropriately targeted towards disability and handicap (Wade and de Jong, 2000). Regular documentation of the outcome measurements used in practice and appropriately linked to the patient's problems, condition and treatment interventions is necessary (Wade and de Jong, 2000). However, this current study is the only study which has investigated the frequency of using these outcome measurements in real practice. Hence comparing this study's finding with the literature is difficult. Figure 5-3 summarises the inpatient physiotherapy assessment for ABI patients in a mapping process flowchart.

Figure 5-3: Process map of the physiotherapy assessment for ABI patient in inpatient setting



5.3.2.2. Goal setting (Sub-theme four)

Goal setting is widely reported in the literature to be a fundamental and effective element of the rehabilitation process. Feedback from the heads of the rehabilitation team in Morriston hospital, showed that once each discipline has finished assessing a patient, the whole team, the patient and his/her family met in what they called a "family meeting". This meeting was to discuss the multidisciplinary patient's goals. During that meeting, the team in Morriston Hospital were sure to ask the patient and his/her family about what they would like to see achieved during the inpatient service time, since this was considered a patient's once-in-a-lifetime opportunity as it was very hard to readmit a patient to an inpatient rehabilitation service once discharged. In that meeting, the team, the patient and his/her family should agree to use that time maximally to the patient's benefit

> (Interviewee 2- Morriston Hospital) *"So we have to provide them with what we can during that time and they should also agree to use that time maximally to their benefit".*

The literature has strongly supported this as it has been reported that the goal-setting process should be used to ensure that the patient, their family and carers agree on the rehabilitation goals and the methods to be used to achieve these goals (Holliday et al., 2007). It has also been reported that the multidisciplinary goals set in inpatient rehabilitation facilitates both the efficiency and effectiveness of rehabilitation and led to an increase in the number of goals set (Wade, 2009; Dalton et al., 2012). The results of this study are also supported by Leach et al. (2010), as they found that one of the most common approaches to the goal-setting process was a therapist-led approach based on collaboration between patient and therapist, whereby the goal-setting process began by completion of an initial assessment and interaction between therapist and patient to set goals.

The goals in Morriston Hospital were considered as MDT goals and were written up after the meeting and sent to each therapist who was treating the patient to be kept in the patient's note. Each individual discipline was then to have a further goal-planning meeting with the patient and their family to divide the goals into smaller goals, with that in-depth goal-planning meeting being documented into separate notes. Once the patient has achieved the discharge point, the therapist was then to look at the goal achievement and whether the goal had been achieved. If not, then another goal might need to be set.

In Rookwood Hospital, the multidisciplinary team met with the patient and his/her family every 3-6 weeks to discuss the patient's progress and goals. An MDT patient's goals were written before the meeting as the therapists knew roughly what they should be able to achieve with a patient after the initial assessment was completed and there was another 2-3 weeks of rehabilitation and continuous discussion with the patient. The purpose of the meeting was to discuss goals with the patient and his/her family and agree on the goals which they should be able to achieve together.

> (Interviewee 4- Rookwood Hospital) *"They discussed in the admission meeting before they get here, so the members of the MDT know roughly what they need to meet and then we do have a MDT meeting, usually 3 to 4 weeks after their arrival."*

The goal-setting process in Rookwood Hospital was found by Leach et al. (2010) to be the most commonly used method for goal-setting in an inpatient rehabilitation setting. According to them, the most commonly used method in goal-setting appeared to be largely controlled by therapists, as they set their goals based on their assessment, with little or no consideration given to the patient and/or their family members in the goal-setting process. In Rookwood Hospital, the patient and/or their family input little to the goal-setting process.

The goal-setting process in both hospitals was to some extend collaborative. The literature emphasises the importance of the goal-setting process being collaborative, so that the patient, therapist and multidisciplinary rehabilitation team agree on a set of goals (Holliday et al., 2007).

Both centres gave the patient and his/her carer some opportunity to contribute to the goal-setting process. Involving the patient in the goal-setting process has been reported as being very important in that it supports person-centred care approaches where all the patients' needs are considered (Dalton et al., 2012, Rosewilliam et al., 2011). It has been reported as promoting and facilitating patients to engage in treatment decisions and feel supported, and helping to make behavioural changes which improve patient satisfaction (National Ageing Research Institute, 2006).

The only one main difference between the two centres was that the therapists in Rookwood Hospital allowed more time before the goal-setting meeting to assess the patient and set goals to be discussed in the meeting. This extra time helps the therapists to set more realistic goals since they have more time to evaluate the problems and understand the patient's capabilities (Holliday et al., 2007). The frequency of meetings in both hospitals was different, as in Morriston Hospital, the MDT met every week to discuss a patient's progress, while in Rookwood they met once every 4 to 6 weeks.

> (Interviewee 2 – Morriston Hospital) *"we obviously discuss any changes at our weekly meeting. We sit with our team and we discuss whether our patients are achieving their goals or not,"*
>
> (Interviewee 4 – Rookwood Hospital) *"... so the members of the MDT know roughly what they need to meet and then we do have a MDT meeting, usually 3 to 4 weeks after their arrival ... and then we have MDT meeting roughly every 4 to 6 weeks.".*
>
> (Interviewee 1 – Morriston Hospital) *"we usually have a family meeting and the whole team is there to discuss the plan and give feedback to the family and to the patient"*.

This finding was supported by the National Clinical Guidelines for Rehabilitation (British Society of Rehabilitation Medicine, 2003) as they support team co-ordination and recommend regular meetings to share patient assessments and progress and plan patient treatment (Strasser and Falconer, 1997).

Feedback from the physiotherapists who completed the questionnaire showed that 43 physiotherapists (86% of the respondents) stated that they met to set the treatment's goals. Twenty four (48%) physiotherapists mentioned that they did not have a special physiotherapy meeting to set goals for their patients and that they met with a multidisciplinary team and/or the patient's family, to set goals. Twenty one (42%) met with a multidisciplinary team only without the patient and/or their family being present and 3 (6%) only met with a multidisciplinary team and the patient, along with his/her family. Nineteen (38%) respondents indicated that they met with other physiotherapists in a goal setting meeting to set patient goals (physiotherapists were allowed to report more than one type of meetings if there were any). However, some other physiotherapists set their goals in a physiotherapy meeting, based on their observations and patient assessment, without patient involvement in the process:

> (Physiotherapist 018- ACPIN member) "*we use a treatment plan by the therapist as goal setting,"*
>
> (Physiotherapist 005- Rookwood Hospital) "*we set goals based on the results of assessments".*

The literature has reported the complexity of the goal-setting process. A strong relationship between each component of the rehabilitation process, including how the assessment process helps clinicians to set goals and how goal-setting helps to choose the intervention provided and to monitor the treatment outcome, has been reported and is supported by the literature (Wade, 2009).

A 'patient-centred service' is the core requirement in the National Service Framework for Long Term Conditions (Department of Health, 2003). The British Society for Rehabilitation Medicine standards for inpatient services state that: *'The individual should be involved as actively as possible in goal setting. The goals ... should be agreed between the individual, their family, carers, and the rehabilitation team'* (Turner-Stokes, 2003).The literature emphasises that the goal-setting process should be collaborative, whereby the patient, therapist and multidisciplinary rehabilitation team agree on a set of goals (Holliday et al., 2007). However, only 6% of the physiotherapists met to set their goals by involving the patient and/or his/her family in the goal-setting process. While the patient plays a very important and active role in the goal-setting process, some patients with ABI lack the ability to contribute formally to the goal-setting process due to their injury and their mental capacity after their incident, which might increase the difficulties of involving the patient in the goal-setting process (Wade, 2009 & Dalton et al., 2012). Holliday, Ballinger and Playford (2007) found that the patient's limitations due to their condition including the consequences of impairment have a large effect on the goal-setting process and Dalton et al. (2012) reported that only 40% of patients who went through inpatient rehabilitation had a chance to be involved in the process of goal-setting. Although patient involvement in the goal-setting process is important, it is considered to be a very challenging process in neuro-rehabilitation clinical practice (Holliday et al., 2007, Dalton et al., 2014) because of the lack of the patient's ability to contribute formally to the goal-setting process due to their injury and their mental capacity after the incident.

The feedback from the questionnaire has also shown that 6 (13.9%) physiotherapists from the 43 physiotherapists who met to set their goals had a regular meeting every week to set their goals, 17 (39.5%) physiotherapists reported that they met every two weeks, 3 (7%) met every three weeks and 4 (9%) physiotherapists met every month. Thirteen (30%) physiotherapists met every 6 weeks or more to set their goals. In response to a question asked to the physiotherapists about

how they set goals for each patient, the majority replied that all goals were set after patient assessment and a discussion with the patient and their family:

> *(Physiotherapist 075- ACPIN member) "Careful assessment and realistic planning, with the patient to see what their aims are and discuss how to break down the task."*

In addition, eighteen (36%) physiotherapists stated that they reviewed their goals every week. Eleven (22%) physiotherapists reported that they re-evaluated patient goals fortnightly and 9 (18%) reviewed them every month. However, 12 (24%) physiotherapists stated that they reviewed their goals every 6 weeks or more. Physiotherapists reported that they meet to review their patient's goals and reassess their patients regularly and use outcome measurements to monitor their set goals.

> *(Physiotherapist 012- ACPIN member) "6 weeks after first Ax or 8 weeks, depending on what is agreed".*

The literature reveals that it is difficult to make evidence-based recommendations for the appropriate time for the physiotherapists to meet and set their goals or to review their goals (Chartered Society of Physiotherapy, 2005). Guidelines state that physiotherapists should meet regularly to set and review their goals (Chartered Society of Physiotherapy, 2005). The researcher believes that reviewing the patient's goals should be on a regular basis, based on the patient's progress and whether the patient has achieved his/her goals or not and these goals should be accurately documented (Wade, 2009). However, the time to review the goals set can be different from one patient to another depending on the patient's progress and response to the treatment provided (Turner-Stokes, 2003).

In response to a question asked to the physiotherapists about what they did if their goal was not achieved, most physiotherapists stated that they first tried to identify the reason why the goal was not achieved; then they adapted or reset the goal, either altering the time period or breaking down

the unachievable goal:

> *(Physiotherapist 018- ACPIN member) "Adapt goal, either altering time period or the extent of the goal."*

Young et al. (2008) support this process by stating that the failure of a patient to reach a goal might lead the therapist to re-evaluate that goal and find the reason why it was not achieved and whether it was unrealistic, if the intervention was lacking, or the patient was unable or unwilling to participate (Young et al., 2008). Some physiotherapists reported that they prefer to change the goal and to try more realistic goals and different treatments:

> *(Physiotherapist 004- Rookwood Hospital) "Change it, try another treatment or cancel it, state the reason".*

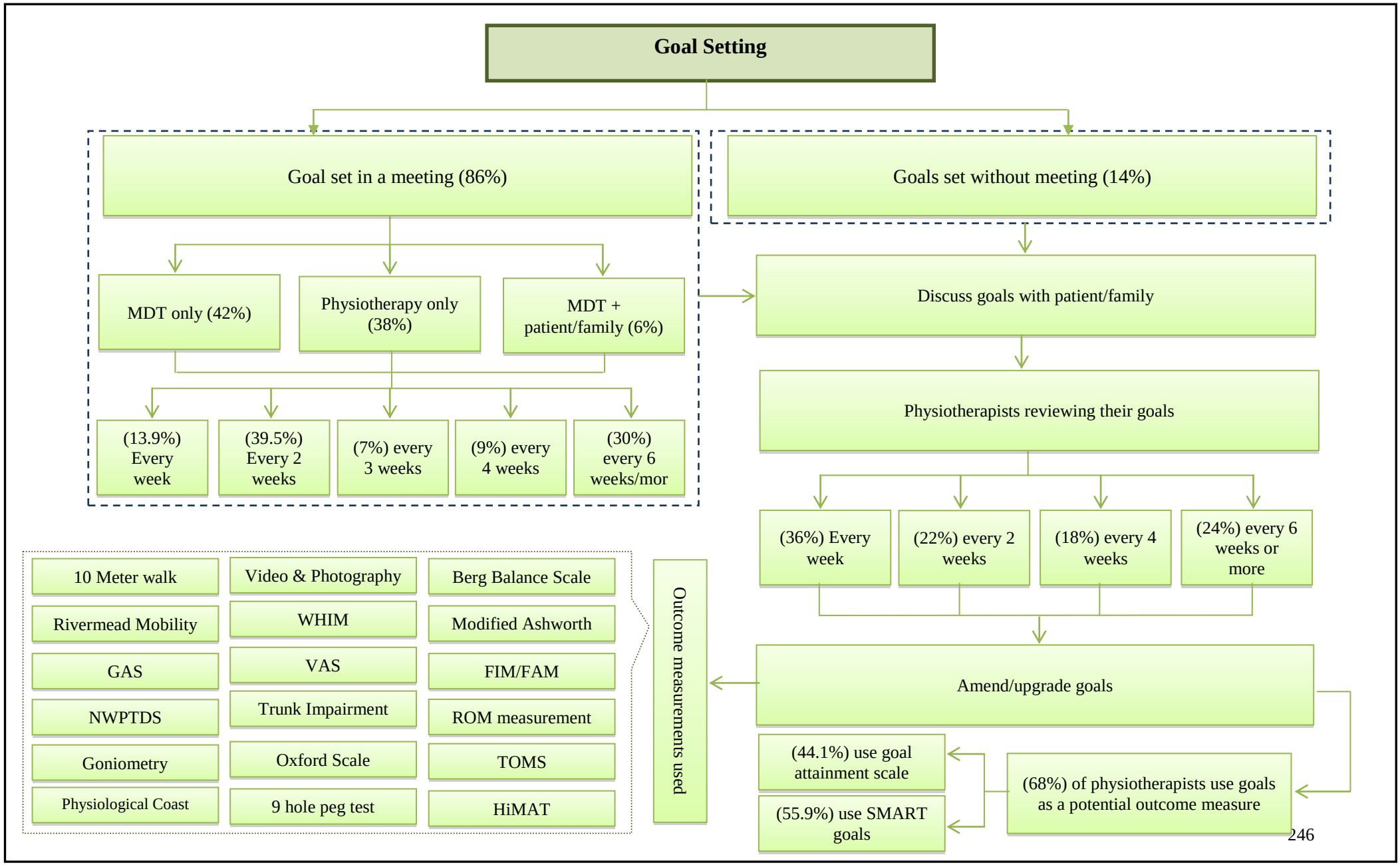
Thirty four (68%) physiotherapists stated that they use set goals as potential outcome measures. Fifteen (44.1%) of them used the goal attainment scale and 19 (55.9%) physiotherapists used the set goals as potential outcome measures by ensuring that the goals are SMART and the patient was making progress by having evidence of patients achieving goals:

> *"Example (Physiotherapist 089- ACPIN member): I have a client who is increasing his distance walking skills and stamina by walking around a local shopping mall. Each retail unit has a unit number so we can record how far he walks. His care team chart how many metres he walks, how long it takes him, how many times he bumps into the wall, etc. I can calculate his metres/second plus graph changes in his skills."*

Some researchers believe that using the goals set as potential outcome measures would help clinicians to review their goals accurately on a regular basis (Holliday et al., 2007). Although the literature has reported the use of goal setting as a potential outcome measured by a goal attainment scale, some researchers believe that a goal attainment scale is not an appropriate outcome measure to be used in routine daily clinical practice (Wade, 2009). Holliday, Ballinger

and Playford, (2007) have reported that appropriate goals should be specific, measurable, achievable, realistic/ relevant and timed (SMART), and able to be used as potential outcome measures. However, some other researchers report that not all set goals need to be SMART and to satisfy all five criteria. They believe that therapists should be less rigid in their adherence to being SMART (Bovend'Eerdt et al., 2009). Figure 5-4 summarises the inpatient physiotherapy goal-setting process in a mapping process flowchart.

Figure 5-4: Mapping process of the physiotherapy goal setting process for ABI patients in an inpatient setting



MDT: Multidisciplinary team, WHIM: Wessex Head Injury Matrix, GAS: Goal Attainment Scaling, VAS: Visual Analog Scale, FIM FAM: Functional Assessment Measures and Functional Independence Measure, TOMS: Therapy Outcome Measures

5.3.2.3. Treatment plan and reassessment process (Sub-theme five)

Due to the difficulties in identifying physiotherapy interventions which truly contribute to rehabilitation outcomes, the need for an accurate and detailed description of physiotherapy interventions has been widely discussed in the literature (De Wit et al., 2006, DeJong et al., 2004). Most published studies examined physiotherapy on aggregate, as a whole, and the literature reported that individual interventions are rarely examined in the context of the entire array of physiotherapy interventions (DeJong et al., 2004). A robust method to document the physiotherapy provided has been reported as it would bring systemisation, greater clarity and more precision to describing, evaluating and quantifying what happens in physiotherapy practice (De Wit et al., 2006, DeJong et al., 2004).

Fewer details were provided by the heads of rehabilitation teams about the treatment provided for patients with ABI in an inpatient setting. The researcher intended to seek in-depth information from physiotherapists who were treating ABI in an inpatient setting about the treatment provided for their patients. Feedback from physiotherapists showed that 72.7% of the treatment techniques which were listed in the questionnaire were mentioned as being used at least once a week by more than 75% of the physiotherapists (see Tables 5-5 for more detail). Most of the treatment techniques which have been reported as not being used on a regular basis were related to musculoskeletal interventions, respiratory care and exercise. The treatment techniques reportedly used more than any other treatment techniques (>= once a week by >90% of physiotherapists) including manual facilitation and alignment, re-education and core stability to improve balance, manual cueing & sensory inputs and demonstration/ modelling as task-specific training and strengthening for positioning musculoskeletal intervention.

On the other hand, about thirty nine per cent (39.3%) of the listed treatment adjuncts were indicated as being used at least once a week by more than 75% of the physiotherapists while 68.9% of the treatment tasks and positions which were listed in the questionnaire were reported as being used at least once a week by more than 75% of the physiotherapists (see Tables 5-6 and 5-7 for more detail). In total, 50 treatment activities were selected by at least 75% of the physiotherapists who completed the questionnaire as being used regularly. The treatment tasks and positions which were reported as being used more than any other treatment tasks and positions (>= once a week by >90% of physiotherapists) include sitting unsupported, standing stride stand, standing step stand as a posture and/or position, sitting to standing (and vice versa) as a transfer activity, stepping, walking, reaching and UL activities. and balance as task training.

Table 5-5: Treatment techniques listed in the questionnaire and their frequency of use by the physiotherapists

			Very regularly > 1 a week	Regularly </= 1 a week	Less regularly > 1 a month	Rarely used </= 1 a month	never used	% or regular basis </= 1 a week
Treatment technique	**Selective Movement**	Manual Facilitation	37	10	3	0	0	94%
		Co-ordination	33	11	6	0	0	88%
		Alignment	39	8	3	0	0	94%
	Balance	Re-education	42	6	2	0	0	96%
		Core stability	32	13	2	0	3	90%
	Task specific training	Cognitive strategies	25	11	12	0	2	72%
		Perceptual training	16	11	18	0	5	54%
		Manual cueing & sensory inputs	31	14	4	0	1	90%
		External cueing	28	16	6	0	0	88%
		Demonstration/modelling	34	11	5	0	0	90%
		Soft tissue mobilisation	21	17	10	0	2	76%
	Musculoskeletal interventions	Joint Mobilisation	6	14	25	0	5	40%
		Strengthening (Resistance from the therapist/ body weight or equipment)	30	10	10	0	0	80%
		Stretching	35	11	4	0	0	92%
		PROM	27	11	7	0	5	76%
		Positioning	40	7	3	0	0	94%
		Electrotherapy techniques (FES, TENS)	6	9	28	0	7	30%
	Respiratory Care	Secretion management:- Suction, ACBT, Manual techniques or Positioning	18	12	12	0	8	60%
		Management of lung volumes	8	11	20	0	11	38%
	Exercise	Hydrotherapy	14	9	17	0	10	56%
		Cardiovascular / Cardio-respiratory Exercise	28	14	6	0	2	84%
		Endurance Exercise	27	12	9	0	2	78%

Table 5-6: Treatment adjuncts listed in the questionnaire and their frequency of use by the physiotherapists

			Very regularly > 1 a week	Regularly </= 1 a week	Less regularly > 1 a month	Rarely used </= 1 a month	never used	% or regular basis </= 1 a week
Treatment Adjuncts	**Education and advice**	Patient	39	10	1	0	0	98%
		Ward staff	33	10	2	1	4	86%
		Family [Care-giver]	22	19	6	3	0	82%
	Medication	Botulinum Toxin Injection	2	10	26	9	3	24%
		Systematic spasticity medication	13	10	16	7	4	46%
		Pain relief	28	12	6	3	1	80%
	Orthotics	Splinting	18	20	6	4	2	76%
		Casting	8	17	9	7	9	50%
		Ankle Foot Orthoses	13	17	12	7	1	60%
	Equipment	Plinth	39	4	2	3	2	86%
		Tilt table	22	5	9	5	9	54%
		Electric standing frame	18	9	8	5	10	27%
		passive standing frame	24	14	6	4	2	76%
		Gym ball	25	14	6	3	2	78%
		Sit-fit	11	6	5	4	24	34%
		Parallel bars	29	10	5	4	2	78%
		Free weights	7	17	12	10	4	48%
		Exercise bike	28	12	5	3	2	80%
		Treadmill or other gym equipment	17	13	7	6	7	60%
		Static bike	18	16	4	4	8	68%
		Motorised bike	3	10	4	1	32	26%
		Walking stick	21	17	6	4	2	76%
		High walking stick	9	13	7	9	9	44%
		Quad/tripod	10	12	10	9	9	44%
		Wheeled Rollator	21	10	10	7	2	62%
		Pick up Zimmer frame	7	13	9	11	10	40%
		Elbow crushes	7	12	14	11	6	38%
		Arjo walker	7	7	8	11	17	14%
		Mattresses	21	10	5	8	6	62%
		Seating	25	10	9	4	2	70%
		Wheelchair	35	7	5	3	0	84%
		Cushions	32	7	4	5	2	78%
		T-roll	24	9	7	4	6	66%

Table 5-7: Treatment tasks and positions listed in the questionnaire and their frequency of use by the physiotherapists

			Very regularly > 1 a week	Regularly </= 1 a week	Less regularly > 1 a month	Rarely used </= 1 a month	never used	% or regular basis </= 1 a week
Treatment Task and Positions	**Posture/ position**	Lying--supine	39	8	1	2	0	94%
		Lying--Prone	29	12	2	5	2	82%
		Side lying	33	11	3	3	0	88%
		Sitting--supported	33	11	2	2	2	88%
		Sitting--unsupported	35	11	2	2	0	92%
		Standing--stride stand	30	16	2	2	0	92%
		Standing--step stand	28	17	3	2	0	90%
		Standing--single leg stand	29	13	3	4	1	84%
	Transfers	Bed mobility (including rolling)	35	7	5	3	0	84%
		Lying to sitting (vice versa)	35	8	4	3	0	86%
		Sitting to standing (vice versa)	40	6	1	3	0	92%
		Stand and step around	36	8	3	3	0	88%
		Lower limb activities	33	11	3	3	0	88%
		Car transfer	5	15	18	10	2	40%
		Floor to chair (vice versa)	10	13	15	8	4	46%
	Task	Stepping	37	10	2	1	0	94%
		Up and down stair activities	30	11	6	1	2	80%
		Turning around activity	29	15	5	1	0	88%
		Walking	38	9	2	1	0	94%
		Wheelchair handling and driving	11	17	9	10	3	54%
		Reaching and UL activities	36	10	3	1	0	92%
		Lower limb activities	33	11	3	3	0	88%
		Personal ADL	15	16	12	5	2	62%
		Domestic ADL	9	12	18	7	4	42%
		Leisure./ hobbies and sports	7	21	15	5	2	56%
		Work related activities	4	12	18	9	7	32%
		Balance	36	10	3	1	0	92%
	Class activity	Circuit activities	10	11	5	11	13	42%
		Hydrotherapy	11	9	8	8	14	40%

Although a stroke is an ABI, it still remains necessary to identify whether the treatment provided for stroke patients is similar to the treatment provided for ABI patients or if there are differences. This will help the researcher to determine whether what exists in the literature about stroke can be used for all other conditions of ABI or if what is provided for ABI patients is different from what physiotherapists are providing to stroke patients. Comparing this study's results with what is available in the literature, the researcher found that according to Tyson et al. (2009), facilitation, practising an activity and mobilisation are the most frequently used interventions used by physiotherapists who treat postural control and mobility problems after a stroke (Tyson et al., 2009). This is concluded based on data collected from a total of 1,156 physiotherapy treatment sessions using a special data collection form. The researcher has reported that the most frequently used facilitation activities focusing on sit to stand exercises, balance activities, standing and sitting, movements of the arm, and walking. The most frequently practised activities are standing exercises, walking and sit to stand, while the most frequently used type of mobilisation is the shoulder girdle (Tyson et al., 2009).

Although the focus on treatment in Tyson et al.'s (2009) study might be different from the focus on treatment provided by physiotherapists in this current study, comparing both practices was necessary.

Comparing this current study's result with Tyson et al. (2009), it can be clearly seen that facilitation techniques are commonly used in both stroke and ABI rehabilitation. Exercise in standing was the most commonly practised activity used by physiotherapists with stroke patients, followed by walking and then sit to stand activities. Comparing to this current study's findings which showed that walking and stepping activities are the most commonly used practice activities with ABI patients followed by reaching and upper-limb activities. However, musculoskeletal intervention is less commonly used with ABI compared to stroke rehabilitation. Generally, the results of this study show that patient education

and advice and balance re-education are the treatment activities most commonly used by physiotherapists who treat ABI in the UK, while facilitating sit to stand and movement of the arm are the most commonly used treatment activities with stroke patients based on Tyson et al.'s (2009) study.

Selective movement was also reported by De Wit et al. (2007) as it is used very frequently to treat stroke patients in an inpatient setting. De Wit et al. (2007) conducted a study to identify the content of physiotherapy sessions for stroke patients in an inpatient rehabilitation setting. Their study was a part of the Collaborative Evaluation of Rehabilitation in Stroke across Europe (CERISE) study and the researchers collected their data by recording 15 individual physiotherapy sessions. They found that selective movement, exercise and balance in standing and sitting, ambulatory exercise and transfer activities were the most frequently recorded categories in physiotherapy sessions. This finding supports the point that selective movement including facilitation activity is the most common treatment technique used to treat stroke or ABI patients in inpatient settings. However, patient education is not listed by De Wit et al. (2007) as one of the treatment activities in stroke inpatient rehabilitation.

Both previous studies discuss the physiotherapy treatment activities provided for stroke patients in the United Kingdom (De Wit et al., 2007, Tyson and Selley, 2006). Jette et al. (2005) conducted a study to describe a physiotherapy plan of care in terms of the interventions used during treatment sessions in the United States and New Zealand (Jette et al., 2005). This was part of the PSROP study and data were collected from 972 patients with stroke treated by 86 physiotherapists working in six different treatment hospitals in the United States and New Zealand. The researchers used a special data collection form developed for this purpose and found that gait training, pre-functional activities and transfer activities were the activities most frequently used to treat stroke patients. According to their findings the interventions provided most frequently to address gait and transfer activities are balance and postural training and motor learning. Although balance exercise was found to be one of the most

common treatment activities in ABI rehabilitation and stroke rehabilitation, neither postural training nor motor learning is frequently used in ABI physiotherapy rehabilitation based on this study finding and the available literature (De Wit et al., 2006, Tyson and Selley, 2006). In addition, according to De Wit et al.'s (2007) study, transfer practise is less frequently used by physiotherapists to treat stroke patients. This study reveals that transfer exercise is frequently used with ABI, which is supported by Jette et al.'s (2005) finding. Stretching exercises are reported by Jette et al. (2005) as the most frequently used pre-functional activities and the same was found in this study with ABI patients.

It can be clearly seen that some similar physiotherapy treatment activities are used with both stroke and ABI patients and it seems that the actual intervention components are to some extent similar, though they are used in different ways. However, there are some discrepancies in the literature concerning the physiotherapy activities provided for stroke patients in an inpatient setting and it can be clearly seen that physiotherapy practice differs from one country to another. Hence, generalising the research findings for stroke patients for application to ABI patients is currently not appropriate. At this stage; more evidence via comprehensive studies is needed to prove whether the treatment activities provided for both conditions are similar or not.

5.3.2.4. Discharge stage (Sub-theme six)

The last stage of the rehabilitation phase which has been reported by the heads of the rehabilitation teams was discharging the patient to the most appropriate community service, or home, depending on his/her abilities:

> (Interviewee 3 – Rookwood Hospital) *"we will discharge the patients either to another facility or to their home, or wherever it is appropriate for their level of improvement*".

Discharge planning was reported in the literature as an essential part of the patient's rehabilitation

process (Scottish Intercollegiate Guidelines Network, 2010).

The feedback from the heads of rehabilitation teams indicated that each rehabilitation centre has discharge criteria for their patients. The top three discharge criteria in Morriston and Rookwood hospitals were that the patient achieved all goals, was safe to be discharged, and that rehabilitation could be achieved in the community (see Table 5-8 for all discharge criteria).

Table 5-8: Discharge criteria followed in Morriston and Rookwood Hospital

Criterion	Morriston Hospital	Rookwood Hospital
Patient has achieved all goals	√	√
Safe to be discharged	√	√
The patient's needs can be met either in a local rehabilitation setting or in the community	√	√
Patient has reached a plateau (unable or unwilling to participate actively in the programme)	√	√
The patient is medically stable		√
Fewer than 2 disciplines required		√
Access to community rehabilitation	√	
Passive patient	√	
Safe home and appropriate social set-up are available		√

The feedback from the questionnaire showed that the most important criterion to discharge a patient was that the patient had achieved all their goals. The Scottish Intercollegiate Guidelines Network (2010) support this finding and consider this criterion to be the most important standard to discharge any patient from an inpatient rehabilitation service. They report that discharging a patient from the inpatient rehabilitation service is appropriate when the patient's goals have been achieved and an intensive multidisciplinary rehabilitation service is no longer needed (Scottish Intercollegiate Guidelines Network, 2010). However, if the patient's goals are not achieved, they are re-evaluated to find the reason why and then new, more realistic goals are set (see goal setting – sub-theme under the rehabilitation theme for more details)

Other discharge criteria reported by the heads of the rehabilitation teams in both hospitals and supported by the Scottish Intercollegiate Guidelines Network (2010) were that further progress by the patient was unlikely to occur as the patient had reached a plateau. The patient was discharged if he/she was unwilling or unable to cooperate with the rehabilitation programme, or s/he was medically unstable and required further intensive medical care (Scottish Intercollegiate Guidelines Network, 2010).

According to the Scottish Intercollegiate Guidelines Network (2010), a pre-discharge home visit is considered to be a vital part of the discharge planning process. It should be conducted by different members of the multidisciplinary team to give the patient and the multidisciplinary team the opportunity to identify all possible problems that are likely to appear when the patient is discharged. It also helped to address any other needs that the patient and/or carer may have and to evaluate how safe the home environment is (Scottish Intercollegiate Guidelines Network, 2010).

According to Interviewee 1, regarding the advantage of having discharge criteria, only patients who need to be in an intensive rehabilitation setting stay and, if their needs can be met elsewhere, they will obviously be directed to the right place. It also makes optimum use of the very limited rehabilitation resources and makes certain that people are safe to go home before being discharged.

> (Interviewee 1- Morriston Hospital) *" only people who need to be in the acute rehabilitation setting stay here and …. Making optimum use of our very limited resources … and being certain that people are safe to go home before we actually discharge them."*.

Interviewee 2 summarised the critical need for very well structured discharge criteria as they help the multidisciplinary team to determine the best time to discharge the patient from the facility

> (Interviewee 2 – Morriston Hospital)*"It is important to have some criteria to be able to discharge, otherwise if you discharge a patient too early and they have not achieved their*

> *goals, then there is no other service for them and the outpatient service is so scattered that that patient will just be lost in the system and they will keep going back to their GP with the same problem. It is better for them to achieve their goals, have a safe place to go, and then discharge them."*

The head of the rehabilitation team in Rookwood Hospital thought that discharge criteria helped them to discharge patients in a timely fashion, when they are ready to be discharged, as they start planning discharge as soon as they arrive at the hospital, so the team know from the beginning what they are working towards

> (Interviewee 4 – Rookwood Hospital) *"Ideally, you want to be able to discharge patients in a timely fashion, when they are ready to go…. So if you have discharge criteria, you can start planning their discharge as soon as they get in here, …".*

According to the interviewees, the main disadvantage of having discharge criteria in place is that sometimes they discharge a patient who might have benefited from staying in the inpatient rehabilitation service

> (Interviewee 1 – Morriston Hospital" *"I suppose there might be patients who are going through a phase where they cannot engage in the rehabilitation process and we have to discharge them because they are not engaging with it; and maybe a little bit further down the line they might just improve from a psychological or cognitive problem and then be able to engage in the rehabilitation process."*

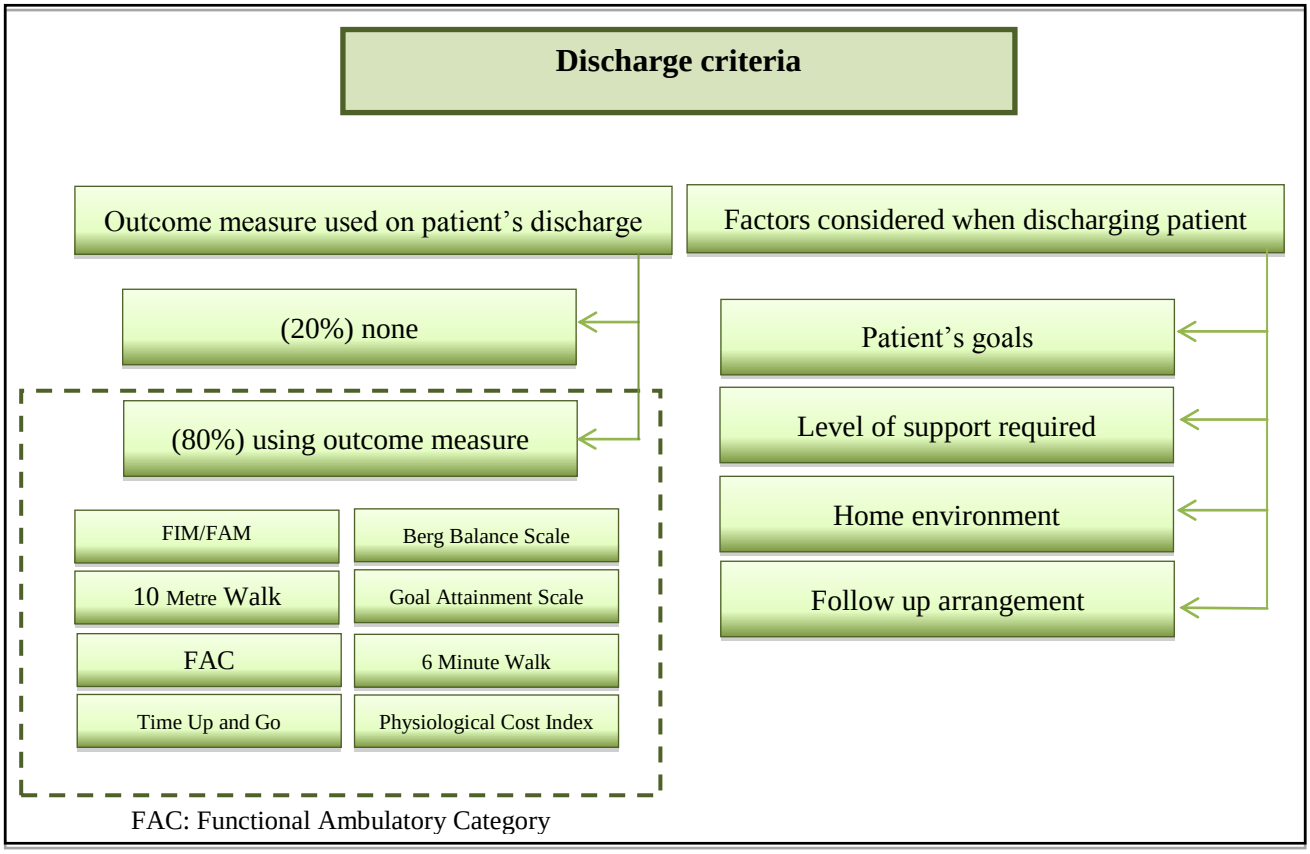
Taking an example, some patients may be going through a phase whereby they cannot engage in the rehabilitation process and so the team have to discharge them because they are not engaging with it. However, after some time, they might recover from a psychological or cognitive problem and then be able to engage in the rehabilitation process.

> Interviewee 2 from Morriston Hospital sees the discharge criteria negatively, saying, *"Sometimes they can affect the patient's length of stay because it takes a while for the discharge process to run its course. Moreover, medically and otherwise, the patient might have achieved the goals set but if the patient is not safe to go home because their house is unsuitable, this can prolong their hospital stay."*

With regards to the feedback from physiotherapists responding to the question about what they consider when they discharge a patient from the service, most replies were about whether the patient's goals were achieved or not. Another reported criterion was related to the level of support required after discharge and what support was available, including whether it was safe and appropriate to transfer the patient to a community service or any other facility. The feedback also included the importance of knowing whether the home was suitable for the patient and what on-going support was needed by the family, and what follow up the patient requires.

When the researcher asked the physiotherapists about what outcome measures they used to guide their discharge, 20% replied that they didn't use any. However, the most frequently used outcome measures on discharge which were reported by physiotherapists were the Functional Assessment Measures/ Functional Independence Measure (FIM FAM), the Berg Balance Scale, a 10 Metre Walk, the Goal Attainment Scale, the Functional Ambulatory Category, a 6 Minute Walk, and the Time Up and Go and Physiological Cost Index. The findings of this part of the study emphasise the importance of outcome measurements being regularly documented to monitor a patient's progress until he/she is discharged from the service. Hence, any inpatient documentation method should have space to report the outcome measurements used during treatment sessions. Figure 5-5 summarises the discharge process from an ABI inpatient rehabilitation setting.

Figure 5-5 Patient discharge process from physiotherapy rehabilitation service in inpatient setting



5.3.3. **Post- rehabilitation stage (theme three)**

This theme was not considered in this study since this research was focusing on the rehabilitation process provided for people with ABI in inpatient rehabilitation settings but the post-rehabilitation stage covers the community health service provided for patients after discharge.

5.3.4. **Documentation (Theme four)**

The fourth theme identified from the interviewees' feedback was the documentation theme. This theme helped the researcher to obtain more information about the documentation procedures used by the multidisciplinary team and the physiotherapists in inpatient rehabilitation. The interviews and

questionnaire feedback were also useful to identify the advantages and disadvantages of the documentation methods used and how documentation methods can be developed. The first question in regard to the documentation process was asking the head of the rehabilitation team about how the team documented the rehabilitation process in an inpatient setting. All the interviewees in Morriston Hospital responded that the multidisciplinary team wrote their notes in a multidisciplinary file.

> (Interviewee 1- Morriston Hospital) *"What we have at the moment is multidisciplinary documentation, a general rehab. process, medics, therapists, nurses, everything."*

This file was kept on the nursing site to record a patient's rehabilitation process in chronological order, from the day of admission, throughout the rehabilitation process, until the patient was discharged. The researcher sought more details of what the therapist usually wrote in the multidisciplinary notes and the head of the rehabilitation team replied that the multidisciplinary notes contained the patient's medical history and admission notes, and then the therapists wrote their daily notes which included a summary of a patient's assessment and treatment. However, some disciplines have separate in-depth documentation

> (Interviewee 2 –Morriston Hospital) "*some disciplines have in-depth assessment and have separate documentation."*

On the other hand, interviewees from Rookwood Hospital mentioned that Rookwood Hospital does not have collaborative multidisciplinary notes for all rehabilitation staff. The medical notes being used in Rookwood Hospital were collaborative, but between medical doctors and nurses only.

> (Interviewee 3 – Rookwood Hospital) *"We don't have collaborative notes. Medical and nursing notes are collaborative but not for other therapists."*

The literature emphasises the importance of having a single and collaborative recording system in all in-patient rehabilitation settings in which all members of the team record their interventions (British Society of Rehabilitation Medicine, 2003). It has been reported that collaborative notes help to facilitate the continuity of patient care by serving as a vehicle for communication between the therapy team and help to evaluate, plan and monitor patients' care plans (Salter et al., 2006). Although the British Society of Rehabilitation medicine (2003) has recommended the use of multidisciplinary notes within the inpatient rehabilitation service, not all rehabilitation services are actually using collaborative notes. Turner-Stokes et al. (2001) conducted a study on behalf of the British Society of Rehabilitation medicine (BSRM) amongst its consultant members who were providing a rehabilitation service for ABI patients in the UK. Consultants were asked to assess their service in relation to the BSRM standards. The result showed that only twenty-three consultants out of fifty (46%) used a multidisciplinary record system in their rehabilitation centres (Turner-Stokes et al., 2001).

However, to enhance the communication process among the multidisciplinary team in both hospitals, the whole team met regularly to discuss patient progress and printed documents out of this meeting about patient progress which were usually kept in a multidisciplinary or medical file

> (Interviewee 1- Morriston Hospital). *"we meet every two weeks and every two weeks we document the progress that the patient has made in every area of the therapy and keep this printed documentation in the patient's notes."*

In Rookwood Hospital, information was shared between the rehabilitation staff in many other ways, such as verbal communication between the team, the MDT meetings which are held every week, email and telephone

> (Interviewee 3 – Rookwood Hospital) *"there is verbal communication. We have an MDT meeting every Tuesday, so they can bring things up there, and they can email us or ring us."*

The Chartered Society of Physiotherapy supports the use of deferent methods of communication to share information between the multidisciplinary team. This was reported in criterion 7.2.6 of the Quality Assurance Standard for Physiotherapy Service Delivery (2012), which states that the methods of communication can be modified to meet the needs of the service user (Chartered Society of Physiotherapy, 2012). According to the Quality Assurance Standard for Physiotherapy Service Delivery (2012), communication includes the sharing of information, advice and ideas with a range of people, using a variety of media (including spoken, non-verbal, written and e-based), and modifying these to meet the service user's preferences and needs.

The interviewees' feedback showed that the disadvantage of having one medical or multidisciplinary file, in which all therapists write their full comprehensive report, is that the file will become bulky, disorganised and unstructured, and information about a particular patient problem will be scattered throughout the file, so it is then difficult to find chronological information about a patient's problems and progress. Interviewee 001 mentioned that the patient usually spends a long time in rehabilitation and the multidisciplinary notes tend to be bulky.

> Interviewee 001 said, *"It could be we don't need everything written in the same file. Otherwise the file will be bulky"*

The International Federation of Health Information Management Association, (2012) supported this statement as they reported that the multidisciplinary notes form a bulky and less organised medical record system, as sometimes data can be recorded twice or missed between headings (International Federation of Health Information Management Association, 2012). Despite this, organising the medical records is necessary.

Interviewee 002 thought that the documentation method currently used was time-consuming and paper-

based documentation has the disadvantages that some papers can be easily lost and a file cannot be used by more than one therapist at the same time. Interviewees 003 and 004 criticised the standardisation of the method currently used and described it as it is repetitive, bureaucratic and not truly collaborative. There are too many copies of everything, which means that therapists are working independently. Finally, it requires enormous storage space, nobody in the rehabilitation team accesses the notes, and not all important documents go into the medical notes.

> (Interviewee 003 - Rookwood Hospital) *"It is repetitive and bureaucratic."* and; "*there are too many copies of everything, which means therapists are working independently."*
>
> (Interviewee 004 - Rookwood Hospital) *"is not truly collaborative." and; "there is a lot of repetition I suspect, and there is a lot, lot, lot of storage problems because huge numbers of notes are just written. And actually nobody else has access to them and not all of them go into the medical notes."*

The Audit Commission (1999) supports this finding as they reviewed 200 sets of medical notes in eight different hospitals in England and Wales (Audit Commission report, 1999). The researchers criticised the structure of medical notes and found there was a lack of standardisation in them. Wyatt and Wright (1998) argues that structured records are easier and quicker to search, but they have the disadvantage of being more difficult to write (Wyatt and Wright, 1998). However, some researchers have found no significant difference in the time taken to complete a structured pro forma and free-text history sheets (Belmin et al., 1998). Perhaps it is the therapist's familiarity with a documentation method that makes it quicker to complete.

Although all therapists in Morriston Hospital wrote daily notes in a collaborative multidisciplinary file, in both hospitals, each discipline has its own in-depth documentation file, which records full details of the treatment given by a therapist and patient progress. When the researcher asked the heads of the

rehabilitation teams in Morriston Hospital about how comprehensive the therapists' notes were in the multidisciplinary note, Interviewee 002 replied:

> *"They are not writing full details about a patient's treatment, therapists say that they may be unable to write everything in those multidisciplinary notes, for example if the occupational therapist does an access visit or home visit then their assessment will be several pages long and they say there is no point in writing all of that in the multidisciplinary notes as only a summary of what they did is needed. So they summarise their actions in the multidisciplinary notes but still keep their own personal detailed notes."*

However, not all interviewees were happy with the separate therapists' notes since they don't have enough details of the therapy provided to the patient, as according to Interviewee 3:

> "*What happens is that therapists keep their notes separate and we don't always have enough information about what is happening to the patient."*

According to Interviewee 001, the main advantage of the method of documentation that they used in Morriston Hospital was that it covers all the legal requirements. Most interviewees believe that multidisciplinary notes allow them to control the whole team. However, not all interviewees are happy with the currently used documentation, as Interviewee 003 stated:

> *"It is not working as it should do, somehow the discharge planning and goal setting should be documented in the notes, that is not what always happens in practice, and you should have enough information to be able to see what therapists are doing with the patient. What happens is that therapists keep their notes separate and we don't always have enough information about what is happening to the patient."*

The literature widely supports that fact that medical notes are a legal requirement of any healthcare practice (Chartered Society of Physiotherapy, 2000).

The head of the rehabilitation team thought that if there has been a bad outcome then they need to be able to identify how it might have occurred to ensure it never happens again and the multidisciplinary notes will help them to achieve that. When the researcher asked the head of the rehabilitation team about how the documentation process might be improved, Interviewee 001 said that electronic documentation, primarily, would be a useful way in which to improve the documentation method. Interviewees 3 and 4 supported electronic documentation and thought it would be a useful way to improve the documentation process. Interviewee 3 mentioned the side effect of using the electronic documentation method as she thought that electronic documentation is time-consuming, as it requires a lot of staff training and is highly dependent on the use of appropriate software and good IT support. Interviewee 004 was very concerned with data security and system stability

> (Interviewee 4 – Rookwood Hospital) *"It would be easier to access information but you would have to have a computer and IT support. … Accessible by multiple people,… you have to make sure that it is secure and the people who are supposed to access it can access it, and it may go wrong, things go crash and you have to train the people how to use it."*

In order to seek in-depth detail of the documentation method used by physiotherapists in an inpatient rehabilitation setting, the physiotherapists were asked to list all the documentation methods that they use to document their assessments. Thirty eight (74%) physiotherapists from all those who completed the questionnaire stated that they used a standardised assessment form (pro forma), 27 (54%) used SOAP notes and 13 (26%) used a narrative format (their own format). Some physiotherapists reported that they used more than one documentation method. Physiotherapists reported a list of the advantages and disadvantages of each documentation method that they used in their clinic (see Table 5-9).

Table 5-9: Advantages and disadvantages of the currently used assessment documentation method

Documentation method	**Advantages**	**Disadvantages**
Standardised assessment form (pro forma)	- Structured - Clearly laid out and easy to fill in - Easy to read by other physiotherapists - Standardised - Clinically well known - Every patient gets the same battery of assessment - Ensures you do not miss anything - Comprehensive - Allows less written documentation, use of tick boxes - Thorough - Covers all elements - Ensures all staff obtain same information - Familiar - Ease of reading - Flexible	- Some repetition - Time consuming - Does not include ROM list for UL/LL - Rigid thinking, too structured - Not arranged in order of patient needs - Complex - Not very narrative, tick the box - Very subjective - Some duplication within MDT - Does not meet all clients' needs
SOAP	- Flexible. - Shared by all PTs - Structured and patient-centred - Standardised - Clinically well known - Allow you to record in the main body what you have done - Broad for use with all patients - Thorough - Comprehensive information - It is well known and universally practised	- Repetitive - Large volumes of paper - Time consuming to complete - Less skilled staff may not know what to document.
Narrative format (your own format)	- Able to use what is appropriate for each client - It tells the patient's story - Individual to client - Any new observations can be included	- It does not have exact measures if they are required at any stage - Time consuming - Not concise enough for quick assessment, very time consuming. - Not standardised

In response to the question about what kind of documentation formats physiotherapists were using to document their patient's progress notes, 82% (41 respondents) stated that they used SOAP notes, 10% (5 respondents) used a narrative format, 4% used a standardised treatment format and 4% used an electronic database treatment format. In terms of the advantages and disadvantages of each documentation method, Table 5-10 summarises the physiotherapists' feedback.

Table 5-10: The advantages and disadvantages of the method used to document patient progress

	Advantages	Disadvantages
SOAP	Comprehensive Clinically well known Quick and easy to complete Standardised vocabulary Facilitates structured thinking Useful for students on placement Easy for another therapist to continue with Descriptive but in an organised format Flexible Systematic Concise Logical notes	Time consuming Difficult to audit Held in central file which is not always available Not clear which are each profession's notes Wordy Varies from therapist to therapist Occasionally forget details Need to read all sections thoroughly so as not to miss information. Less potential to document Sometimes not detailed enough Not all professionals bother to read the record Not always familiar to others outside of therapy staff Not always objective
Narrative format	It tells the patient's story Keeps a record for the physiotherapist, patient, family & MDT Client specific Easily accessible Plenty of space available to document any changes	There are minimal specific measurements and it is subjective Abbreviations used would not necessarily be used by other members of the MDT
Standardised treatment form (pro forma)	Uniform, standard and simple	None
Electronic database treatment format	Easy to access	Computer glitches

SOAP note were reported by physiotherapists as the most commonly used documentation format to document a patient's progress, followed by a narrative format, a standardised treatment format and an electronic database treatment format. Most of the advantages and disadvantages reported by physiotherapists regarding SOAP notes are supported by the literature. Sames (2009) and Borcherding & Kappel (2006) have reported many advantages of using the SOAP notes method, including that this method of documentation is systematic and easily accessible (Borcherding and Kappel, 2006, Sames, 2009). It supports on-going assessment, reflects the logical thinking of healthcare providers and

structures the documentation method. However, the level of capability and consistency of SOAP formats has been questioned in the literature. Borcherding & Kappel, 2006 reported that there is huge variation between therapists. The disadvantages of SOAP notes have been reported by the physiotherapists in this study as they indicated that the information in SOAP notes varies from therapist to therapist (Borcherding and Kappel, 2006). They also reported that SOAP notes form a bulky and less organised medical record system and this was reported by all the physiotherapists in this current study (International Federation of Health Information Management Association, 2012).

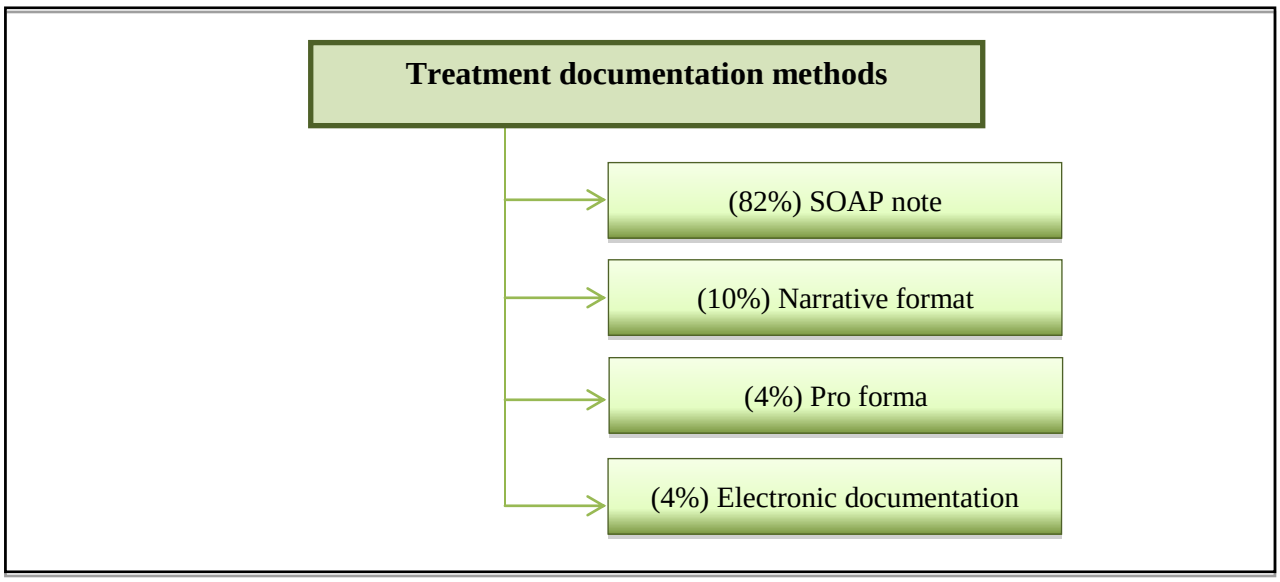
The narrative notes format has been reported in the literature as giving the therapist the freedom to describe or explain the rehabilitation process and activity in as much as depth and detail as they desire. This was also reported by the physiotherapists who completed the questionnaire in this study as an advantage of this narrative notes method. However, the effectiveness of a narrative method of documentation and source-oriented records has been questioned in the literature. How effective this documentation method could be as a communication tool and whether the information stored using these methods is easily and readily retrievable have also been questioned in the literature. The challenges to and disadvantages of narrative documentation which are reported in the literature are numerous (Byrne, 2012). These include ambiguity of expression, a lack of structure, redundancy in care capture, a host of transcription and cognitive errors, and limited opportunities for aggregation or reuse in databases or by clinical decision-support systems. It has also been reported that narrative notes often become bulky, disorganised and scattered during the rehabilitation process. Those limitations are hampering the communication between healthcare providers and making the retrieval of vital information very difficult (Byrne, 2012, International Federation of Health Information Management Association, 2012).

In terms of physiotherapists' discharge reports, the Scottish Intercollegiate Guidelines Network (2010) has emphasised the importance of the discharge report as this can help the patient understand his/her functional level at discharge, enhance his/her involvement in their rehabilitation treatment after discharge, and increase their satisfaction (Ayana et al., 1998, Scottish Intercollegiate Guidelines Network, 2010, Shepperd et al., 2004). Feedback from the physiotherapists showed that 40% of the respondent physiotherapists used a letter format in their discharge reports, 27% used a standardised discharge form (pro forma), 23% used a narrative format and 10% used an electronic database discharge form. Table 5-11 shows the advantages and disadvantages of the discharge report methods which was reported by the physiotherapists who completed the questionnaire. Figure 5-6 summarises the documentation methods the physiotherapists use to document their treatment activities in an inpatient setting.

Table 5-11: The advantages and disadvantages of the discharge report methods

	Advantages	Disadvantages
Letter	Interdisciplinary and comprehensive Easy Quick to do Saves time, covers areas needing to be communicated to others. Flexible	Not standardised Not comprehensive enough Timely Subjective Complex Varies depending on who writes the letter Can be misplaced
Standardised discharge form (pro forma)	Comprehensive Interdisciplinary Standardised Record all necessary information Clear Simple Relevant, important information is given priority. All therapists involved with patient treatment will write on the discharge note.	Time consuming Sometime not comprehensive enough Very long
narrative format	The whole team involved in the process It tells a story of the patients experience Flexible All area covered Standardised Client specific Easily understood Specific and individual	Time consuming, difficult to compile full team letter Time consuming Subjective Long report as all MDT involved.
Electronic database discharge form	Quick to do Intensive, systematic Covers all required areas to Comprehensive Easy	Required computer and network Complex Technical problems

Figure 5-6: Documentation methods physiotherapists used to document their treatment activities provided to ABI patients in an inpatient setting



5.4. Conclusion (Part one)

The feedback from the heads of the rehabilitation teams and physiotherapists has helped the researcher to gather in-depth details about the rehabilitation service provided to people with ABI. The layout of this research was described based on the ICF framework. The information gathered on this research and the descriptions provided by the ICF framework were used in this study to guide the process of describing and mapping the processes and pathways that patients follow if they have an ABI.

Although, the processes of rehabilitation and pathways were slightly different between the two centres, in terms of the time therapists spent on the assessment process and the frequency of some regular meetings, the general stages that the patient would go through if they have an ABI were very similar. The identified rehabilitation pathway was used as a layout to map the study results. The feedback from the heads of rehabilitation teams showed that the rehabilitation pathway was divided into three main parts: pre-admission, the rehabilitation stage and the post-rehabilitation stage. The ICF framework was used as a guide to ensure that all the phases of the identified pathway were comprehensively covered.

The pre-admission stage was the first stage which the patient would go through if he/she had an ABI. At this stage, the patient was assessed to decide whether he/she met certain admission criteria and was fit to be admitted to an inpatient rehabilitation service. Knowing the admission criteria helped the researcher to describe what procedures were followed to transfer the patient from the pre-rehabilitation stage to the following stage (rehabilitation stage). In the context of the ICF, the initial assessment would usually provide comprehensive details of the health condition domain of the ICF framework, which includes the body's functions and structures, activity limitations and participation restrictions.

The next step of the rehabilitation pathway was the rehabilitation stage. This stage starts with a comprehensive assessment process. The heads of the rehabilitation teams could not give in-depth details about the assessment that each discipline performs in their departments. The feedback from physiotherapists who completed the questionnaire showed that about 54% of physiotherapists were using some guidelines in their assessment process, the rest were using some assessment methods they learned at university, on clinical placement, from background reading and/or provided by the trust. The feedback also showed that physiotherapists were using a wide variety of outcome measurements to evaluate their patients. Patient assessment and outcome measurements provide important details of the patient's health condition.

The assessment process was followed by a process of the patient’s goal setting. The interviews clarified the process of multidisciplinary goal-setting in an inpatient rehabilitation service. In the context of the ICF, the goal-setting process helps to understand the personal factors which might have an effect on the rehabilitation progress.

The heads of the rehabilitation teams provided fewer details about the treatment activities provided for patients with ABI by each discipline. Feedback from physiotherapists who completed the questionnaire

provided comprehensive details about the physiotherapy activities followed to treat ABI patients in inpatient settings (see Figure 5-7). The physiotherapists who responded to the question asking them to specify what physiotherapy techniques and treatment they used to treat patient with ABI, helped the researcher to create a list of physiotherapy treatment activities, which was then used to develop a documentation method for use by physiotherapists in an inpatient setting. Figures 5-7 summarise the pathway that an ABI patient follows in the UK and Figure 5-8 shows the treatment activities list used by physiotherapists to treat acquired brain injury patient in an inpatient setting.

Interview feedback has also helped the researcher to obtain some information about the multidisciplinary documentation process and its advantages and disadvantages. Both hospitals reported using collaborative multidisciplinary notes; however, the multidisciplinary notes in Rookwood Hospital were collaborative, but between medical doctors and nurses only. Since the interviews showed that each discipline in the inpatient rehabilitation service was keeping its own in-depth documentation file, which records full details of the treatment given by a discipline and patient progress, and the heads of rehabilitation teams could not give any details of these notes, it was necessary to obtain in-depth information about the physiotherapy documentation process from the physiotherapists who were treating ABI in an inpatient setting, in order to be able to describe the service in more depth and to find methods and ways for improvement.

The researcher's investigation of the physiotherapy documentation methods covered all the documentation processes in almost all the key components of the rehabilitation process, including assessment and goal setting, treatment and discharge. This helped the researcher to cover comprehensively all elements of physiotherapy documentation and use this feedback to develop the documentation methods used by physiotherapists.

In terms of the documentation method, there was feedback from physiotherapists who responded to the question asking them to specify the advantages and disadvantages of the documentation methods that they were using to document the physiotherapy process, and this helped the researcher to identify the most critical features of any documentation method which should be carefully considered when designing and developing a new recording tool. These features include a recommendation that the documentation method should be structured, standardised, systematic, comprehensive, flexible and easy to use. It should be quick to complete, neither repetitive nor complex, and less wordy.

Figure 5-7: Process Map of the pathway that the ABI patient would follow in inpatient rehabilitation setting

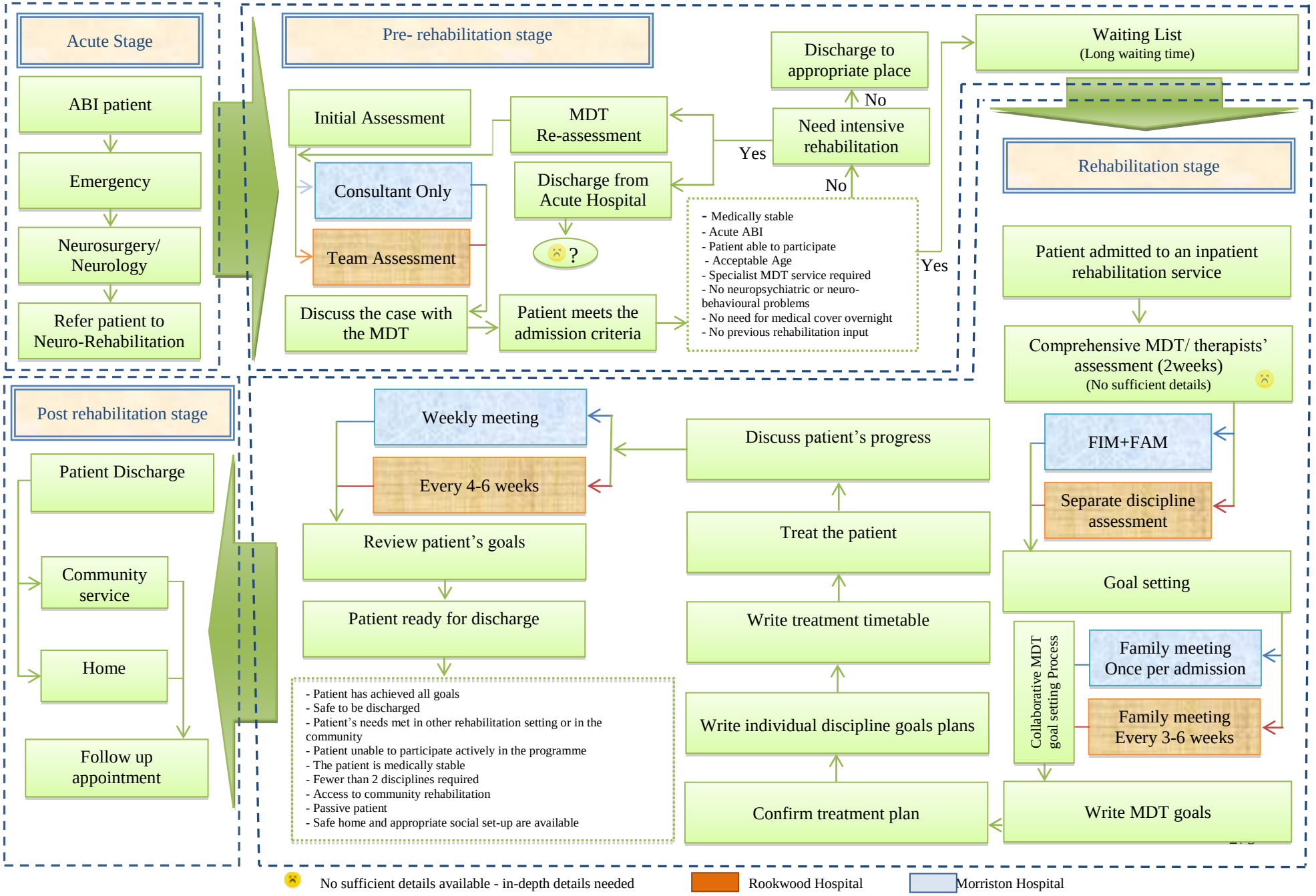
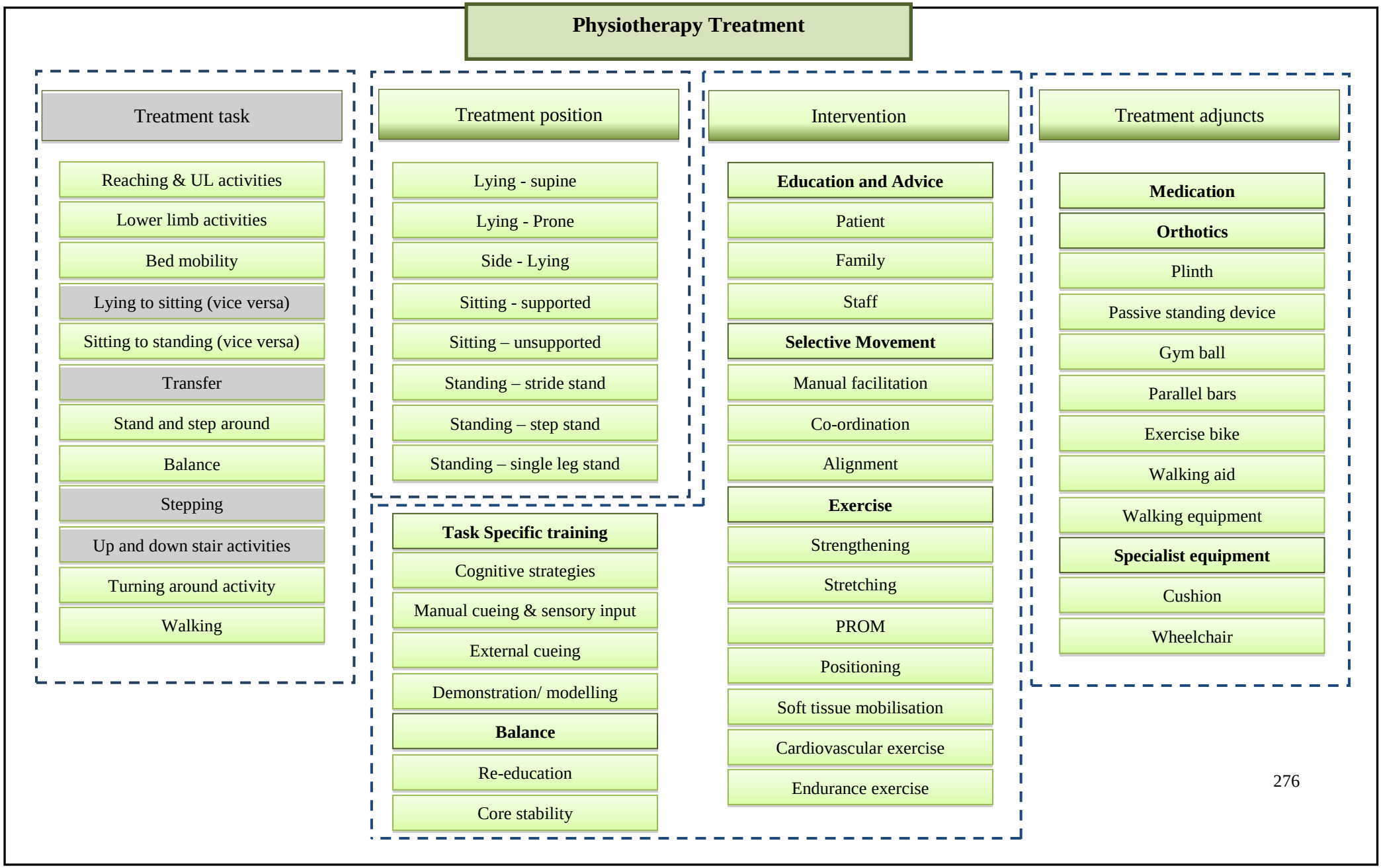


Figure 5-8: Treatment activities list used by physiotherapists to treat ABI patient in an inpatient setting



CHAPTER SIX
(RESULTS AND DISCUSSION)
TREATMENT RECORDING TOOL

Chapter 6. Treatment recording tool development and evaluation phase

6.1. Approaches to develop the treatment recording tool

The treatment recording tool is a means of providing a standardised method for developing the documentation process and evaluating the service (Donaldson et al., 2009). The treatment recording tool in this current study was developed based on an inductive approach. The inductive approach is an experience-driven, bottom-up method led by practitioners' opinions and scientific evidence. The treatment recording tool in this study was built based on the information gathered from the heads of rehabilitation teams and physiotherapists who were interviewed and completed the questionnaire. The information gathered was incorporated with the evidence from the literature to describe what clinicians actually do in a clinical setting and then the interventions provided were categorised using a common language (DeJong et al., 2004).

The developed treatment recording tool was designed for use by physiotherapists with people with ABI in an inpatient rehabilitation setting. The process of developing a new documentation tool has focused on the rehabilitation stage only, since the tool was planned to be built for use by physiotherapists in an inpatient rehabilitation setting. Although the current study focuses on the inpatient rehabilitation service, the development of an inpatient documentation process will help formulate the patient’s discharge plan and post-rehabilitation community service. According to the National Institute for Health and Care excellence (2013), healthcare professionals should ensure that the healthcare service and the patient's medical status are assessed and documented promptly before the patient is transferred from hospital back into the community. Better documentation of the rehabilitation services provided for patients with ABI during the rehabilitation process helps to identify any on-going needs of the patient and/or their family or

carer. It has been reported that this should be accurately documented during rehabilitation (National Institute for Health and Care Excellences, 2013).

The literature has pointed to the need for developing the physiotherapy treatment documentation method in an inpatient setting. The developed documentation tool was designed to provide comprehensive details of the physiotherapy activities provided for people with ABI in an inpatient setting. The next chapter will describe in detail the developed treatment recording tool.

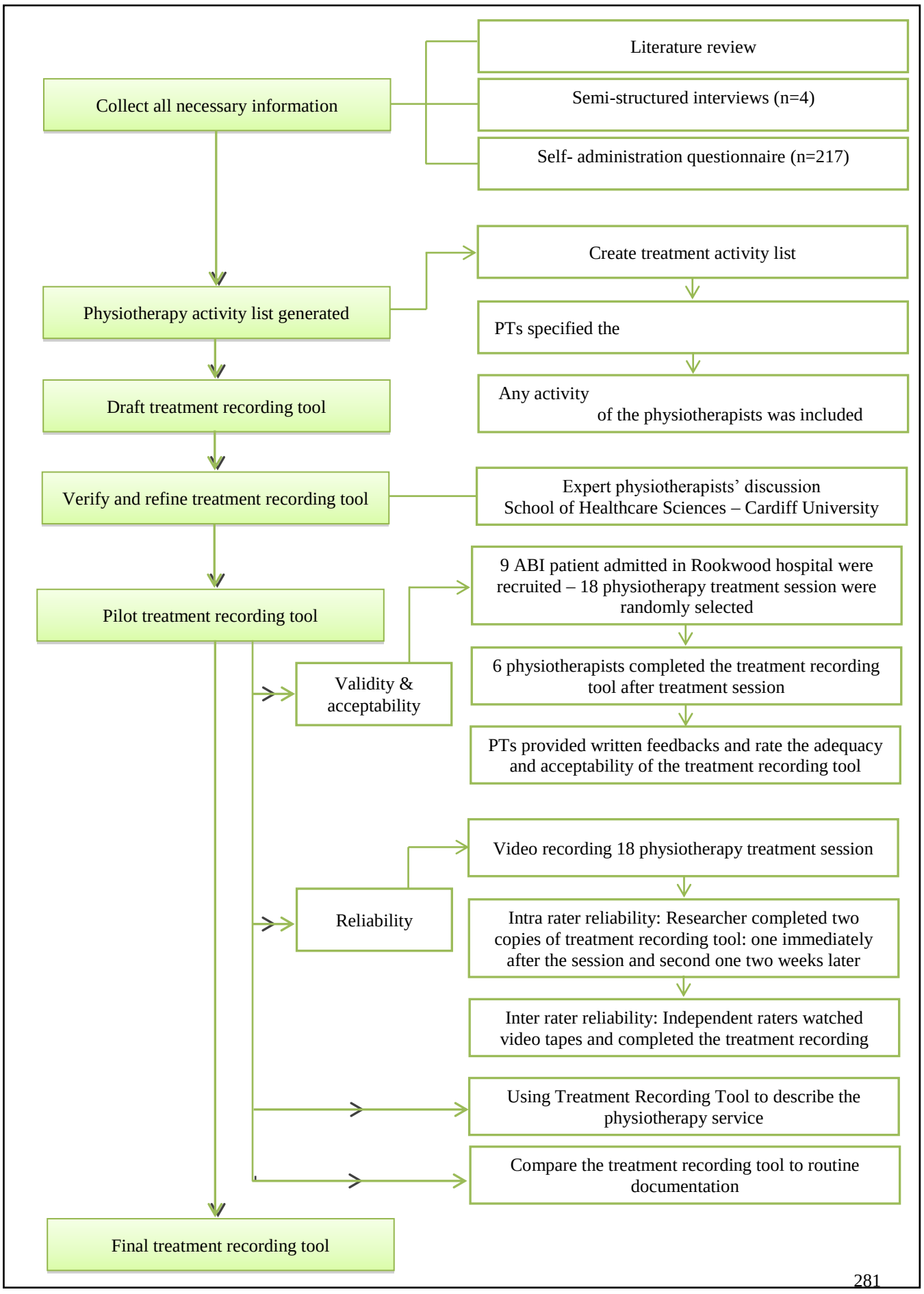
6.2. Building the treatment recording tool

The literature review identifies twelve studies in which a treatment recording tool was developed to be used by clinicians in their practice (Edward, et al., 1990, Mickelborough et al., 1997, Ballinger et al., 1999, Wittwer et al., 2000, Van Vliet et al., 2001, Lennon, 2001, Tyson and Selley, 2004, Gassaway et al., 2005, Pomeroy et al., 2005, Hunter et al., 2006, De Wit et al., 2007 and Donaldson, et al., 2009). All the identified studies relate to stroke rehabilitation. Although some of these developed treatment recording tools provided a good description of physiotherapy activity, they focus on stroke patients and some tools are even developed to cover small areas of physiotherapy treatment activities (Mickelborough et al., 1997, Pomeroy et al., 2005, Hunter et al., 2006). Furthermore, neither the reliability nor the validity of most of the identified treatment recording tools was tested. The process map of the rehabilitation service provided for people with ABI in the UK which was described earlier in this study shows that the physiotherapy activities provided for people with ABI are to some extent different from those provided for stroke patients. Hence, using these treatment recording tools to record the physiotherapy treatment activity provided for people with ABI may need some modification. This is also supported by the literature as it is reported that there is a conflict with regard to the duplication of the rehabilitation of one condition of brain injury to treat others (Brain Injury Australia, 2011, Brain Injury Network, 2011, The Brain Injury Association, 2011). ABI is a

broad category covering many conditions and researchers state that although TBI and stroke are technically a form of ABI, they are different conditions (Brain Injury Association of America, 2012, National Institute of Neurological Disorders and Stroke, 2013).

There is general agreement that TBI and stroke are both forms of ABI but these are not interchangeable terms since TBI and stroke are ABIs, but not all ABIs are TBI or stroke. So there must be a distinction between TBI, stroke and all other ABI conditions. Therefore since it is generally agreed that what was developed for one form of ABI, such as stroke and/or TBI, is not ideally applicable to another condition of ABI. Therefore the development of a new treatment recording tool which is specially designed to report the physiotherapy treatment provided for people with ABI is needed. The treatment recording tool in this study is developed via a five-stage process including collecting all the necessary information from the literature and clinicians who treat ABI in an inpatient setting, the generation of a treatment activity list, drafting the treatment recording tool, piloting the tool and then generating a final draft (see Fig. 6-1).

Figure 6-1: Flow chart to illustrate the treatment recording tool's building procedure



6.2.1. **Collecting all necessary information and generating the treatment activity list**

The previous chapters describe in detail the process of collecting information from the literature and clinicians and generating a treatment activity list (see Chapters 3, 4 and 5 for more details).

6.2.2. **Drafting treatment recording tool**

The treatment recording tool is a treatment documentation form designed to fit on one side of A4 paper to allow different views on data to be recorded in a structured way. It is developed to provide clinicians with a tool that will help them to record what treatments are provided to patients with ABI during treatment sessions. The tool is formatted to promote accuracy in data transcription and to limit the possibility of physiotherapists missing any essential data. The tool is divided into six categories, including: ethical and legal requirements; patient assessment; outcome measurements; treatment location; treatment aims; treatment activities. The next sections will describe each category of the treatment recording tool in detail.

6.2.2.1. Ethical and legal requirements

In developing and finalising the treatment recording tool, great care was taken not to duplicate documentation that clinicians routinely record in other parts of the medical record. The purpose of the new documentation form is to allow physiotherapists to document actual physiotherapy practice provided for patients with acquired brain injury in an inpatient setting. The new developed treatment recording tool must satisfy all ethical and legal requirements if the tool is to be used in real practice. Hence, the first section of the treatment recording tool covers all ethical and legal requirements.

Most ethical and policy documents including the Core Standards of Physiotherapy Practice (core 14) (Chartered Society of Physiotherapy, 2000) have reported the need for any documentation to be dated. The physiotherapist's name and signature with each entry/attendance and/or report and the patient's name and either date of birth, hospital number or NHS number should all be reported as an essential part of any documentation or report. This information should be reported on each page of any record keeping (Core standard 15 of the Core Standards of Physiotherapy Practice) (Chartered Society of Physiotherapy, 2000). However, the newly developed treatment recording tool started with sections for the physiotherapists/physiotherapy assistants to write their names and signatures, the patient's name, identification number and the date of treatment. This section was included in all the other recording tools which were developed before, including the Hunter, PSROP, SPIRIT and Donaldson's recording tools (Hunter et al., 2006, De Wit et al., 2007, Donaldson et al., 2009, Gassaway et al., 2005). Due to the complexity of ABI conditions, very often, more than one physiotherapist /physiotherapy assistant provides a treatment session for a patient (Turner-Stokes, 2003). The new treatment recording tool allows all therapists who are involved in the treatment session, including two physiotherapists and one physiotherapy assistance, to write their name and signature. In contrast, the PSROP (Gassaway et al., 2005) and Hunter et al's (2006) treatment schedule provides space for only one therapist to record his/her name. This does not allow clinicians to report the physiotherapists and physiotherapy assistants' names which is considered to be very important information. Donaldson's treatment schedule recording form allows only one therapist to record his/her identification number and then state how many therapists were involved in the treatment session. Missing such information is also making it difficult to know how and where other physiotherapists who did not sign the sheet were spending their time.

According to the Quality Assurance Standard for Physiotherapy Service Delivery (Chartered Society of Physiotherapy, 2012) the physiotherapist should obtain and document the patient's

consent before any advice is given or beginning an assessment, examination, intervention, treatment or procedure. Obtaining informed consent from the patient before the treatment session and reporting that in the medical record is a legal requirement (Chartered Society of Physiotherapy, 2012). However, it was necessary for the researcher to add a new section to the treatment recording tool for the clinicians to report whether informed consent was obtained from the patient.

The Chartered Society of Physiotherapy has published guidelines for manual handling which were launched at the Disabled Living Foundation's Moving and Handling People Conference in 2008 (Chartered Society of Physiotherapy, 2008). The guidance explained how legislation requires physiotherapists to make and report risk assessments of manual handling, and offers strategies for reducing risks if there are any. The newly developed treatment recording tool considers the importance of manual handling and has space for physiotherapists to indicate whether the manual handling risk assessment was conducted before the treatment was provided.

The first part of the treatment recording tool is designed to cover the most important and necessary ethical and legal requirements. This was including the physiotherapists/physiotherapy assistants' names and signatures, the patient's informed consent and manual handling risk assessment.

6.2.2.2. Patient assessment, outcome measurements; treatment location and treatment aim sections

Feedback from the heads of the rehabilitation teams and physiotherapists who treat patients with ABI in the UK shows that assessment is one of the most important parts of the rehabilitation process. Patient assessment is a continuous evaluation process, repeated continuously throughout the rehabilitation stage. Physiotherapists very often spend some time before each treatment

session to re-evaluate the patient's progress (Turner-Stokes, 2003), though the next section of the treatment recording tool was designed for physiotherapists to report whether the interventions were associated with any kind of patient's assessment, and the time spent on this activity in units (each unit equal to 5 minutes). Reporting the time spent on patient assessment helped to record the total time of the treatment session and how the treatment time was divided between activities. The British Society of Rehabilitation Medicine (2003), in their National Clinical Guidelines for Rehabilitation, state that the patient's documentation should integrate a minimum dataset, which should include the patient assessment (British Society of Rehabilitation Medicine, 2003). The options in the patient assessment section were divided into four categories: (i) none, (ii) initial (iii) re-assessment and (iv) discharge. Most other developed treatment recording forms do not provide any space for the physiotherapists to report whether they assess their patients during a treatment session (Hunter et al., 2006, De Wit et al., 2007, Donaldson et al., 2009, Tyson and Selley, 2004). However, the Mickelborough et al.'s (1997) treatment schedule is the only treatment recording form which allows the physiotherapist to report on patient assessment during a treatment session. Adding such details to the treatment recording tool will improve the documentation process as it allows physiotherapists to add very important information about the treatment session.

Although the treatment recording tool does not provide full details of the assessment process, it allows physiotherapists to report any outcome measurements they used during the treatment session. Standard 6 of the Core Standards of Physiotherapy Practice considers the evaluation of patient change during the physiotherapy service process by using published, standardised, valid, reliable and responsive outcome measures and emphasises the need for physiotherapists to record the outcome measurement being used and the results of the measure at the end of or during the rehabilitation input (Chartered Society of Physiotherapy, 2005). Feedback from physiotherapists who completed the questionnaire showed the importance of noting the outcome measurements

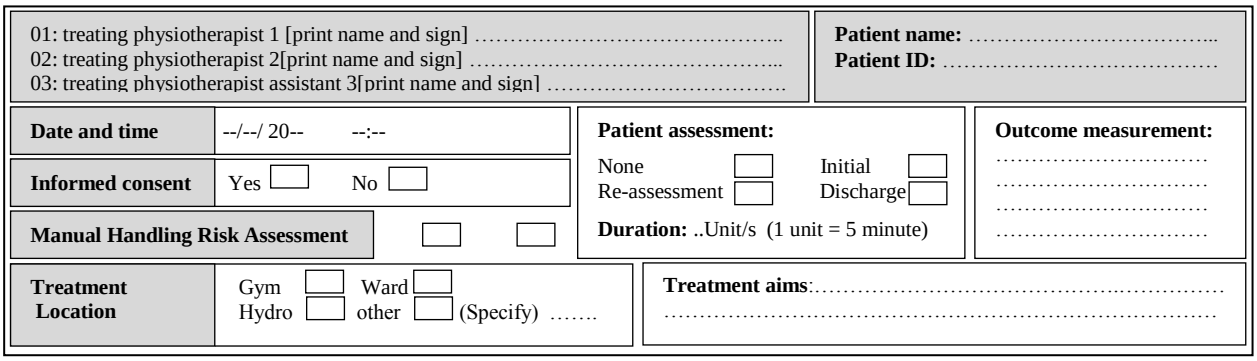
used during the treatment session, since almost all the responding physiotherapists who completed the questionnaire in this study reported some outcome measurements which they use very frequently with their patients. Using outcome measurements is considered to be a routine practice during the physiotherapy treatment sessions provided for people with acquired brain injury (Turner-Stokes, 2003). Hence, allowing physiotherapists to report what outcome measurements they use during treatment sessions will improve the inpatient documentation process as there is space provided for physiotherapists to report important and necessary information. Comparing to other treatment recording tools, Mickelborough et al.'s (1997) treatment schedule is the only tool which allows the physiotherapist to report the outcome measurements used during a treatment session.

The treatment recording tool also provides a space to report the treatment location. Patients often receive treatment in different areas of a hospital and medical notes should record details which help clinicians to keep track of all physiotherapy treatments in all locations (Sorgente and Fernandez, 2004). Donaldson et al.'s (2009) treatment schedule recording form is the only treatment recording tool which provides a space for physiotherapists to report the treatment location (Hunter et al., 2006, De Wit et al., 2006, DeJong et al., 2004, Donaldson et al., 2009, Tyson and Selley, 2004). The options for treatment locations in the new developed treatment recording tool were divided into four categories: (i) gym, (ii) ward (iii) hydro and (iv)other. Physiotherapists were asked to provide more details about the treatment location if they treated their patient anywhere other than those mentioned above.

Reporting treatment aims helps physiotherapists who read the medical notes to understand whether treatment is intended to be curative or palliative or to treat symptoms. It helps physiotherapists to understand the physiotherapy treatment plan and to anticipate future treatment needs. The NCSI (2012) reports that including the treatment aims in the treatment progress notes

is essential (National Cancer Survivorship Initiative, 2012). In this current treatment recording tool, a space to include treatment aims is provided (see Figure 6-2). Most other reviewed treatment recording tools which were developed to record the physiotherapy treatment provided for people with stroke do not include a space to add treatment aims (De Wit et al., 2007, DeJong et al., 2004, Tyson and Selley, 2006). The only treatment recording forms which allow the physiotherapist to report treatment aims are those of Pomeroy et al. (2005), Hunter et al. (2006) and Donaldson et al. (2009). Feedback from the heads of rehabilitation teams shows the importance of physiotherapy treatment aims being reported as it is indicates that a patient's treatment and progress are based on the patient meeting the treatment aims. Hence, adding a space to record treatment aims in the treatment recording tool is important as it facilitates recording valuable information from the treatment session.

Figure 6-2: treatment recording tool (header part)



6.2.2.3. Treatment activities

The next part of the treatment recording tool was designed to be used to document the physiotherapy treatment provided to patients with ABI in an inpatient setting. It was decided that the new developed treatment recording tool would have different sections to allow the physiotherapists to describe treatment sessions comprehensively. Therefore, this part of the

treatment recording tool was divided into four sections: treatment task, treatment position, intervention and treatment adjuncts. This decision was based on a critical review of the available literature and all previously developed treatment schedules, such as the PSROP, CERISE and SPIRIT treatment schedules. The researcher found that physiotherapy treatment tasks are sometimes included in the intervention list. This, however, was reported as it sometimes confuses physiotherapists (Wittwer et al., 2000). This problem was pointed out by Wittwer et al. (2000) as they state that one of the potential problems in the treatment record they developed was that selected categories are not mutually exclusive and so therapists often combine two or more treatment tasks in one treatment position (Wittwer et al., 2000). They suggested that to develop a robust treatment recording tool, clear categories should be included (Wittwer et al., 2000).

To make sure that the categorisation of treatment activities was accurate, the researcher asked the physiotherapists who were involved in the process of validating the questionnaire which was sent to physiotherapists who treat acquired brain injury in the UK about this categorising of physiotherapy treatment activities. All seven physiotherapists who treat acquired brain injury at Northwick Park Hospital in London agreed that the new categorisation was clear and comprehensive.

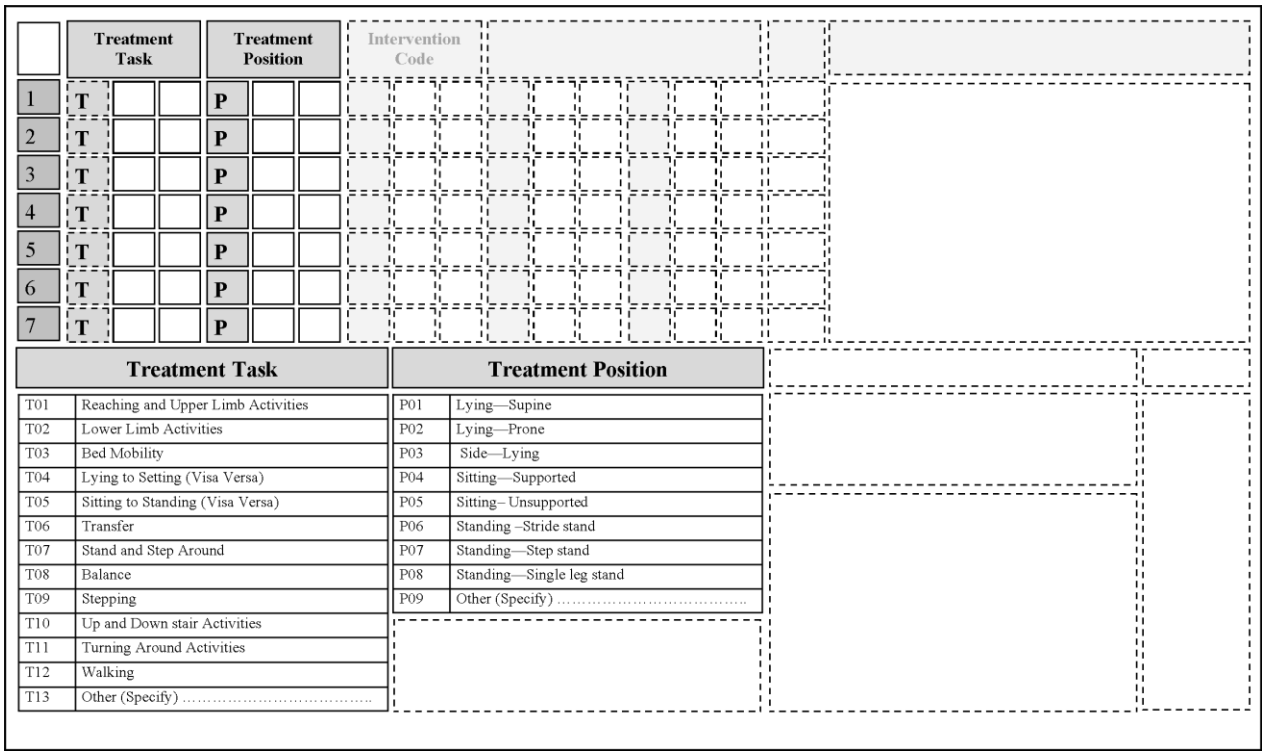
> (Physiotherapist 1) *"I liked the sections with your list in question 21,22 and 23, I think it is really comprehensive"*
>
> (Physiotherapist 2) "*I think they covered the treatment that I would use in practice, so I thought they were a good reflection of what is happening in the practice."*
>
> (Physiotherapist 3) *"Comprehensive and easy to complete"*
>
> (Physiotherapist 6) *"All interventions covered and I like the categories"*

The treatment task section in the treatment recording tool allows the physiotherapists to choose from 12 treatment tasks listed in the treatment recording tool which included; (i) Reaching and upper limb activities, (ii) lower limb activity, (iii) bed mobility, (iv) lying to sitting (vice versa), (v) sitting to standing (vice versa), (vi) transfer, (vii) stand and step around, (viii) balance, (ix) stepping, (x) up and down stair activities, (xi) turning around activities, and (xii) walking. This list was built based on the feedback received from physiotherapists who completed the questionnaire in regard to the question which asked them to specify what treatment tasks they were using to treat their ABI patients and how often they used each of them. Any treatment tasks that were used at least once a week by more than 75% of the physiotherapists were considered as used on a regular basis and were therefore included in the new treatment recording tool. If a treatment task was not listed in the treatment recording tool's listing code, an empty space was provided to write down the treatment task and give it a unique code. This section of the treatment recording tool was not in any other treatment schedule developed before (Hunter et al., 2006, De Wit et al., 2007, DeJong et al., 2004, Donaldson et al., 2009, Pomeroy et al., 2005, Tyson and Selley, 2004).

The second section contains codes for eight different positions listed on the coding list and physiotherapists reported the treatment position they used for each selected treatment task. Physiotherapists can also add a new treatment position and code it. The eight positions have also been listed based on the feedback received from physiotherapists who completed the questionnaire and included (i) Lying - supine, (ii) Lying - prone, (iii) Side - lying, (iv) Sitting – supported, (vice versa), (v) Sitting - unsupported (vice versa), (vi) Standing – stride stand, (vii) Standing – step stand, and (viii) Standing – single leg stand (See Figure 6-3). Specifying the treatment position for each treatment task adds more comprehensive details to the documentation process as it links all components of treatment activities to each other. Comparing this to other treatment recording forms, The treatment recording tool in this study is the only tool which links

the treatment task to the treatment position, intervention and treatment adjuncts (Hunter et al., 2006, De Wit et al., 2007, DeJong et al., 2004, Donaldson et al., 2009, Pomeroy et al., 2005, Tyson and Selley, 2004).

Figure 6-3: Treatment tasks and treatment position sections of the treatment recording tool



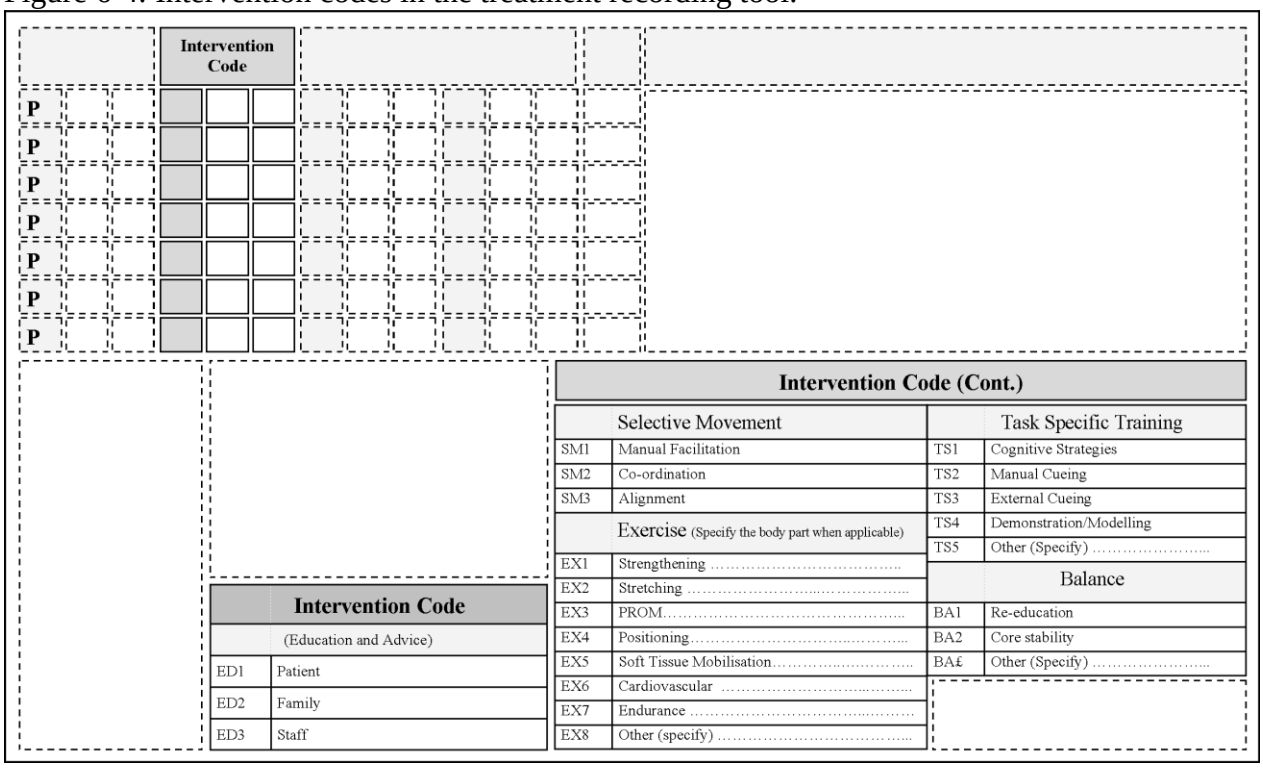
	Treatment Task	Treatment Position	Intervention Code
1	T	P	
2	T	P	
3	T	P	
4	T	P	
5	T	P	
6	T	P	
7	T	P	

Treatment Task		Treatment Position	
T01	Reaching and Upper Limb Activities	P01	Lying—Supine
T02	Lower Limb Activities	P02	Lying—Prone
T03	Bed Mobility	P03	Side—Lying
T04	Lying to Setting (Visa Versa)	P04	Sitting—Supported
T05	Sitting to Standing (Visa Versa)	P05	Sitting– Unsupported
T06	Transfer	P06	Standing –Stride stand
T07	Stand and Step Around	P07	Standing—Step stand
T08	Balance	P08	Standing—Single leg stand
T09	Stepping	P09	Other (Specify) ……
T10	Up and Down stair Activities		
T11	Turning Around Activities		
T12	Walking		
T13	Other (Specify) ……		

The next section of the treatment recording tool was to report physiotherapy interventions. The intervention codes included in the treatment recording tool were divided into five categories, including: education and advice; selective movement; exercise; task-specific training, and balance. See Figure 6-4 for a full list of the intervention codes included in the treatment recording tool. The decision to choose these five categories and subcategories (intervention codes) was also based on the feedback received from the physiotherapists who completed the questionnaire (See table 5-5, in chapter five). The physiotherapists were asked to specify what physiotherapy techniques they were using to treat their ABI patients and how often they used each of them. Out of a comprehensive list of physiotherapy interventions, only twenty two interventions were

selected by physiotherapists as being used regularly to treat ABI and thus included in the treatment recording tool (see Figure 6-4 for a full list of the interventions code included).

Figure 6-4: Intervention codes in the treatment recording tool.



Intervention Code	
(Education and Advice)	
ED1	Patient
ED2	Family
ED3	Staff

Intervention Code (Cont.)

Selective Movement	
SM1	Manual Facilitation
SM2	Co-ordination
SM3	Alignment
Exercise (Specify the body part when applicable)	
EX1	Strengthening ……
EX2	Stretching ……
EX3	PROM……
EX4	Positioning……
EX5	Soft Tissue Mobilisation……
EX6	Cardiovascular ……
EX7	Endurance ……
EX8	Other (specify) ……

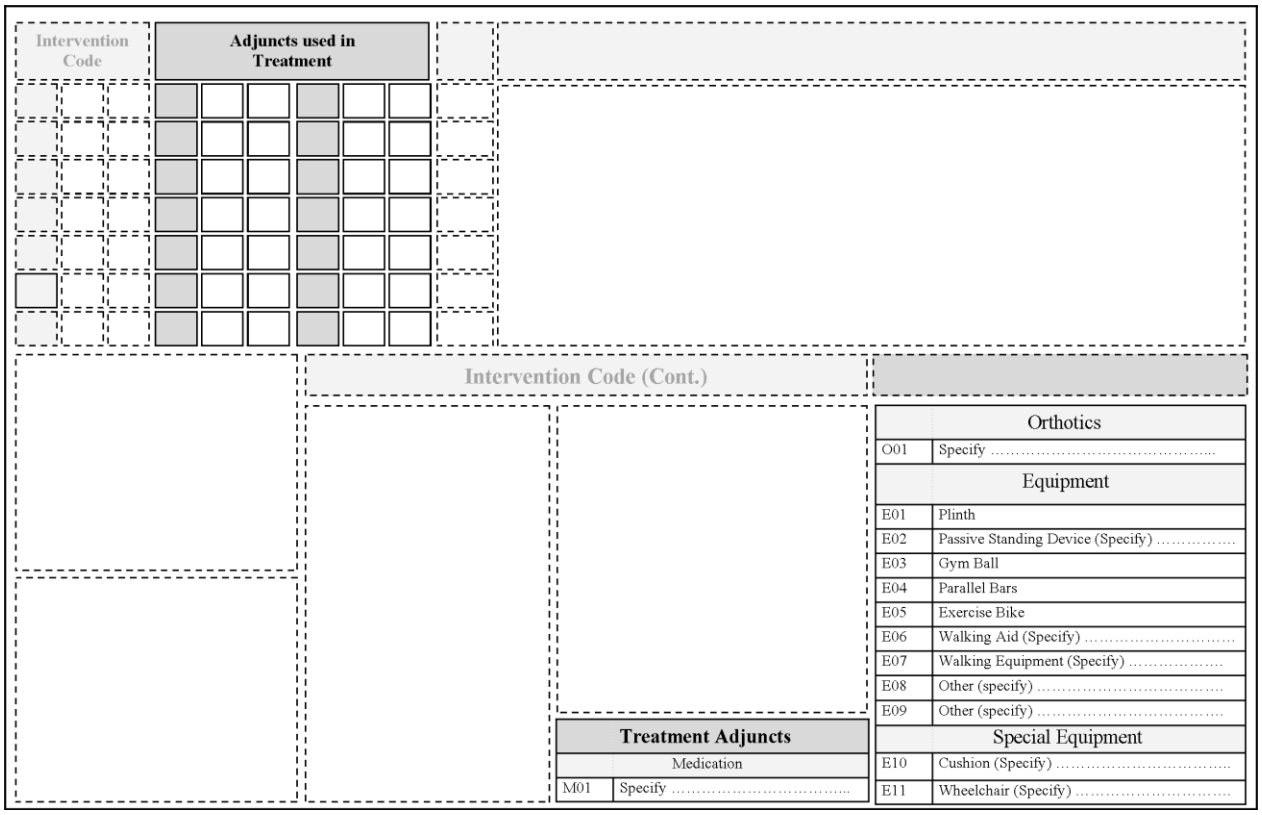
Task Specific Training	
TS1	Cognitive Strategies
TS2	Manual Cueing
TS3	External Cueing
TS4	Demonstration/Modelling
TS5	Other (Specify) ……
Balance	
BA1	Re-education
BA2	Core stability
BA£	Other (Specify) ……

The next section of the treatment recording tool was used to report the adjuncts used in patient treatment. Out of 30 different treatment adjuncts, the physiotherapists selected only nine different pieces of physiotherapy equipment as being used regularly with ABI. These nine adjuncts were included in the treatment recording tool and there was free space to add two more adjuncts if they were not included in the coding list. The physiotherapist can report two adjuncts for each treatment task (see figure 6-5 for a full list of the adjuncts included in the treatment recording tool).

In total, 50 treatment activities were selected by at least 75% of the physiotherapists who completed the questionnaire as being used regularly. Comparing to other treatment recording

tools and/or treatment schedules designed to be used by physiotherapists who treat stroke patients, the treatment activities listed in the treatment recording tool was within the average, as the PSROP treatment documentation form listed 63 treatment activities and CERISE had only 46. In this current study, the researcher did not intend to include all physiotherapy activities but rather to list those most often used to make the process of documenting treatment sessions easier and quicker. However, the physiotherapists still had the "other" option in each category of treatment activities to allow him/her to add any activity which was not included in the list.

Figure 6-5: List of the adjuncts used in the treatment recording tool.



The literature reports that individual and group physiotherapy treatment times for each patient must be documented in the medical record for each intervention for which services are delivered (Centers for Medicare & Medicaid Service, 2010). The next section of the treatment recording tool was to report the time per unit that the physiotherapists used on each treatment task. Each unit was equal to five minutes and if a physiotherapist spent five minutes or less on a specific

task that would be considered as a complete unit as used in PSROP study (DeJong et al., 2004). Most other treatment recording forms are designed to allow the physiotherapist to report the treatment time either as total treatment minutes (Hunter et al., 2006) or as time spent on each intervention (see figure 6-6) (De Wit et al., 2007, DeJong et al., 2004, Donaldson et al., 2009, Pomeroy et al., 2005, Tyson and Selley, 2004).

Although the restricted format of the documentation offers better organisation of physiotherapy records and makes it useful as a management tool for patient care and to evaluate the service (Sames, 2009), the feedback from the physiotherapists who completed the questionnaire shows that too much structure will affect the documentation standard as physiotherapists might not be able to add certain necessary information due to documentation rigidity. To avoid this limitation in the newly developed treatment recording tool, the researcher includes free space for physiotherapists to report any additional comment which they might think was important to be reported with regard to the treatment provided (see figure 6-6). This section was also included to capture in-depth information about the patient's physiotherapy treatment that physiotherapists thought was critical to clinical decision-making processes or to the continuity of the treatment provided. Physiotherapists were free to add any information that they thought was important to report. Although the free text would affect the standardisation of the documentation process, it provides the freedom for therapists to describe or explain any additional activity in as much depth and detail as they desire, (Byrne, 2012) see figure 6-7 for the whole treatment recording tool.

Figure 6-6: Areas to report treatment duration and comments in the treatment recording tool

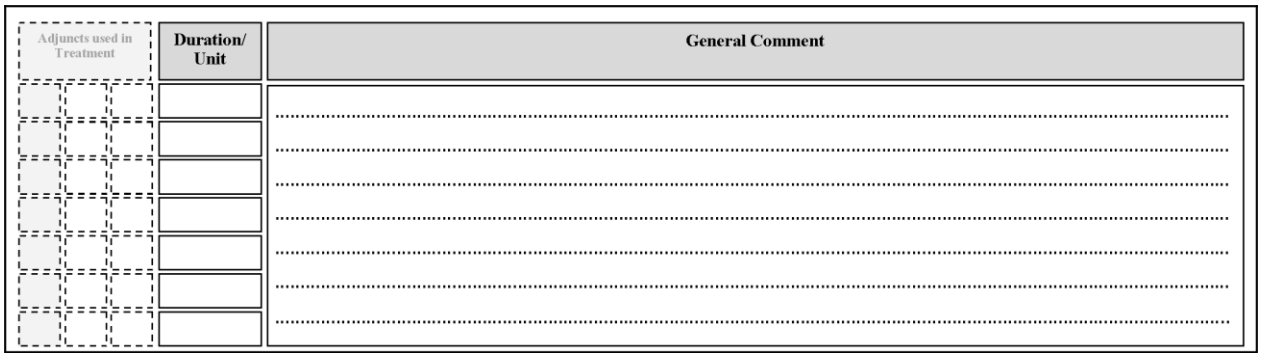


Figure 6-7: Treatment recording tool

01: treating physiotherapist 1 [print name and sign] .....
02: treating physiotherapist 2[print name and sign] .....
03: treating physiotherapist assistant 3[print name and sign] .....

Patient name: .....

Patient ID: .....

Date and time	--/--/ 20-- --:--
Informed consent	Yes ☐ No ☐
Manual Handling Risk Assessment	Yes ☐ No ☐

Patient assessment:
None ☐ Initial ☐ re-assessment ☐ Discharge ☐

Duration: ..... Unit/s (1 unit = 5 minute)

Outcome measurement: .....

Treatment location
Gym ☐ Ward ☐
Hydro ☐ other ☐ (Specify) .....

Treatment aims: .....

Treatment Task				Treatment Positions		Intervention Code (Selective Movement)		Intervention Code (Task Specific training)		Treatment Adjunct (Equipment)	
T01		Reaching and upper limb activities		P01	Lying – supine	SM1	Manual facilitation	TS1	Cognitive strategies	E01	Plinth
T02		Lower limb activity		P02	Lying – Prone	SM2	Co-ordination	TS2	Manual cueing & sensory input	E02	Passive standing device
T03	T	Bed mobility		P03	Side – Lying	SM3	Alignment	TS3	External cueing	E03	Gym ball
T04		Lying to sitting (vice versa)		P04	Sitting – supported	**Intervention Code (Exercise)**		TS4	Demonstration/ modelling	E04	Parallel bars
T05	T	Sitting to standing (vice versa)		P05	Sitting – unsupported	Specify the body part/s when applicable		TS5	Other (Specify)	E05	Exercise bike
T06		Transfer		P06	Standing – stride stand	EX1	Strengthening	**Intervention Code (Balance)**		E06	Walking aid (specify) .....
T07	T	Stand and step around		P07	Standing – step stand	EX2	Stretching	BA1	Re-education	E07	Walking equipment (Specify) .....
T08		Balance	P	P08	Standing – single leg stand	EX3	PROM	BA2	Core stability	E08	Other equipment .....
T09	T	Stepping		P09	Other (specify) ……..	EX4	Positioning	BA3	Other (Specify)	E09	Other equipment .....
T10	T	Up and down stair activities	P	**Intervention Code (Education and Advice)**		EX5	Soft tissue mobilisation	**Treatment Adjunct (Medication)**			
T11		Turning around activity		ED1	Patient	EX6	Cardiovascular exercise	M01	Specify	**Treatment Adjunct (Specialist equipment)**	
T12	T	Waking	P	ED2	Family	EX7	Endurance exercise	**Treatment Adjunct (Orthotics)**		E10	Cushion (Specify)……..
T13		Other (specify)		ED3	Staff	EX8	Other (specify)	O01	Specify	E11	Wheelchair (Specify) .....

6.3. Piloting of the treatment recording tool

Once the complete draft of the treatment recording tool was developed, the process of evaluating the acceptability, validity and reliability of the treatment recording tool was begun. Piloting the draft treatment recording tool aimed to:

1. determine whether the physiotherapists agreed that the record of the treatment generated using the treatment recording tool would accurately describe the treatment activities provided to patients with ABI in an inpatient setting.
2. determine whether individual physiotherapists provided a similar list of treatment activities when, on two separate occasions, they viewed video tapes of the same treatment sessions provided for the same patient (intra-rater reliability).
3. determine whether two different physiotherapists provided a similar list of treatment activities when they viewed video tapes of the same treatment sessions provided for the same patient (inter-rater reliability).

6.3.1. **Participants**

The piloting process of the treatment recording tool took place at Rookwood Hospital Cardiff, UK. Six physiotherapists were invited to participate in this part of the study. All physiotherapists were in band 6 (66.6%) and band 7 (33.4%), and their experiences varied from 3 years to 10 years, with a mean of 5.83 years of experience and a standard deviation of 2.64 (see Table 6-1 for more details).

Table 6-1: Physiotherapists' years of experiences and bands

Physiotherapist			Physiotherapist		
	Years of Experience	Band		Years of Experience	Band
PT 1	4 Years	6	PT 4	10 Years	6
PT 2	7 Years	7	PT 5	3 Years	6
PT 3	7 Years	7	PT 6	4 Years	6

6.3.2. **Treatment recording tool acceptability and validity**

The time physiotherapists spend completing medical notes is very important. Most physiotherapists who completed the questionnaire and who were asked to report any disadvantages of the documentation method that they use in their clinics reported that it was time-consuming. According to Quinn and Gordon (2010), physiotherapists often view documentation negatively, due to the time involved in the documentation process (Quinn and Gordon, 2010). Hence, developing a tool which can be completed quickly and meets all legal and professional documentation requirements would improve the documentation process. The researcher carefully considered this issue when developing the new treatment recording tool. The feedback from the physiotherapists, who were asked to score their acceptability and to write their comments on and opinions about each part of the treatment recording tool showed that the mean score of the acceptability for the time the physiotherapists spent completing the treatment recording tool was 75% (95% CI 68.3 to 81.7). The lowest rating (score 0) corresponded to "the time spend on completing the treatment recording tool was unacceptable" and the highest rating (score 100) corresponded to "the time spend on completing the treatment recording tool was highly acceptable". An acceptable level was set as a mean score of 60% or higher based on Chung et al.'s (2007) study (Chung et al., 2007). Hence, the acceptability for the time the physiotherapists spent completing the treatment recording tool was very high. Table 6-2 shows the means, 95 CIs and all the physiotherapists' scores.

Table 6-2: Means and 95% confidence intervals for physiotherapists' ranking of the acceptability of time to complete the treatment recording tool.

	PT 1	PT 2	PT 3	PT 4	PT 5	PT 6	Mean	(± 95 CI)	
								Lower	Upper
Time	80	80	70	80	60	80	75	68.3	81.7

Although the physiotherapists ranked the time they spent to complete the treatment recording tool as acceptable, their comments showed that their familiarity with the treatment recoding tool contributed to their ranking:

> (Physiotherapist 002) "*Time to complete recording tool decreases with each use as I become more familiar with it"*
> (Physiotherapist 003) *"Initially quite time consuming but when repeated less so"* and
> (Physiotherapist 005) *"Would get quicker once familiar with it".*

Some other physiotherapists reported a need for training on how to use the treatment recording tool before using it in real practice as this would help become familiar with the treatment recording tool:

> (Physiotherapist 006) *"Would have been easier to have had some teaching on how to use it. Would become easier to use over time as you became more familiar with it*."

Training in how to use the treatment recording tool is very important. One of the limitations of this study was that the researcher did not provide comprehensive training to all the physiotherapists before they used the treatment recording tool. Although the researcher provided the physiotherapist with full definitions of the terms used, along with a training manual that included instructions for completing the treatment recording tool, training sessions would have helped the physiotherapists to become familiar with the tool and standardise their usage of the new documentation method and shorten the time they used to complete the documentation. Most other researchers who developed and tested documentation forms provided a good training programme for all physiotherapists before they used their tools (Gassaway et al., 2005).

In terms of the accuracy of the treatment recording tool for reporting the treatment activities provided by physiotherapists in an inpatient setting, the literature reports that it is extremely important to have accurate medical notes which accurately describe the treatment provided to the patient (Indian Health Service, 2010). An accurate medical record has been reported as providing a database for planning and evaluating the service. It also allows for a continuity of care and improves the communication between healthcare providers. It provides written evidence that can be used to protect the legal interests of the hospital and/or staff (Indian Health Service, 2010). Hence, evaluating the accuracy of the treatment recording tool to describe treatment sessions is very important.

The feedback from the physiotherapists who rated the accuracy of the treatment recording tool to describe a treatment session by using a 100mm horizontal visual analogue scale (VAS) showed that the average score of the accuracy of the treatment recording tool to describe a treatment session was 70% (95% CI 61.2 to 78.7) which is above the 60% level set for acceptability (Chung et al., 2007) (see Table 6-3. Means, 95 CIs and all physiotherapists' scores).

Table 6-3: Means and 95% confidence intervals for physiotherapists' ranking of the acceptability of the accuracy of the treatment recording tool to describe the treatment session.

	PT 1	PT 2	PT 3	PT 4	PT 5	PT 6	Mean	(± 95 CI)	
								Lower	Upper
Accuracy	80	70	70	50	70	80	70	61.2	78.7

One expert physiotherapist (band 7) found it difficult to report her analysis, which made her feel that the treatment recording tool would not allow reporting of the next session plan.

> (Physiotherapist 002) *"I found it difficult to record my analysis and felt it lacked some necessary detail, because of that nowhere to document plan for the next session".*

However, all the other physiotherapists thought that the treatment recording tool was appropriate to describe treatment activities.

(Physiotherapist 003) "*It describes what we do.*"

The results show that the accuracy of the treatment recording tool to describe treatment sessions is satisfactory, although a new section to note the next treatment session plan would improve the quality of the information reported by the treatment recording tool. This section can be added to a new version of the treatment recording tool. None of the other researchers who developed the treatment recording forms reviewed in this study evaluated the accuracy of their treatment recording tool to describe treatment sessions (DeJong et al., 2005, DeJong et al., 2004, Donaldson et al., 2009, Tyson and Selley, 2004).

A comprehensive list of treatments has been reported as enabling the research evaluation of the content and quantity of physiotherapy treatment (Donaldson et al., 2009). It also helps both researchers and clinicians to describe treatment activities in sufficient detail and allows the replication of evaluative studies. Although the treatment activity list in the newly developed treatment recording tool is devised based on the feedback received from 50 physiotherapists who treat ABI patients in different treatment centres across the UK, the researcher asked the physiotherapists who used the treatment recording tool to rank the comprehensiveness of the treatment activity list included in the treatment recording tool to make sure that it is comprehensive enough to describe physiotherapy treatment sessions.

The average score for the comprehensiveness of the treatment activities list reported by the expert physiotherapists who piloted the treatment recording tool in Rookwood Hospital was 80% (95% CI 67.6 to 92.4) which is above the 60% level set for acceptability (Chung et al., 2007) (see Table 6-4. Means, 95 CIs and all physiotherapists' scores).

Table 6-4: Means and 95% confidence intervals for physiotherapists' ranking of the acceptability of the comprehensiveness of the treatment activity list.

	PT 1	PT 2	PT 3	PT 4	PT 5	PT 6	Mean	(± 95 CI)	
								Lower	Upper
Accuracy	90	50	80	80	90	90	80	67.6	92.4

Most physiotherapists found that the activity list was comprehensive and that the "other" option was useful.

> (Physiotherapist 003) *"Fairly comprehensive* and *clear and easy to understand"*.

Some physiotherapists found the activity list was good but did not give them enough space to add all the adjuncts they used in a session.

> (Physiotherapist 005) *"Doesn't list all adjuncts and not enough space to include all"* and (Physiotherapist 006) *"It is ok at describing main activity but nowhere to add smaller activities done within main table."*

The level of the treatment activity list's comprehensiveness is satisfactory. Based on the feedback from the physiotherapists, the researcher found that adding two more "other" options to the treatment adjuncts list would give the physiotherapists more free space to include all the treatment adjuncts that they use in their treatment sessions. These will be added to a new version of the treatment recording tool.

The average of the overall acceptance of the recording tool was 66.7% (95% CI 58.4 to 74.9) which is above the 60% level set for acceptability, although the lower 95% CI was just below acceptability (see Table 6-5. Means, 95 CIs and all physiotherapists' scores).

Table 6-5: Means and 95% confidence intervals for physiotherapists' ranking of the acceptability of the overall acceptance of the treatment recording tool.

	PT 1	PT 2	PT 3	PT 4	PT 5	PT 6	Mean	(± 95 CI)	
								Lower	Upper
Accuracy	60	50	70	80	70	70	66.7	58.4	74.9

However, some physiotherapists felt that the current treatment recording tool could not replace their current documentation but could be added to their documentation.

> (Physiotherapist 002) *"Could not replace the current notes for me as it is but could decrease documentation over time, at present would just add to documentation"*.

This opinion may be because of the same physiotherapist's previous opinion about the difficulties of reporting treatment analysis and the next session plan in the new tool. However, since physiotherapists can report their treatment analysis in the free space and the new version of the treatment recording tool has an extra space to report the future plan, this should improve the quality of the treatment recording tool.

In conclusion, the feedback from the physiotherapists showed that the developed treatment recording tool was acceptable in terms of the time the physiotherapists spent completing the treatment recording tool, the accuracy of the treatment recording tool in describing a treatment session and the comprehensiveness of the treatment activity list. In response to the feedback from the physiotherapists, a new version of the treatment recording tool was developed (see figure 6-12 at the end of this chapter). This version had extra spaces to add more treatment adjuncts, and physiotherapists will be able to add four extra treatment adjuncts rather than two. With regard to the physiotherapists who commented on the difficulties of reporting the analysis with the treatment recording tool, the researcher believes that the free text space will give any physiotherapist enough space to add any extra comments including analyses and future plans. In terms of those who commented on the difficulties of replacing the current documentation by

using the treatment recording tool, the research plan was to develop the documentation method used by physiotherapists who are treating ABI in an inpatient setting and the feedback from physiotherapists who used the treatment recording tool showed that the tool is a valid documentation method for physiotherapists to use.

6.3.3. **Treatment recording tool reliability study**

6.3.3.1. Intra-rater reliability

To test intra-rater reliability, the researcher completed the treatment recording tool (based on the video recordings) for all treatment sessions on two separate occasions. One was on the same day of treatment and another one was two weeks after the first completion. The point-to-point percentages of agreement of the treatment tasks, treatment positions, intervention codes and/or treatment adjuncts for the activities section on both occasions were calculated and are shown in Table 6-6. The weighted Kappa statistic, standard error and the 95% confidence interval were then calculated, using Statistical Package for the Social Sciences Version 20 (SPSS Inc., Chicago, IL, USA), to estimate the level of agreement. The Kappa statistic varied between moderate agreement at 0. 415 to substantial agreement at 0.675 where a score <0 is considered as poor agreement, 0 – .20 slight agreement, 0.21 – 0.4 is fair, 0.41 – 0.60 is moderate, 0.61 – 0.80 is substantial and 0.81 – 1 is almost perfect (Altman, 1991). Data for agreement for the ratings of the same treatment session on two different occasions by the researcher are shown in Table 6-7.

Table 6-6: inter rater reliability of the treatment recording tool - point to point agreement

Intra rater reliability					
Subject	treatment tasks	treatment position	intervention code	treatment adjuncts	Duration
001-1	100%	87.5%	89.5%	81.8%	100%
002-1	91.6%	100%	78.9%	90.9%	100%
003-1	91.6%	100%	89.5%	100%	100%
004-1	75%	75%	89.5%	81.8%	83.3%
005-1	100%	100%	84.2%	90.1%	66.7%
006-1	100%	100%	84.2%	100%	100%
007-1	91.7%	75%	100%	63.6%	87.5%
008-1	66.7%	75%	94.7%	90.9%	100%
009-1	91.7%	87.5%	89.5%	90.9%	80%
001-2	87.5%	100%	94.7%	90.9%	75%
002-2	91.7%	100%	89.5%	90.9%	85.7%
003-2	100%	100%	94.7%	100%	75%
004-2	83.3%	100%	89.5%	90.9%	83.3%
005-2	100%	100%	68.4%	100%	100%
006-2	91.7%	87.5%	89.5%	90.9%	83.3%
007-2	11%	100%	84.2%	100%	83.3%
008-2	83.3%	100%	94.7%	90.9%	80%
009-2	75%	100%	78.9%	100%	75%
Total Average	**90%**	**93.75%**	**88%**	**91.36%**	**86.56%**

Table 6-7: Weighted Kappa, Standard Error and 95% Confidence Interval of the treatment recording tool's intra-rater reliability

Component	Weighted Kappa	Standard error	95% Confidence interval	
			Lower limit	Upper limit
treatment tasks	0.636	0.0692	0.501	0.772
treatment position	0.675	0.100	0.478	0.872
intervention code	0.509	0.063	0.385	0.633
treatment adjuncts	0.415	0.117	0.175	0.635

The results from this part of the study showed that the level of agreement between two completions of the treatment recording tool which were completed by the same rater were acceptable. Although the intra-rater reliability of the treatment adjuncts section was the lowest, compared to all other sections, it still had moderate agreement. Thus, the intra-rater reliability of all sections of the treatment recording tool was acceptable and the treatment recording tool was reliable.

6.3.3.2. Inter-rater reliability

The researcher and another experienced physiotherapist independently completed the treatment recording tool for all 18 video-recorded treatment sessions in order to evaluate the inter rater reliability of the treatment schedule. The point-to-point percentages for agreement over treatment tasks, treatment positions, intervention codes and/or treatment adjuncts for the activities section on two completions of the treatment recording tool for the same patient by different physiotherapists were calculated and are shown in Table 6-8 and Table 6-9. The weighted Kappa statistic, standard error and 95% Confidence interval were then calculated using the Statistical Package for the Social Sciences Version 20 (SPSS Inc., Chicago, IL, USA), to estimate the level of agreement. The weighted Kappa statistic varied between moderate agreement at 0. 464 to substantial agreement at 0.712 (Altman, 1991). Data for agreement of the ratings for the same treatment session on two different occasions by the researcher are shown in Table 6-9.

Table 6-8: Percentages of agreement and weighted Kappa values for the treatment tasks, treatment positions, interventions and/or treatment adjuncts to test the treatment recording tool's inter-rater reliability

Inter-rater reliability					
Subject	treatment tasks	treatment positions	intervention codes	treatment adjuncts	Duration
001-1	100	100	78.9	100	90.9
002-1	91.7	87.5	94.7	81.8	100
003-1	100	100	89.5	90.9	83.3
004-1	91.7	100	89.5	81.8	75
005-1	100	100	94.7	100	100
006-1	83.3	87.5	78.9	90.9	85.7
007-1	91.7	75	89.5	81.8	87.5
008-1	91.7	87.5	89.5	72.7	100
009-1	83.3	87.5	94.7	90.9	80
001-2	100	100	78.9	100	88.9
002-2	75	87.5	100	90.9	85.7
003-2	100	100	84.2	90.9	75
004-2	83.3	75	89.5	90.9	83.3
005-2	100	100	84.2	100	100
006-2	83.3	87.5	73.7	81.8	100
007-2	100	100	89.5	100	100
008-2	91.7	100	89.5	100	80
009-2	83.3	87.5	84.2	81.8	85.7
Total Average	**91.7**	**92.4**	**87.4**	**90.4**	**88.9**

Table 6-9: Weighted Kappa, s Standard error and 95% Confidence Interval for the treatment recording tool to test the inter-rater reliability

Component	Weighted Kappa	Standard error	95% Confidence interval	
			Lower limit	Upper limit
treatment tasks	0.712	0.0636	0.588	0.837
treatment position	0.625	0.102	0.4252	0.826
intervention code	0.573	0.0581	0.460	0.687
treatment adjuncts	0.464	0.102	0.263	0.665

Thus, inter-rater reliability was acceptable for each of categories and varied between moderate agreement (0. 464) and substantial agreement (0.712). The agreement between the two completions of the treatment tasks and treatment positions sections for the same treatment session by two different physiotherapists was highly acceptable, with substantial agreement. The agreements of two completions of the intervention and treatment adjuncts of the same treatment session were slightly lower than the treatment tasks and treatment positions but still acceptable with moderate agreement (0.573 and 0.464). It is possible that the reason why the inter-rater reliability of the intervention and treatment adjuncts sections was lower than the inter-rater reliability of the treatment task and treatment position was because of the complexity of the physiotherapy intervention and the variety of treatment adjuncts used by physiotherapists in clinics.

6.4. Describing the physiotherapy service using the treatment recording tool

There has been a rapid expansion in the roles of physiotherapists in ABI care (Turner-Stokes et al., 2005). However, there has been no attempt to describe ABI physiotherapy in an inpatient setting. The aim of this part of the study is to describe the content of ABI physiotherapy in inpatient settings in the UK that use data collected by the treatment recording tool. Describing the content of the physiotherapy service provided for people with ABI helps to evaluate the services provided to patients and facilitates a better understanding of which activities benefit recovery for which types of patients and how physiotherapy aids recovery. The researcher used the recording tool which was completed by the physiotherapists to describe and summarise the physiotherapy activities provided for people with ABI in Rookwood hospital. The researcher has also reported the combination of physiotherapy interventions (treatment packages) using geometric coding (Tyson et al., 2009).

Six physiotherapists working at Rookwood hospital recorded 18 treatment sessions for nine patients. The patients' mean age was 42 years (SD 20.6 years). Five males and four females were in the rehabilitation stage and their diagnoses included TBI, meningitis, chronic subarachnoid haematoma, epilepsy, multiple sclerosis and cerebral aneurysm (See table 6-10 for more details about the patients).

Table 6-10: Recruited patient's characteristics

Patient	Age	gender	Diagnosis	Cause of injury	Date of injury	Period in inpatient rehabilitation
001	82	M	Meningitis	Infection	Jan 2011	1 Month
002	42	F	Hypoxic brain injury	Epileptics	Feb 2008	35 months
003	58	F	Brain hematoma	Cerebral aneurysm	2009	11 months
004	21	M	Subarachnoid hemorrhage	Intra-cerebral aneurysm	March 2009	25 months
005	24	M	Subarachnoid hemorrhage	Road traffic collision	November 2009	13 months
006	22	F	Multiple sclerosis	Multiple sclerosis	December 2009	4 months
007	56	M	Traumatic Brain Injury	Unknown	February 2011	4 Months
008	28	M	Traumatic Brain Injury	Direct trauma	May 2011	2 months
009	44	F	Subarachnoid hemorrhage	Intra-cerebral aneurysm	March 2007	8 Months

A Barthel Index score was calculated for all the included patients in order to report on the patients' daily living and functioning activities and mobility level. The Barthel Index covers 10 items, including: feeding, bathing, grooming, dressing, moving from a wheelchair into bed and a return, the continence of bowels and bladder, transferring to and from a toilet, walking on a level surface and going up and down stairs. Table 6-11 shows the Barthel Index scores for all patients.

Table 6-11: Bathel index scores for all recruited patients

Patient	Activity of daily living										
	Feeding	Bathing	Grooming	Dressing	Bowels	Bladder	Toilet use	Transfers	Mobility	Stairs	**Total Score**
001	5	0	0	5	5	0	5	5	0	5	**30**
002	0	0	0	0	0	0	0	0	0	0	**0**
003	5	0	0	0	0	0	0	5	0	0	**10**
004	5	0	0	0	10	0	0	5	0	0	**20**
005	5	0	0	5	0	5	5	5	5	0	**30**
006	10	0	5	0	0	0	0	0	5	0	**20**
007	5	0	5	5	10	10	5	10	10	5	**65**
008	5	0	0	5	10	10	5	10	10	5	**60**
009	5	0	0	0	0	0	0	0	0	0	**5**

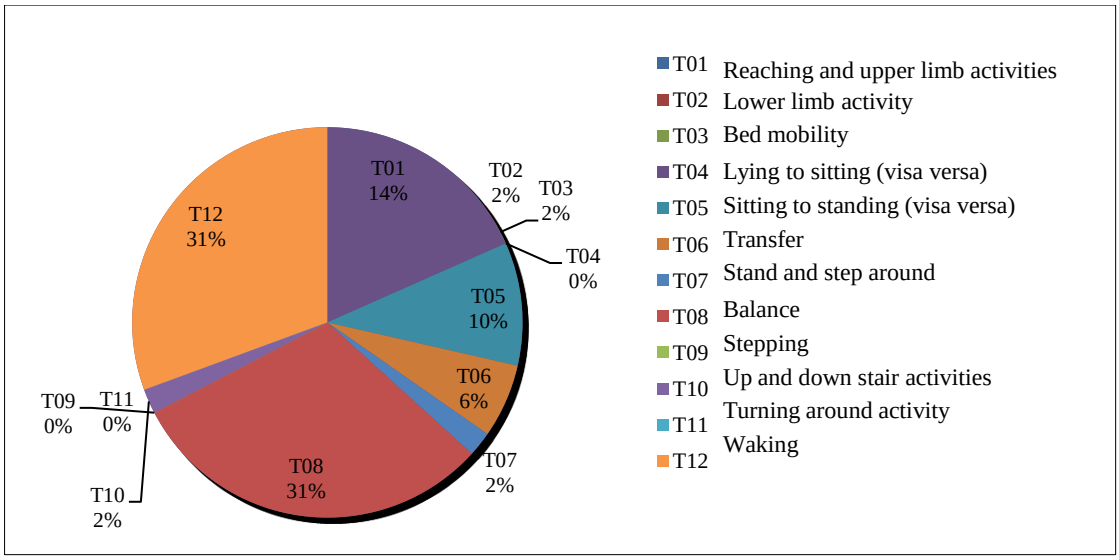
0= Unable to do the task; 5= Need some help and 10 = independent

Barthel Index assessment is used to determine the patient's daily activity level. The items in the scale are weighted according to a scheme developed by Mahoney and Barthel (1965). The patient obtains a score based on whether he/she receives help while doing a task. The individual task scores are then summed to create a total score. A higher score means that a patient is more independent. Independence means that the patient needs no assistance with any part of the task. Looking at the scores, it can be clearly seen that most of the recruited patients were highly dependent, except the traumatic brain injury patient who were in need of some help with their activities of daily living (patient numbers 7 and 8).

The percentages for the frequencies for the treatment tasks the physiotherapists used are shown in Figure 6-8. The most frequently used treatment tasks were balance and walking activities (31%). The next most commonly used treatment task was reaching and upper-limb activity (14%), followed by sitting to standing activity (10%). The results of this part of the study show that the

physiotherapists' tasks to treat people with acquired brain injury in an inpatient rehabilitation stage focus on out of bed functional activities, including patient balance and walking.

Figure 6-8: Treatment task activities reported by physiotherapists using the treatment recording tool.



In term of the treatment task packages (see table 6-12 for all codes located for all selected treatment activities), there were 55 treatments tasks and 12 different treatment packages reported by the physiotherapists. One physiotherapist added one (5%) new treatment task which was not included in the treatment task list in the treatment recording tool. The maximum number of treatment task combinations that made up a treatment package was 3 and the geometric code was 2,048 (walking) (see Table 6-13 for more details). This finding shows that physiotherapists often focus their treatment task on improving the patient's walking activity (16.7%). They also sometimes combine a walking activity treatment task with either balance, reaching and upper limb activities (11.1%), or balance, sitting to standing, lying to sitting and lower limb activities (11.1%). This finding of this study agrees with the literature as it has been reported that patient mobilisation is the main aim of physiotherapy rehabilitation (Brandstater and Shutter, 2002, Tyson et al., 2008).

Table 6-12: Codes allocated for all treatment activities in the treatment recording tool

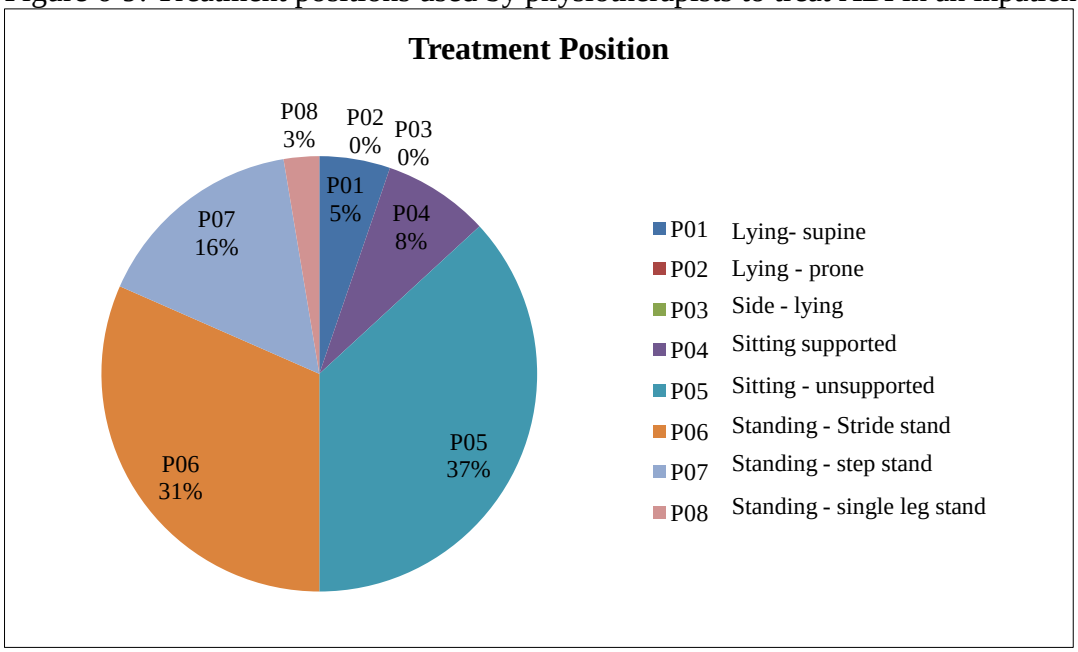
Treatment Task	**Code Located**	**Intervention Code (Exercise)**	**Code Located**
T01: Reaching and upper limb activities	**1**	EX1: Strengthening	**1**
T02: Lower limb activity	**2**	EX2: Stretching	**2**
T03: Bed mobility	**4**	EX3**:** PROM	**4**
T04: Lying to sitting	**8**	EX4**:** Positioning	**8**
T05: Sitting to standing	**16**	EX5: Soft tissue mobilisation	**16**
T06: Transfer	**32**	EX6: Cardiovascular exercise	**32**
T07: Stand and step around	**64**	EX7: Endurance exercise	**64**
T08: Balance	**128**	**Intervention Code (Task Specific training)**	**Code Located**
T09: Stepping	**256**	TS1: Cognitive strategies	**1**
T10: Up and down stair activities	**512**	TS2: Manual cueing & sensory input	**2**
T11: Turning around activity	**1024**	TS3: External cueing	**4**
T12: Walking	**2048**	TS4: Demonstration/ modelling	**8**
Treatment Positions	**Code Located**	**Intervention Code (Balance)**	**Code Located**
P01: Lying – supine	**1**	BA1: Re-education	**1**
P02: Lying – Prone	**2**	BA2: Core stability	**2**
P03: Side – Lying	**4**	**Treatment Adjunct**	**Code Located**
P04: Sitting – supported	**8**	M01: Medication	**1**
P05: Sitting – unsupported	**16**	O01: Orthotics	**2**
P06: Standing – stride stand	**32**	E01: Plinth	**4**
P07: Standing – step stand	**64**	E02: Passive standing device	**8**
P08**:** Standing – single leg stand	**128**	E03: Gym ball	**16**
Intervention Code (Education and Advice)	**Code Located**	E04: Parallel bars	**32**
ED1: Patient	**1**	E05: Exercise bike	**64**
ED2: Family	**2**	E06: Walking aid	**128**
ED3: Staff	**4**	E07: Walking equipment	**256**
Intervention Code (Selective Movement)	**Code Located**	E11: Cushion	**512**
SM1: Manual facilitation	**1**	E12: Wheelchair	**1024**
SM2: Co-ordination	**2**		
SM3: Alignment	**4**		

Table 6-13: Treatment task geometric codes

Treatment Task			
Geometric Code	Treatment task activities	frequency of code	
		n	%
2048	Walking	3	16.7
2177	Reaching and upper limb activities +Walking + Balance	2	11.1
2192	Walking + Balance + Sitting to standing + Lying to sitting + Lower limb activity	2	11.1
1	Reaching and upper limb activities	1	5.5
16	Sitting to standing		
38	Lower limb activity + Bed mobility + Transfer		
48	Sitting to standing + Transfer		
128	Balance		
2113	Reaching and upper limb activities + Stand and step around + Walking		
2176	Walking + Balance		
2689	Reaching and upper limb activities + Balance + Up and down stair activities + Walking		

With regard to treatment positions, fifty five treatment positions were reported by the physiotherapists in the treatment recording tool. Five (27.8%) new treatment positions were added as "other" and were not included in the treatment positions list. The treatment position most often used to treat ABI in an inpatient setting was sitting unsupported, as 37% of the physiotherapists stated that they used this treatment position in their treatment sessions. Thirty-one percent of the physiotherapists reported that they used a standing (stride stand) position in their treatment sessions and 16% of the physiotherapists using a standing (step stand) position (see Figure 6-9 for more details). The treatment position used corresponded with the treatment task, as the most common treatment tasks reported by physiotherapists are walking activities and balance exercises. These treatment tasks will always be performed in a sitting or standing position (Turner-Stokes et al., 2005).

Figure 6-9: Treatment positions used by physiotherapists to treat ABI in an inpatient setting.



Ten different treatment position packages were reported by the physiotherapists. The maximum number of treatment position packages that were made up by a combination of different treatment positions was 4 and the geometric code was 48, which was a combination of "sitting-unsupported" and "standing-stride stand" treatment positions (see Table 6-14 for more details).

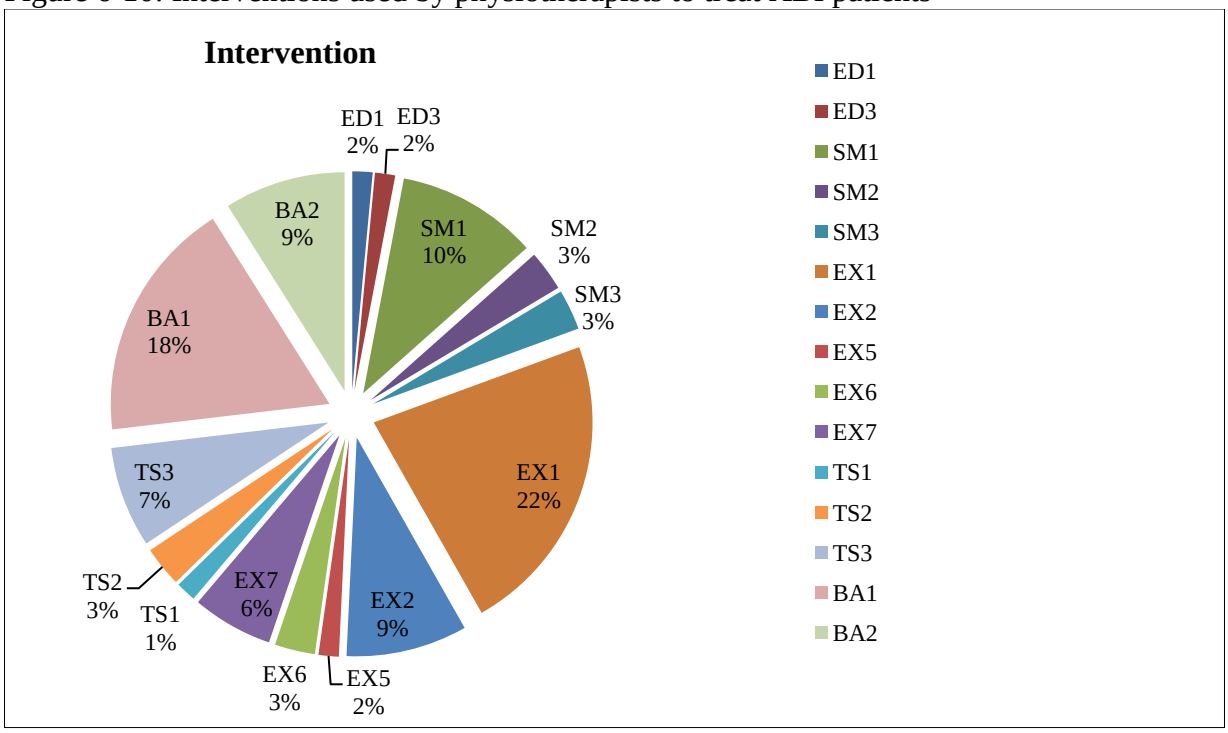
Table 6-14: Treatment position geometric codes

Treatment position			
Geometric Code	Combination of treatment positions	frequency of code	
		n	%
48	sitting- unsupported + standing-stride stand	4	22.2
32	Standing – stride stand	2	11.1
8	Sitting – supported	1	5.5
16	Sitting – unsupported		
45	Lying – supine + Side – Lying + Sitting – supported + Standing – stride stand		
64	Standing – step stand		
72	Sitting – supported + Standing – step stand		
112	Sitting – unsupported + Standing – stride stand + Standing – step stand		
192	Standing – step stand + Standing – single leg stand		

Sixty six physiotherapy interventions were reported by physiotherapists in the treatment recording tool. Twenty two per cent of the physiotherapists reported that they were using

strengthening exercise as an intervention to treat patients with ABI while 18% of the physiotherapists were using re-education of balance as an intervention. These two interventions were followed by selective movement (manual facilitation) (10%), balance (core stability) (9%) and stretching exercise (9%) (see Figure 6-10 for more details).

Figure 6-10: Interventions used by physiotherapists to treat ABI patients



ED1: Education and Advice (Patient); **ED3**: Education and Advice (Staff); **SM1**:Manual facilitation **SM2**: Co-ordination; **SM3**:Alignment; **EX1**: Strengthening; **EX2**: Stretching; **EX3**: PROM; **EX4**:Positioning; **EX5**: Soft tissue mobilisation; **EX6**: Cardiovascular exercise; **EX7**:Endurance exercise; **TS1**: Cognitive strategies; **TS2**: Manual cueing & sensory input; **TS3**: External cueing; **TS4**:Demonstration/ modelling; **BA1**: Balance (Re-education); **BA2**: Balance (Core stability)

Since the number of physiotherapy interventions listed in the treatment recording tool consisted of 30 interventions, it was difficult to assign codes for the whole list at once as the sum of the codes would be very big. The interventions list was divided into five sections: education and advice; selective movement; exercise; task specific training and balance. Each section is assigned a unique separate code. The result shows that only two (11.1%) physiotherapists use a combination of strengthening and stretching exercises and two (11.1%) use a combination of strengthening and endurance exercises. Other combinations of treatment are: strengthening and

soft tissue mobilisation (5.5%); strengthening and cardiovascular exercise and endurance exercise (5.5%); cognitive strategies and manual cueing & sensory input (5.5%); cognitive strategies, manual cueing & sensory input, and external cueing (5.5%) (see Table 6-15 for more details).

Table 6-15: Intervention geometric codes

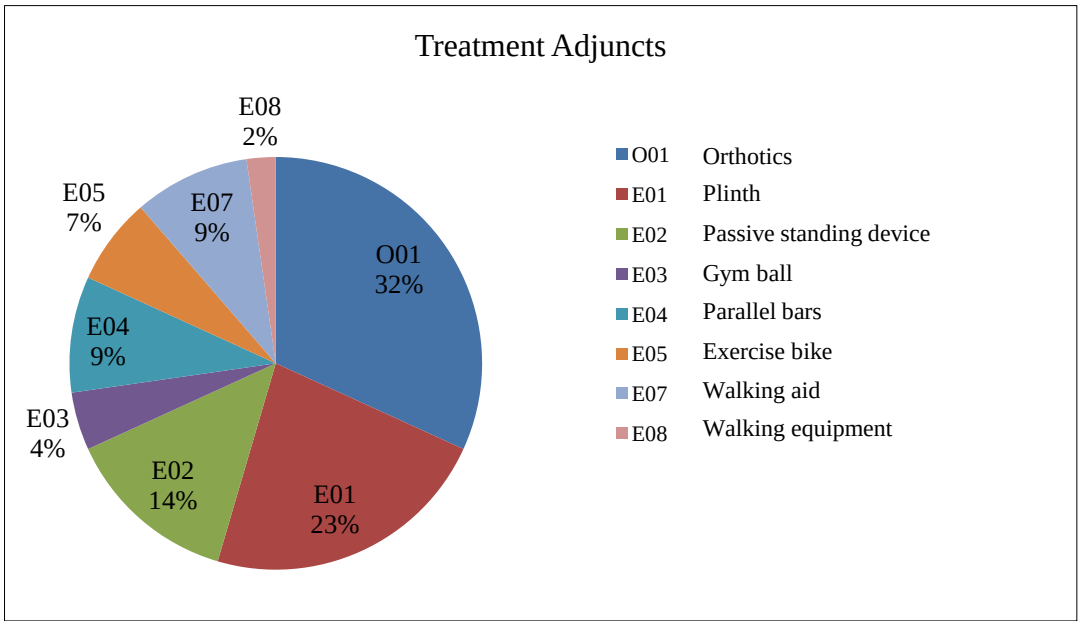
Intervention				
Geometric Code		Combination of intervention	frequency of code	
			N	%
Education and advice	1	Patient	1	5.5
	4	Staff	1	5.5
Selective movement	1	Manual facilitation	5	27.8
	2	Co-ordination	2	11.1
	4	Alignment	2	11.1
Exercise	1	Strengthening	5	27.8
	3	Strengthening + Stretching	2	11.1
	65	Strengthening + Endurance exercise	2	11.1
	2	Stretching	1	5.5
	17	Strengthening + Soft tissue mobilisation	1	5.5
	64	Endurance exercise	1	5.5
	97	Strengthening + Cardiovascular exercise + Endurance exercise	1	5.5
Task Specific training	1	Cognitive strategies	1	5.5
	2	Manual cueing & sensory input	1	5.5
	3	Cognitive strategies + Manual cueing & sensory input	1	5.5
	4	External cueing	1	5.5
	7	Cognitive strategies + Manual cueing & sensory input + External cueing	1	5.5
Balance	1	Re-education	6	33.3
	2	Core stability	4	22.2

The results of this study show that physiotherapists tend to use treatment techniques to improve body function more often than practising functional tasks, which means they tend to practise the components of activities via strengthening, re-education and facilitation techniques rather than practising whole activities. This is the first study which reports the content of ABI physiotherapy in an inpatient setting, therefore a comparison with previous reports is not possible. The results show that physiotherapists focus on therapist-led, 'hands-on' interventions, such as facilitation techniques. Facilitation, known as the performance of 'normal movement patterns' is the therapist

leading/ guiding the movements, and providing stability to allow selective movement of the limbs while the patient is physically active-assisted or passive (Tyson and Selley, 2004). The results of this part are broadly in line with the previous study by Tyson et al. (2008) about the content of physiotherapy for hospitalised patients with stroke (Tyson et al., 2008).

In terms of treatment adjuncts, 76 treatments adjuncts are reported as being used by physiotherapists during their treatment. Four (22.2%) treatment adjuncts were added as "other" and were not included in the treatment adjuncts listed in the treatment recording tool. Additional adjuncts include a balloon, bowling toy, free weight and sit-fit cushion. Thirty-two per cent of the physiotherapists reported that they used orthotics with their patients, 23% used the plinth and 14% used the passive standing device (see Figure 6-11 for more details).

Figure 6-11: Treatment adjuncts used by physiotherapists during treatment sessions.



In terms of the combination of treatment adjuncts, nine treatment adjunct packages were found. The repetitions of packages were similar and are as follows: orthotics and passive standing device (5.5%); plinth and passive standing device (5.5%); plinth, passive standing device and gym ball

(5.5%); plinth and parallel bars (5.5%); plinth, gym ball and exercise bike (5.5%); medication and walking equipment (5.5%); orthotics, plinth and walking equipment (5.5%); exercise bike and wheelchair (5.5%); parallel bars, walking equipment and wheelchair (5.5%) (see Table 6-16 for more details).

Table 6-16: Treatment adjunct geometric codes

Treatment adjuncts			
Geometric Code	Combination of treatment adjuncts	frequency of code	
		n	%
2	Orthotics	4	22.2
4	Plinth	1	5.5
10	Orthotics + Passive standing device	1	5.5
12	Plinth + Passive standing device	1	5.5
28	Plinth + Passive standing device + Gym ball	1	5.5
36	Plinth + Parallel bars	1	5.5
84	Plinth + Gym ball + Exercise bike	1	5.5
257	Medication + Walking equipment	1	5.5
262	Orthotics + Plinth + Walking equipment	1	5.5
1088	Exercise bike + Wheelchair	1	5.5
1312	Parallel bars + Walking equipment + Wheelchair	1	5.5

6.5. Treatment recoding tool versus Physiotherapy SOAP notes

This part of the study aimed to help the researcher evaluate how comprehensive the treatment recording tool was by reviewing the regular physiotherapy SOAP notes which were completed after each physiotherapy session and comparing them to the treatment recording tool which was completed by the same physiotherapists for the same treatment sessions. The comprehensiveness of the documentation method is widely recognised as an important feature of any documentation method (General Medical Council, 2013). Many researchers find that to improve the quality of the physiotherapy service provided for people with neurological conditions, a comprehensive method to document physiotherapy practice is necessary (DeJong et al., 2005, Jette et al., 2005).

Hence, testing the comprehensiveness of the newly developed treatment recording tool is very important.

First, the researcher checked all the legal documentation requirements. All the physiotherapists reported their name, date of treatment session, patient's name and ID in both the treatment recording tool and the SOAP notes. The literature emphasises the importance of the patient's name and either the date of birth, hospital number or NHS number being reported on each page of their medical record (Chartered Society of Physiotherapy, 2000), which all the physiotherapists did in both the treatment recording tool and SOAP notes. Thirteen out of 18 (72.2%) did not report the treatment time on the SOAP notes whereas all the physiotherapists reported the treatment time when they completed the recording tool. Treatment time is one of the legal requirements in medical records and omitting such information will affect the quality of the documentation process (Chartered Society of Physiotherapy, 2000). Some researchers have reported that therapists who use a problem-oriented medical record (POMR),such as SOAP notes, often forget to document some necessary information, such as times, dates, treatment locations and/or duration and intensity (Pourasghar et al., 2008). Such missing information might affect the quality of the service (Pourasghar et al., 2008). In addition, the feedback from the physiotherapists who completed the questionnaire shows that one disadvantage of the SOAP notes is that physiotherapists occasionally forget to report some important details. In contrast, the structure of the treatment recording tool means that physiotherapists should not forget any essential details.

Informed consent and manual handling risk assessment are other legal requirements which should be reported in medical notes (Chartered Society of Physiotherapy, 2008). Six physiotherapists (33.3%) did not mention in the SOAP notes whether they sought informed consented from their patients compared to all of them reporting that they did when they completed the treatment

recording tool. None of the physiotherapists reported that they had done a manual handling risk assessment in the SOAP notes compared to 5 (27.8%) physiotherapists stating in the treatment recording tool that they did and 7 (38.9) that they did not, while 6 (33.3%) did not answer this question. It can be clearly seen that the physiotherapists mostly reported all the legally required and necessary information when they completed the treatment recording tool. Standardising and structuring the documentation method helps physiotherapists to report all the necessary information as it always reminds them what needs to be reported. The General Medical Council's (General Medical Council, 2013) guidance on record keeping has supported this argument by reporting that standardising medical records is needed so that records are structured appropriately and clinical information is not missed and/or recorded in the wrong place. Byrne (2012) has also mentioned that the use of a structured or standardised documentation template can mitigate missing critical information in record keeping (Byrne, 2012).

Evaluating the SOAP and treatment recording tool showed that twelve (66.7%) physiotherapists did not provide any details about the treatment location in the SOAP notes compared to the treatment recording tools where all the physiotherapists reported the treatment location. The literature reports the importance of reporting the treatment location as this helps therapist to track and repeat all physiotherapy treatments in all locations (Sorgente and Fernandez, 2004). None of the physiotherapists reported that he/she did any kind of assessment during the treatment session in the SOAP notes while 2 physiotherapists (11.1%) stated that they did some kind of assessment in their treatment session, one physiotherapist did not answer this question and 15 physiotherapists reported that they did not do any patient assessment during the treatment session. Both the literature and the feedback from the heads of rehabilitation teams and physiotherapists who treat patients with ABI in the UK emphasise the importance of reporting the assessment process in medical notes (British Society of Rehabilitation Medicine, 2003). A special box to report the assessment process in the treatment recording tool and an option to tick a box to

indicate that the physiotherapist did not do any assessment process during the treatment session helps to make sure that such important information is not missed (Frazer and Lawley, 2000). Taking an example to support this argument, from the treatment recording tool data, the researcher knows that 15 physiotherapists did not re-evaluate their patients during treatment sessions, while with SOAP notes the researcher does not know whether such information is missing or if physiotherapists did not do any patient assessments during treatment sessions. This can be proven by the fact that the treatment recording tool shows that two physiotherapists re-assessed their patients during treatment sessions while the same physiotherapists did not report in the SOAP notes that they re-assessed patients in the same sessions.

Only one physiotherapist reported in the SOAP notes that he/she used an outcome measure in their treatment session and the same physiotherapist reported that in the treatment recording tool as well. One other physiotherapist reported in the treatment recording tool that he/she used an outcome measurement in the treatment session and he/she did not report that in the SOAP notes. No other physiotherapists completed this section in the treatment recording tool nor did they report this in the SOAP notes. Although the feedback from the physiotherapists who completed the questionnaire in this study shows that physiotherapists use a wide variety of outcome measurements to evaluate their patients, the SOAP notes and treatment recording tool show that the physiotherapists do not using outcome measures very often. A possible reason why the physiotherapists did not use the outcome measure in these treatment sessions was that there were only two physiotherapists who re-assessed their patients during the treatment sessions and often the use of the outcome measure is combined with the patient assessment. Only two physiotherapy sessions out of 18 included the use of some sort of outcome measurements. The literature reports the importance of the regular use of outcome measurements. Standard 6 of the Core Standards of Physiotherapy Practice recommend the evaluation of patient change during the physiotherapy service process by using published, standardised, valid, reliable and responsive outcome

measures (Chartered Society of Physiotherapy, 2005). Waddell and Burton (2004) support this study finding, as they found that 22% of therapists do not measure outcomes in their treatment sessions and that many use measures that have not been tested for reliability and/or validity (Waddell and Burton, 2004).

Reporting the treatment aims in progress notes is essential (National Cancer Survivorship Initiative, 2012) as it helps physiotherapists to understand the physiotherapy treatment plan and to anticipate future treatment needs. The completed SOAP notes and treatment recording tool reveal that none of the physiotherapists reported their treatment aim in the SOAP notes compared to 13 (72.3%) physiotherapists who reported the treatment aim in the recording tool. It was clearly noticeable that the treatment recoding tool was always giving extra information about the physiotherapy sessions and this information was not mentioned in the regular SOAP notes. The fact that some physiotherapists reported in the treatment recording tool that they did some rehabilitation activities such as assessment and outcome measurement, and these activities were not mentioned in the SOAP notes, would be evidence that structuring the documentation method by using a treatment recording tool should provide more comprehensive and accurate information about the service. To the best of the researcher's knowledge, there is no evidence in the literature about physiotherapists reporting their aims in medical notes so that the researcher can compare with this study's results. Table 6-17 summarises the comparisons between the SOAP note and the treatment recording tool which were completed by the same physiotherapists for the same patients during the piloting process.

Table 6-17: Comparison between the SOAP note and treatment recording tool

	SOAP note (n=18)	Treatment Recording Tool (n=18)
Therapist name	All	All
Patient's name or ID	All	All
Treatment date and time	5	All
Informed consent	12	All
Manual Handling Risk Assessment	None	12
Treatment Location	6	All
Assessment	None	17
Outcome measurement	1	2
Treatment aim	None	13

The treatment recording tool is designed to provide as many details about the physiotherapy treatment activity as is ethically and professionally required. In terms of treatment activities reported in both the SOAP notes and the treatment recording tool which were completed by the same physiotherapists, the treatment recording tool provided clear details about treatment position, intervention provided, adjustments used in the treatment session and its duration. The treatment tasks reported in the treatment recording tool and the SOAP notes for the first three patients are similar. The first three patients had different diagnosis and different functional ability and mobility level. The time they spent in rehabilitation service varied between one month to thirty five months. Six different treatment tasks are reported which include: reaching and upper limb activities; lower limb activities; bed activities; transfer activities; stand and step around and walking activities. However, in the SOAP notes, the physiotherapists did not report most of the treatment positions or interventions provided in any of the treatment tasks, and they did not mention three of the treatment adjuncts that they reported in the treatment recording tool. Although the third physiotherapist documented some details about the treatment sessions in the

SOAP notes and provided some details of the treatment positions and interventions provided for some of the treatment tasks, the treatment positions and interventions were still missing for the majority of the treatment tasks. This finding indicates that the treatment recording tool records more comprehensive and organised details of treatment sessions compared to SOAP notes. On the other hand, some subjective details were reported in the SOAP notes that were not reported in the treatment recording tool, as the treatment recording tool does not have space to report such information. The extra details included more specific details about the amount of assistance the physiotherapists provided to patients during the physical activity. The SOAP note also contains details about the next session plan, whereas the recording tool did not capture this information. Although some physiotherapists provide more details about the treatment sessions in SOAP notes, the level of consistency of SOAP formats may however vary between physiotherapists. This is reported and supported by Borcherding and Kappel (2006) (Borcherding and Kappel, 2006). The flexibility of SOAP notes (problem-oriented medical records) which allows physiotherapists to report extra details about treatment sessions is supported by the literature and the feedback from physiotherapists who completed the questionnaire. Badia (1999) reports that although POMR is a restricted format of documentation, it offers to some extent a degree of flexibility and simplicity of progression in the data which makes it quicker and easier to find the information needed from the medical records (Sames, 2009). In addition, the advantages of SOAP notes are reported by the physiotherapists who completed the questionnaire in this study and this show that SOAP notes are a flexible documentation method which allows physiotherapists to record in the main body what they have done in the treatment session.

A review of the SOAP notes and the treatment recording tool which were completed for the fourth patient by the fourth physiotherapist support the conclusion that the treatment recording tool records more comprehensive details of a physiotherapy session. An analysis of the notes shows that the physiotherapists do not report interventions and treatment positions for two of the

reported treatment tasks nor their duration in the SOAP notes. They also did not mention all the adjuncts used in the treatment session which were reported in the treatment recording tool.

The SOAP notes reviewed for the fifth patient provided more details of the treatment session compared to the previous four sets of notes. Both the SOAP notes and the treatment recording tool provided details of treatment positions, intervention codes, adjuncts and duration of the treatment session. More details about the patient's walking distance were provided in the SOAP notes and were not mentioned in the treatment recording tool. The next session plan was reported as well. It can be clearly seen that there is a difference in the quality and amount of information reported in the SOAP notes. The comprehensiveness of the information reported in the SOAP notes depends to some extent on the therapists who complete the notes. This finding is reported by the physiotherapists who completed the questionnaire in this study, as they criticised SOAP notes by saying that the therapist's skill and experience affect the quality of the information reported in the documentation. The literature also supports this statement as Borcherding and Kappel (2006) report that the level of ability and consistency of SOAP notes varies between therapists (Borcherding and Kappel, 2006). However, some other researchers believe that the restricted format of SOAP notes offers better organisation of medical records (Sames, 2009).

The treatment recording tool report of the treatment session for the sixth patient provided more details of the intervention provided compared to the SOAP notes as the physiotherapist reported that he/she used 3 different treatment tasks though he/she reported only one in the SOAP notes. The SOAP notes did not contain any details of the treatment session's duration. However, the treatment plan of the next session was reported in the SOAP note. The next treatment session plan is a detail of the treatment session provided in almost all SOAP notes and not in any treatment recording tool. The next revision of the treatment recording tool needs to have an extra space for physiotherapists to report the next session plan.

Some important details about the treatment session were missing in the seventh SOAP note reviewed, as the physiotherapist did not provide any details about the intervention provided or the duration of the session but did report the plan for the next session. Subjective details about the patient such as general medical health, appearance and motivation as well as the next session plan were missing in the treatment recording tool completed by the physiotherapist to report the treatment session provided for the eighth recruited patient. The SOAP and treatment recording tool notes completed by the physiotherapist to document the treatment session of the ninth patient provided details of treatment positions, interventions provided, adjuncts used and treatment duration. Details of the treatment position and treatment duration were not reported in the physiotherapy SOAP notes of the patient numbers ten, eleven, twelve and thirteen. In contrast, some details about the treatment provided were reported in the SOAP notes and not in the treatment recording tool, such as patient appearance, walking distance in metres and the future plan. Physiotherapists who documented the SOAP notes for patient numbers fourteen and fifteen did not report any details about treatment position, intervention/s provided and treatment duration which were all reported by the same physiotherapists when they completed the treatment recording tool. The physiotherapist who completed the SOAP notes for patient number sixteen reported more treatment tasks than those reported in the treatment recording tool by the same physiotherapist. However, the treatment position, adjuncts and treatment duration were not reported in the SOAP notes while the future plan was reported as "*to continue*". Sufficient details about the treatment task, treatment position, intervention and adjuncts used in the session and treatment duration were documented in the SOAP notes of patient number seventeen. In contrast, the intervention provided and treatment duration were not reported in the SOAP notes which were completed by the physiotherapist to document the physiotherapy session provided for patient number eighteen.

It can be clearly seen that the details of the treatment sessions which were documented using the treatment recording tool were more comprehensive, accurate and detailed than those reported in SOAP notes. Treatment tasks, positions, interventions provided, adjuncts used and the duration of each treatment task were comprehensively reported in a structured way. Although the SOAP notes provided more subjective details of patients, such as general medical health, appearance and motivation, physiotherapists could use the "general comment" box in the treatment recording tool to provide those subjective details about the treatment provided. One of the reported treatment recording tool's limitations was the lack of space to report the physiotherapy future plan, although physiotherapists could use the "general comments" box in the treatment recording tool to provide more details about a future plan. Adding a new box for future plans would be necessary for the next version of the treatment recording tool (see Figure 6-12).

Figure 6-12: The Treatment Recording Tool

01: treating physiotherapist 1 [print name and sign] .....
02: treating physiotherapist 2[print name and sign] .....
03: treating physiotherapist assistant 3[print name and sign] .....

Patient name: .....

Patient ID: .....

Date and time --/--/ 20-- --:--

Informed consent Yes ☐ No ☐

Manual Handling Risk Assessment Yes ☐ No ☐

Patient assessment:
None ☐ Initia ☐ re-assessmen ☐ Discharg ☐

Duration: ..... Unit/s (1 unit = 5 minute)

Outcome measurement: .....

Treatment location
Gym ☐ Ward ☐
Hydro ☐ other ☐ (Specify) .....

Treatment aims: .....

	Treatment Task		Treatment position		Intervention code			Adjuncts used in treatment						Duration/Unit	General comment
1	T		P												
2	T		P												
3	T		P												
4	T		P												
5	T		P												**Future plan**
6	T		P												
7	T		P												

Treatment Task		Treatment Positions		Intervention Code (Selective Movement)		Intervention Code (Task Specific training)		Treatment Adjunct (Equipment)	
T01	Reaching and upper limb activities	P01	Lying - supine	SM1	Manual facilitation	TS1	Cognitive strategies	E01	Plinth
T02	Lower limb activity	P02	Lying - Prone	SM2	Co-ordination	TS2	Manual cueing & sensory input	E02	Passive standing device .....
T03	Bed mobility	P03	Side - Lying	SM3	Alignment	TS3	External cueing	E03	Gym ball
T04	Lying to sitting (vice versa)	P04	Sitting - supported	**Intervention Code (Exercise)**		TS4	Demonstration/ modelling	E04	Parallel bars
T05	Sitting to standing (vice versa)	P05	Sitting – unsupported	Specify the body part/s when applicable		TS5	Other (Specify)	E05	Exercise bike
T06	Transfer	P06	Standing – stride stand	EX1	Strengthening	**Intervention Code (Balance)**		E06	Walking aid (specify) .....
T07	Stand and step around	P07	Standing – step stand	EX2	Stretching	BA1	Re-education	E07	Walking equipment (Specify) .....
T08	Balance	P08	Standing – single leg stand	EX3	PROM	BA2	Core stability	E08	Other equipment .....
T09	Stepping	P09	Other (specify) ……..	EX4	Positioning	BA3	Other (Specify)	E09	Other equipment .....
T10	Up and down stair activities	**P10**	Other (specify) ……..	EX5	Soft tissue mobilisation	**Treatment Adjunct (Medication)**		E10	Other equipment .....
T11	Turning around activity	**Intervention Code (Education and Advice)**		EX6	Cardiovascular exercise			E11	Other equipment .....
T12	Waking	ED1	Patient	EX7	Endurance exercise	M01	Specify	**Treatment Adjunct (Specialist equipment)**	
T13	Other (specify)	ED2	Family	EX8	Other (specify)	**Treatment Adjunct (Orthotics)**		E12	Cushion (Specify)…….
T14	Other (specify)	ED3	Staff	EX9	Other (specify)	O01	Specify	E13	Wheelchair (Specify) .....

CHAPTER SEVEN

STUDY LIMITATIONS

Chapter 7. Limitations of the current study

This research is not without its limitations. In terms of the interviews, although there were only four heads of rehabilitation teams working in two rehabilitation centres which provide the service for patients with ABI in Wales, UK, there was a risk of not collecting robust data from interviewing only this small number of heads of rehabilitation teams. One other concern is that there was a possibility that the rehabilitation service in hospitals which treat people with ABI in other parts of the United Kingdom might be different and feedback from the heads of rehabilitation teams working in those centres might add valuable information to the research.

Another possible limitation of this part of the study is the difficulty of the researcher avoiding bias in the analysis, since it was necessary for the analysis to be done by the main researcher who did the interviews to be able to analyse the information in appropriate depth (Patton, 2002).

Regarding the questionnaire sent to physiotherapists who treat patients with ABI in the United Kingdom, the researcher's plan was to achieve at least a 30 per cent response rate, as according to Hamilton (2003), this rate is an average rate if a survey is administered online. However, the total response rate of the questionnaire was only 23 per cent (Hamilton, 2003) which is lower than the acceptable response rate. Although the researcher believes that the response rate to the questionnaire was in fact higher than this, as it appears that some physiotherapists who were registered with PABIN were already registered with ACPIN and if the researcher could have excluded them from the list, then the response rate would have been higher. However, since the survey was conducted using Internet-based software, there is a possibility that participants were either concerned about privacy or the confidentiality of their responses, or not all physiotherapists had access to the internet, resulting in a lower response rate (Couper, 2000). However, in this study, the survey was sent to the physiotherapists' work email addresses which

are registered in the user database and the physiotherapists agreed to be contacted via this email address for research purposes, thus making this limitation of the study less likely. An additional limitation of this part of the study is the risk that some physiotherapists might feel they were not given permission by the administration of their service to answer the survey questions, as it involved describing the health service provided in their rehabilitation centres.

Due to the low response rate and the possibility that the perceptions of the physiotherapists who responded to this survey are specific to the rehabilitation centres that they work in and may differ from the opinions of staff working in other rehabilitation centres, caution is urged regarding external validity; and generalising the findings should be considered with caution as there is no evidence of an appropriate response rate.

Another possible limitation of the questionnaire is whether the information captured represents the interviewees' opinions, i.e. the respondents might not necessarily have been reporting the actual service provided to the patient. In addition, the use of closed questions in a questionnaire limits the respondents' number of choices. However, some of the questions in the questionnaire were designed to give the physiotherapists more space to add more details to answer the question. Additionally, it is understood that bias may be inherent in self-administered information (Couper, 2000).

It would also have been better if the researcher could have discussed the new developed treatment tool with expert physiotherapists who are working in clinical practice via a focus group so as to develop the latest version of the tool based on their feedback prior to the piloting process of the treatment recording tool. Although the researcher had the chance to develop a treatment recording tool based on the feedback collected on the validation process, a refining step via a focus-group study would have improved the treatment tool's acceptability and

reliability. Focus group discussions could also be used to validate the treatment recording tool further, and to compare different physiotherapists' practices, views and opinions of the tool.

Although full definitions of the terms used along with a training manual that includes instructions for completing the treatment recording tool were provided and explained to each physiotherapist who used the treatment recording tool, some physiotherapists reported the need for training on how to use the treatment recording tool before using it in practice, as this would have helped them to become more familiar with the tool. Training on how to use the tool is very important. One of the limitations of this study is that the researcher did not provide comprehensive training to all the physiotherapists before they used the treatment recording tool. Most other researchers who developed and tested a documentation method provided a good training programme for all physiotherapists before they used their tool (Gassaway et al., 2005).

A final possible limitation is that although the acceptability of the new treatment recording tool has been tested and the results show that the tool is highly acceptable, there is a chance that physiotherapists will not use the new treatment recording tool due to their familiarity with their usual documentation method.

CHAPTER EIGHT

CLINICAL IMPLICATION, RECOMMENDATIONS FOR FUTURE WORK AND CONCLUSIONS

Chapter 8. Clinical implications, recommendations for future work and conclusions

8.1. Clinical implications

The main outcome of this current study was the development of a new, valid, acceptable and reliable treatment recording tool. This tool will bring order and rigour to the description of the physiotherapy treatment activities provided for people with ABI in an inpatient setting. It will also help to characterise the many treatments, procedures and interventions used in physiotherapy, taking into account their multidimensionality with respect to content, purpose, intensity, duration, sequence, frequency and other characteristics of care provided. The new treatment recording tool was designed to improve patient care by facilitating accurate and appropriate communication between physiotherapists, and between physiotherapists and other specialists. It also has the potential to help other professionals to better understand physiotherapy practice and the role that physiotherapists play in the multidisciplinary rehabilitation process, and increase the service's effectiveness and efficiency, and improve the quality of interventions, by allowing appropriate evaluation.

The process mapping of the service provided by this study may help clinicians to gain a better in-depth understanding of the inpatient physiotherapy rehabilitation process for treating people with ABI in the United Kingdom and describe the physiotherapy rehabilitation process in an inpatient setting starting from the admission criteria to the assessment process, intervention and re-evaluation and discharge plan. Understanding and describing the rehabilitation process can help clinicians to search for opportunities for improvement by visualising how the whole patient rehabilitation service was working and identifying points of inefficiency, if there were any. It can support clinicians in accurately capturing the reality of the rehabilitation process and identifying strengths, weaknesses, variations and unnecessary steps in the service.

8.2. Recommendations for future work

8.2.1. **Issues related to methods and study designs**

In the developmental phase, this study used a wide range of data collection methods, including interviews, questionnaires and observational study. Within this context, the data and methods presented reveal two main issues that need to be addressed in future research. Firstly, in this study, the researcher interviewed only four heads of rehabilitation teams working with ABI in the only two ABI rehabilitation hospitals in Wales, UK. Future studies should consider collecting data from the heads of teams who work in different rehabilitation centres in the United Kingdom, though more robust data should be collected so that the findings can be generalised.

Secondly, when piloting the questionnaire, it was sent to 13 physiotherapists who treat people with ABI in the UK; there were 7 physiotherapists from Northwick Park Hospital in London to improve the questionnaire's validity and test its acceptability and 6 physiotherapists working in Rookwood hospital to evaluate the questionnaire's reliability. However, since this questionnaire was sent to 212 physiotherapists and some researchers suggested that the number of participants for piloting a survey should be at least 10% of the real population (Hertzog, 2008), recruiting more physiotherapists in the process of piloting the questionnaire could add rigour to the data-collection tool.

In future work, the researcher can conduct another study to improve the treatment recording tool by discussing it with a group of expert physiotherapists who work in clinical practice via a focus group before they start the process of piloting the treatment recording tool. This feedback from expert physiotherapists would add valuable information to the development of the treatment recording tool and improve its validity and reliability.

8.2.2. **Issues related to the treatment recording tool**

The treatment recording tool was designed to document full details of the physiotherapy treatment sessions. However, if a treatment session includes any assessment activities, the clinician will not have enough space to describe the assessment process and its findings. Therefore, in future, researchers can develop an assessment-recording tool to be integrated with the treatment recording tool to provide comprehensive details of treatment sessions.

This assessment tool will help researchers and clinicians to collect detailed information about a condition's severity, such as a patient's specific impairment, though they can relate the choice of intervention to the impairment.

8.2.3. **Conclusion**

The main aim of this study was to develop and evaluate a documentation method for use by physiotherapists who treat people with ABI in an inpatient rehabilitation setting, i.e. a new treatment recording tool. The new documentation tool has the ability to record comprehensive details of a treatment session using a very simple coding process in a very quick way. However, due to the limited studies available in the literature which provide specific details about physiotherapy processes throughout the course of rehabilitation (Jette et al., 2005, Putman and De Wit, 2009), it was necessary initially to describe the rehabilitation process provided to people with ABI in the UK via a mapping process.

To map the process of the physiotherapy service, the literature was comprehensively and critically reviewed to establish a theoretical basis for the rehabilitation service and explore all relevant components of the service so as to open up the black box of rehabilitation and identify and describe the physiotherapy practices provided to people with ABI (Craig et al., 2008). The researcher also collected comprehensive feedback from the heads of rehabilitation teams who

treat ABI in all rehabilitation services which treat patient with ABI in Wales, UK and physiotherapists who were working in different rehabilitation settings across the whole of the UK, using a wide range of data collection methods including interviews and questionnaires. Comprehensive maps of the service were created and are shown in the results chapter (see Figures 5-3, 5-4, 5-5, 5-6, 5-7and 5-8 in chapter 5 for more details). Process mapping the rehabilitation service provided for people with ABI helped to search for opportunities for improvement by visualising how the whole patient rehabilitation service was working and supported the researcher in accurately capturing the reality of the rehabilitation process.

Feedback from the heads of rehabilitation teams and physiotherapists showed that the rehabilitation pathway of a patient with ABI was divided into three main parts: pre-admission, the rehabilitation stage and the post-rehabilitation stage. The patient was going through many different processes during these stages, including the initial assessment to decide whether the patient met certain admissions criteria and was fit to be admitted to an inpatient rehabilitation service during the pre-admission stage. Once the patient had been admitted to an inpatient rehabilitation setting, he/she went through a comprehensive process of multidisciplinary assessment, goal-setting, intervention and re-assessment, and a discharge plan. The post-rehabilitation stage was not covered by this research as the researcher was focusing only on the inpatient rehabilitation process. The feedback from the heads of rehabilitation teams and physiotherapists also helped the researcher to obtain some information about the multidisciplinary physiotherapy documentation process, and its advantages and disadvantages, which have been used to achieve the research aim.

A treatment recording tool was built to develop the documentation method used by physiotherapists who treat ABI patients in an inpatient rehabilitation setting. The researcher used both information gathered from a literature review and the feedback from the heads of

rehabilitation teams and physiotherapists who were treating patients with ABI in an inpatient rehabilitation setting to build the new treatment recording tool.

The process of developing the new treatment recording tool went through many different stages, including gathering all the necessary information from both the literature and clinicians, considering all the reported advantages and disadvantages of the documentation methods currently used, as well as the policy, ethical and legal issues involved in physiotherapy documentation, building an original draft of the treatment recording tool, improving its validity, and finally testing its reliability and acceptability. The research process helped the researcher to improve the validity of the treatment recording tool and the results show that the newly-developed documentation method is both reliable and acceptable. Also, the feedback from physiotherapists about the treatment recording tool during the piloting process helped the researcher to create a more developed version of the treatment recording tool (see Figure 6-12 in chapter 6)

To evaluate the possibility of using the treatment-recording tool to describe the physiotherapy service, the researcher used the data collected using the new developed treatment-recording tool during the piloting process to describe the physiotherapy activities provided to people with ABI in an inpatient rehabilitation setting. The results showed that the treatment-recording tool was providing a sufficiently structured means to collect information about treatment sessions, including treatment tasks, treatment positions, interventions provided, adjuncts used and the treatment duration of each treatment task. The treatment packages (combinations of the physiotherapy interventions) were also investigated using a geometric coding process (Tyson et al., 2009). This method of descriptive analysis helped the researcher to identify the most frequent combinations of treatment activities or ‘treatment packages’.

In terms of evaluating how comprehensive the treatment-recording tool is in describing the physiotherapy rehabilitation service, the researcher compared the information extracted from the treatment recording tool which was completed by the physiotherapists, with the information written on the SOAP notes for the same patients which were completed by the same physiotherapists. This comparison helped the researcher to identify what information the physiotherapists were usually reporting in their notes but not including in the treatment recording tool. The results show that the treatment recording tool was recording more comprehensive and organised details about the physiotherapy treatment sessions compared to the SOAP notes.

Despite all the limitations of this study, the treatment-recording tool developed is able to offer a sufficiently structured method to collect information about treatment sessions, including treatment tasks, treatment positions, interventions provided, adjuncts used and the treatment duration of each treatment task. Using the treatment-recording tool in clinical practice will help to bring order and rigour to the description of the physiotherapy treatment activities provided for people with ABI in an inpatient setting. It will also help to characterise the many treatments, procedures and interventions used in physiotherapy, taking into account their multidimensionality with respect to the content, purpose, intensity, duration, sequence, frequency and other characteristics of care provided. Developing the inpatient documentation process has a potential to improve patient care by facilitating accurate and appropriate communication between physiotherapists, and between physiotherapists and other specialists, and thus help other professionals to better understand physiotherapy practice and the role that physiotherapists play in the multidisciplinary rehabilitation process.

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APPENDICES

APPENDIX ONE:

INVITATION LETTER,

INFORMATION SHEETS

AND

CONSENT FORMS

Appendix 1.1: INVITATION LETTER

(All recruited subjects)

A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service

You have been invited to take part in a study that aims to find out more about the physiotherapy rehabilitation practice and process. An information sheet is enclosed with this letter.

If you would like to discuss any aspect of this research without any obligation to take part, please call Abdulrahman Altowaojri on 02920687739 or send an email to altowaijria@cf.ac.uk

Yours sincerely
Abdulrahman Altowaijri

Appendix 1.2: **Information Sheet (Head of rehabilitation team)**

"A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service"

We would like to invite you to consider whether you would like to take part in a research study

Before deciding you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully and discuss it with others if you wish.

Part 1 of this information sheet tells you the purpose of this study and what will happen if you take part.
Part 2 gives you more detailed information about the conduct of the study.

Please ask us if there is anything that is not clear or if you would like more information.

PART 1

What is the reason for the study?

Physiotherapy plays an important role in the rehabilitation of Acquired brain injury (ABI) patients. The variability of physiotherapy treatment and the lack of standardised written documentation cause difficulties in evaluating its effectiveness. A system to identify and evaluate the physiotherapy practices and process in the treatment of ABI is needed. Such a system could help to improve the physiotherapy services given for these people, generate important additional knowledge and inform policy makers regarding the best rehabilitation service for people with ABI. This study aims to describe the physiotherapy services provided for ABI in-patients and build a model which will be used to evaluate different physiotherapy healthcare services. The research method will include the use of a questionnaire, interviews, clinical observation and clinical investigations at Cardiff and Vale University Health Board and Abertawe Bro Morgannwg University Health Board neuro-rehabilitation service, United Kingdom.

Why I have been chosen to take part in this study?

You have been invited to participate in the study as we are interviewing neurology consultants and head of rehabilitation teams who are working in an acquired brain injury in inpatient setting.

Do I have to take part?

No, it is up to you to decide. We will describe the study and go through this information sheet with you. We will then give the information sheet to you and ask you to sign a consent form to show you have agreed that you are willing to take part in the study. You are free to withdraw at any time, without giving any reason.

What will happen if I take part on this study?

A 30 minute meeting will be arranged with you to discuss all of the admission and discharge criteria of your rehabilitation centres. The method of setting goals and of documenting and monitoring the goals set will also be discussed. The interview procedure will be clearly explained to you before the interviewing process commences. The researcher will also send you a written description of the interview procedure prior to the interview. The interview

procedure and questions used in the interview have been developed using expert opinion from the School of HealthCare Studies, Cardiff University, Cardiff, UK. With your permission, the interviews will be audio recorded using an electronic digital audio recorder. The recorded conversation will be transcribed and stored electronically on a secure password protected computer (and not placed on a server or network) located in the School of Healthcare Studies (SOHCS), Cardiff University. The saved files will not have any data that can identify any study participant. Only the research team will access the saved data. All audio recorded data will be destroyed as soon as the study completed.

What are the possible benefits of taking part?

We do not expect any specific benefits for the individuals taking part, however, the information we gather from this study will help to improve the quality of physiotherapy treatment provided for acquired brain injury patients in the future.

Is there any risk associated with the study?

No risks are anticipated

What if there is a problem?

Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed; detailed information is given in part 2.

What happens when the research study stops?

As soon as the interview has been completed, your participation in the study will finish. After this time you will still be free to contact the researcher with any questions or queries you may have regarding the study.

Confidentiality

Will participation in this study be kept confidential?

Yes. We will follow ethical and legal practice and all information about you, will be handled in confidence. The details are included in Part 2.

If the information in Part 1 has interested you and you are considering participation, please read the additional information in Part 2 before making any decision.

PART 2

What will happen if I don't want to carry on with the study?

If you withdraw from the study, we will destroy all your identifiable information, but we will need to use the data collected up to your withdrawal. You are free to withdraw from the study at any time.

What if there is a problem?

It is unlikely that there will be a problem but if you are harmed by taking part in this research study, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the interview, the normal National Health Service and University complaints procedures will be available to you.

Confidentiality-

Will participation in this study be kept confidential?

All information which is collected about you and your rehabilitation centre during the course of the research will be kept strictly confidential, and any information about you and your rehabilitation centre which leaves the University will have all identifiable information removed so that they cannot be recognised.

What happens to the results of the research study?

The results of this study may be presented at conferences and published in scientific journals. If you would like, a summary of the results can be sent to you after completion of the study.

Who is organising the study?

The study is being organized by the Department of Physiotherapy, School of Healthcare Studies, Cardiff University. The study will be run by the main researcher Abdulrahman Altowaijri in collaboration with Dr Monica Busse, Professor Patricia Price and Dr Robert van Deursen.

Who has reviewed the study?

This study has been reviewed by the School of Healthcare Studies Ethical Committee, Cardiff University and approved on 29/04/2010. It has also been reviewed by the South East Research Ethics Committee on DD/MM/YY, and approved by the Research and Development office in Cardiff and Vale University Health Board on DD/MM/YY and the Research and Development office in Abertawe Bro Morgannwg University Health Board on DD/MM/YY

Contact for further information

If you would like to discuss any part of the project in greater detail then please do not hesitate to contact Abdulrahman Altowaijri at:

Department of Physiotherapy,
Ty Dewi Sant,
Cardiff University, Cardiff
CF14 4XN
Tel: 029 206 87739
Email: altowaijria@cardiff.ac.uk

Thank you for your time and consideration
Abdulrahman Altowaijri
MSc PGC (Physiotherapy)

Appendix 1.3: Information Sheet (Physiotherapist – Rookwood Hospital)

"A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service"

We would like to invite you to consider whether you would like to take part in a research study

Before deciding you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully and discuss it with others if you wish.

Part 1 of this information sheet tells you the purpose of this study and what will happen if you take part.
Part 2 gives you more detailed information about the conduct of the study.

Please ask us if there is anything that is not clear or if you would like more information.

PART 1

What is the reason for the study?

Physiotherapy plays an important role in the rehabilitation of Acquired brain injury (ABI) patients. The variability of physiotherapy treatment and the lack of standardised written documentation cause difficulties in evaluating its effectiveness. A system to identify and evaluate the physiotherapy practices and process in the treatment of ABI is needed. Such a system could also help to improve the rehabilitation services given for these people and generate important additional knowledge. This study aims to describe the physiotherapy rehabilitation services provided for ABI in-patients and build a model which will be used to evaluate different physiotherapy healthcare services. The research method will include the use of a questionnaire, interviews, clinical observation and clinical investigations at Cardiff and Vale University Health Board Neuro-rehabilitation service, United Kingdom. Evaluating the physiotherapy services provided to treat ABI patient in inpatient setting will help to inform policy makers regarding the best rehabilitation service for people with ABI and highlight important issues for further research.

Why I have been chosen to take part in this study?

You have been invited to participate in the study as we are observing a group of physiotherapists who are treating an acquired brain injury in inpatient setting.

Do I have to take part?

No, it is up to you to decide. We will describe the study and go through this information sheet with you. We will then give the information sheet to you and ask you to sign a consent form to show you have agreed that you are willing to take part in the study. You are free to withdraw at any time, without giving any reason.

What will happen if I take part on this study?

The study will not require any change to the original physiotherapy treatment plan that you are providing for your patients. The researcher will randomly select some of your patients and video record 4 different physiotherapy treatment sessions that you are providing for each patient. A digital video camera will be used to record these sessions from many different directions to make sure that the video recorded shows all aspects of the treatment provided to

your patient. The recorded video will be stored electronically on a secure password protected computer (and not placed on a server or network) located in the School of Healthcare Studies (SOHCS), Cardiff University. The saved files will not have any data that can identify any study participant. Patient's and therapist's face will be shaded so they cannot be identified in the recorded video. The research team only will access the saved data. All video records will be destroyed as soon as the study is completed.

You will then be asked to complete a form that describes the treatment that you have just provided for your patient. You might also be asked to rate the accuracy of the form in term of describing the treatment session. The researcher will then record all of the rehabilitation process and practice for this patient, which will include the admission criteria, assessment methods, goal settings and documentation method as well as the discharge plan. This information will be then used to evaluate the rehabilitation services provided for your patient.

What are the possible benefits of taking part?

We do not expect any specific benefits for the individuals taking part, however, the information we gather from this study will help to improve the quality of physiotherapy treatment provided for acquired brain injury patients in the future.

Is there any risk associated with the study?

The study will not make any change to the original treatment plan that you are providing to your patient. The video camera will be placed in a location that will not disturb you or the patient during the treatment. Before and during the study you will be given the opportunity to discuss any concerns with the researcher in private.

What if there is a problem?

Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed; detailed information is given in part 2.

What happens when the research study stops?

As soon as the last video recording has been recorded and all information about the selected patient's rehabilitation process has been gathered, your participation in the study will finish.

After this time you will still be free to contact the researcher with any questions or queries you may have regarding the study.

Confidentiality

Will participation in this study be kept confidential?

Yes. We will follow ethical and legal practice and all information about you and your patient, will be handled in confidence. The details are included in Part 2.

If the information in Part 1 has interested you and you are considering participation, please read the additional information in Part 2 before making any decision.

PART 2

What will happen if new information becomes available?

Sometimes we get new information about this topic. If this happens, we will tell you and discuss whether we should continue with this study or not. If you decide to continue in the study you may be asked to sign an updated consent form.

What will happen if I don't want to carry on with the study?

If you withdraw from the study, we will destroy all your patient's identifiable information, but we will need to use the data collected up to your withdrawal. You are free to withdraw from the study at any time.

What if there is a problem?

It is unlikely that there will be a problem but if you are harmed by taking part in this research study, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the study, the normal National Health Service and University complaints procedures will be available to you.

Confidentiality-

Will participation in this study be kept confidential?

All information which is collected about you and your patient during the course of the research will be kept strictly confidential, and any information about you and your patient which leaves the University will have yours and your patient names and all identifiable information removed so that they cannot be recognised.

What happens to the results of the research study?

The results of this study may be presented at conferences and published in scientific journals. If you would like, a summary of the results can be sent to you after completion of the study.

Who is organising the study?

The study is being organized by the Department of Physiotherapy, School of Healthcare Studies, Cardiff University. The study will be run by the main researcher Abdulrahman

Altowaijri in collaboration with Dr Monica Busse, Professor Patricia Price and Dr Robert van Deursen.

Who has reviewed the study?

This study has been reviewed by the School of Healthcare Studies Ethical Committee on DD/MM/YY. It is also been reviewed by the Cardiff and Vale University Health Board Research and Development Committee on DD/MM/YY

Contact for further information

If you would like to discuss any part of the project in greater detail then please do not hesitate to contact Abdulrahman Altowaijri at:

Department of Physiotherapy,
Ty Dewi Sant,
Cardiff University, Cardiff
CF14 4XN
Tel: 029 206 87739
Email: altowaijria@cardiff.ac.uk

Thank you for your time and consideration
Abdulrahman Altowaijri
MSc PGC (Physiotherapy)

Appendix 1.4: Information Sheet (Physiotherapist- Northwick Park Hospital)

"A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service"

We would like to invite you to consider whether you would like to take part in a research study.

Before deciding you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully and discuss it with others if you wish.

Part 1 of this information sheet tells you the purpose of this study and what will happen if you take part.
Part 2 gives you more detailed information about the conduct of the study.

Please ask us if there is anything that is not clear or if you would like more information.

PART 1

What is the reason for the study?

Physiotherapy plays an important role in the rehabilitation of Acquired brain injury (ABI) patients. The variability of physiotherapy treatment and the lack of standardised written documentation cause difficulties in evaluating its effectiveness. A system to identify and evaluate the physiotherapy practices and process in the treatment of ABI is needed. Such a system could help to improve the physiotherapy services given for these people, generate important additional knowledge and inform policy makers regarding the best rehabilitation service for people with ABI. This study aims to describe the physiotherapy services provided for ABI in-patients and build a model which will be used to evaluate different physiotherapy healthcare services. The research method will include the use of a questionnaire, interviews, clinical observation and clinical investigations at Cardiff and Vale University Health Board and Abertawe Bro Morgannwg University Health Board neuro-rehabilitation service, United Kingdom.

Why I have been chosen to take part in this study?

You have been invited to participate in the study as we are interviewing physiotherapists who are working in an acquired brain injury in inpatient setting. The interview aims to test the validity of a questionnaire that we are going to use to identify the existing rehabilitation processes and practices in UK acquired brain injury rehabilitation centres.

Do I have to take part?

No, it is up to you to decide. We will describe the study and go through this information sheet with you. We will then give the information sheet to you and ask you to sign a consent form to show you have agreed that you are willing to take part in the study. You are free to withdraw at any time, without giving any reason.

What will happen if I take part on this study?

A 20 minute meeting will be arranged with you after you have completed a questionnaire sent to you prior to the interview. The interview aims to ascertain whether your responses given in the questionnaire are concordant. Questions used in the questionnaire will be paraphrased for use in the interview. You will be then asked to write your comments on and opinions of the

questionnaire on a separate sheet and rate its acceptability using a 100mm horizontal visual analogue scale (VAS). Each section of the questionnaire will have a separate scale. The lowest rating (score 0) will correspond to "the questionnaire is not acceptable" and the highest rating (score 100) will correspond to "the questionnaire is very acceptable".

What are the possible benefits of taking part?

We do not expect any specific benefits for the individuals taking part, however, the information we gather from this study will help to improve the quality of physiotherapy treatment provided for acquired brain injury patients in the future.

Is there any risk associated with the study?

No risks are anticipated

What if there is a problem?

Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed; detailed information is given in part 2.

What happens when the research study stops?

As soon as the interview has been completed, your participation in the study will finish. After this time you will still be free to contact the researcher with any questions or queries you may have regarding the study.

Confidentiality

Will participation in this study be kept confidential?

Yes. We will follow ethical and legal practice and all information about you, will be handled in confidence. The details are included in Part 2.

If the information in Part 1 has interested you and you are considering participation, please read the additional information in Part 2 before making any decision.

PART 2

What will happen if I don't want to carry on with the study?

If you withdraw from the study, we will destroy all your identifiable information, but we would like to use the data collected up to your withdrawal. You are free to withdraw from the study at any time.

What if there is a problem?

It is unlikely that there will be a problem but if you are harmed by taking part in this research study, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the interview, the normal National Health Service and University complaints procedures will be available to you.

Confidentiality-

Will participation in this study be kept confidential?

All information which is collected about you and your rehabilitation centre during the course of the research will be kept strictly confidential, and any information about you and your rehabilitation centre which leaves the University will have all identifiable information removed so that they cannot be recognised.

What happens to the results of the research study?

The results of this study may be presented at conferences and published in scientific journals. If you would like, a summary of the results can be sent to you after completion of the study.

Who is organising the study?

The study is being organized by the Department of Physiotherapy, School of Healthcare Studies, Cardiff University. The study will be run by the main researcher Abdulrahman Altowaijri in collaboration with Dr Monica Busse, Professor Patricia Price and Dr Robert van Deursen.

Who has reviewed the study?

This study has been reviewed by the following committees:

School of Healthcare Studies Ethical Committee, Cardiff University (approved on 29/04/2010).
South East Wales Research Ethics Committee (approved on 29/09/2010).
Research and Development office in Abertawe Bro Morgannwg University Health Board (approved on 09/09/2010
Cardiff & Vale University Health Board Research and Development office (approved on DD/MM/YY).

Contact for further information

If you would like to discuss any part of the project in greater detail then please do not hesitate to contact Abdulrahman Altowaijri at:

Department of Physiotherapy,
Ty Dewi Sant,
Cardiff University, Cardiff
CF14 4XN
Tel: 029 206 87739
Email: altowaijria@cardiff.ac.uk

Thank you for your time and consideration
Abdulrahman Altowaijri
MSc PGC (Physiotherapy)

Appendix 1.5: Information Sheet (Patient with acquired brain injury)

"A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service"

We would like to invite you to consider whether you would like to take part in a research study

Before deciding you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully and discuss it with others if you wish.

Part 1 of this information sheet tells you the purpose of this study and what will happen if you take part.
Part 2 gives you more detailed information about the conduct of the study.

Please ask us if there is anything that is not clear or if you would like more information.

PART 1

What is the reason for the study?

Acquired brain injury (ABI) is a brain lesion caused by trauma, tumours, bleeding or brain infections. It causes a loss of functional ability. Physiotherapy plays an important role in the rehabilitation of ABI patients. The variability of the physiotherapy treatment and the lack of standardised written documentation cause difficulties in evaluating its effectiveness. A system to identify and evaluate the physiotherapy practices and process in the treatment of ABI is needed. Such a system could also help to improve the rehabilitation services given for these people and generate important additional knowledge. This study aims to develop a method to evaluate the physiotherapy rehabilitation for people with ABI. The method will be developed using a questionnaire, interviews, clinical observation and clinical investigations at Cardiff and Vale University Health Board Neuro-rehabilitation service, United Kingdom. Evaluating the physiotherapy services provided to treat ABI patient in an inpatient setting will help to inform policy makers regarding the best rehabilitation service for people with ABI and highlight important issues for further research. This study also aims to describe the physiotherapy rehabilitation services provided for ABI in inpatient rehabilitation service and build a model which will be used to evaluate different physiotherapy healthcare services

Why I have been chosen to take part in this study?

You have been invited to participate in the study as we are recruiting a group of individuals who have an acquired brain injury and are receiving their physiotherapy treatment in one of the United Kingdom hospitals

Do I have to take part?

No, it is up to you to decide. We will describe the study and go through this information sheet with you. We will then give the information sheet to you and ask you to sign a consent form to show you have agreed that you are willing to take part in the study. You are free to withdraw at any time, without giving any reason. This would not affect the standard of care that you are receiving.

What will happen if I take part on this study?

The study will not require any change to your original physiotherapy treatment plan. The researcher will randomly select 4 different sessions of your physiotherapy treatment sittings and video recording them. A digital video camera will be used to record these sessions from many different directions to make sure that the video recording shows all treatment provided to you. A digital video camera will be used to record these sessions from many different directions to make sure that the video recorded shows all aspects of the treatment provided to your patient. The recorded video will be stored electronically on a secure password protected computer (and not placed on a server or network) located in the School of Healthcare Studies (SOHCS), Cardiff University. The saved files will not have any data that can identify any study participant. Your face will be shaded so you cannot be identified in the recorded video. Only the research team will access the saved data. All video records will be destroyed as soon as the study is completed. The researcher will then record all of your rehabilitation process and practice which will include all of the admission criteria, assessment methods, goal settings and documentation method as well as the discharge plan. This information will be then used to evaluate the rehabilitation services provided for you.

What are the possible benefits of taking part?

We do not expect any specific benefits for the individuals taking part, however, the information we gather from this study will help to improve the quality of physiotherapy treatment provided for acquired brain injury patients in the future.

Is there any risk associated with the study?

The study will not make any change to the original treatment plan that is already provided to you. The video camera will be placed in a location that will not disturb you or the physiotherapist during the treatment. Before and during the study you will be given the opportunity to discuss any concerns with the researcher in private. Your dignity will be respected at all times.

What if there is a problem?

Any complaint about the way you have been dealt with during the study or any possible harm you might suffer will be addressed; detailed information is given in part 2.

What happens when the research study stops?

As soon as the last video recording has been recorded and all information about your rehabilitation process has been gathered, your participation in the study will finish. After this time you will still be free to contact the researcher with any questions or queries you may have regarding the study.

Confidentiality

Will participation in this study be kept confidential?

Yes. We will follow ethical and legal practice and all information about you, will be handled in confidence. The details are included in Part 2.

If the information in Part 1 has interested you and you are considering participation, please read the additional information in Part 2 before making any decision.

PART 2

What will happen if new information becomes available?

Sometimes we get new information that may be relevant for this topic. If this happens, we will tell you and discuss whether we should continue with this study or not. If you decide not to carry on, your clinical care will not be affected in any way. If you decide to continue in the study you may be asked to sign an updated consent form.

What will happen if I don't want to carry on with the study?

If you withdraw from the study, we will destroy all your identifiable information, but we will need to use the data collected up to your withdrawal. You are free to withdraw from the study at any time and this will not affect your continuing medical care.

What if there is a problem?

It is unlikely that there will be a problem but if you are harmed by taking part in this research study, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the study, the normal National Health Service and University complaints procedures will be available to you.

If you lose the capacity to consent during the study, your carer will be asked for assent for you to continue in the study.

Confidentiality-

Will participation in this study be kept confidential?

All information which is collected about you during the course of the research will be kept strictly confidential, and any information about you which leaves the University will have your name and all identifiable information removed so that they cannot be recognised.

Therapy team notification

We do feel that it is important for all therapists from other specialities who are involved in your rehabilitation programme to be informed of your participation. We would like to let them know if you agree to participate in the study and we will supply them with a copy of

this information sheet if it has been requested. However, please let us know if you would prefer that the other therapists are not informed.

What happens to the results of the research study?

The results of this study may be presented at conferences and published in scientific journals. If you would like, a summary of the results can be sent to you after completion of the study.

Who is organising the study?

The study is being organized by the Department of Physiotherapy, School of Healthcare Studies, Cardiff University. The study will be run by the main researcher Abdulrahman Altowaijri in collaboration with Dr Monica Busse, Professor Patricia Price and Dr Robert van Deursen.

Who has reviewed the study?

All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee to protect your safety, rights, wellbeing and dignity. This study has been reviewed by the School of Healthcare Studies Ethical Committee on DD/MM/YY. It is also been reviewed by the Cardiff and Vale University Health Board Research and Development Committee on DD/MM/YY

Contact for further information

If you would like to discuss any part of the project in greater detail then please do not hesitate to contact Abdulrahman Altowaijri at:

Department of Physiotherapy,
Ty Dewi Sant,
Cardiff University, Cardiff
CF14 4XN
Tel: 029 206 87739
Email: altowaijria@cardiff.ac.uk

Thank you for your time and consideration
Abdulrahman Altowaijri MSc PGC (Physiotherapy)

Appendix 1.6: Information Sheet (Patients who are unable to give consent)

"A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service"

We would like to invite you, as nominated consultee, to consider whether the person you care for (the participant) would like to take part in a research study.

Before deciding you need to understand why the research is being done and what it would involve for you and the participant. Please take the time to read the following information carefully and discuss it with others if you wish.

Part 1 of this information sheet tells you the purpose of this study and what will happen if the participant takes part. Part 2 gives you more detailed information about the conduct of the study.

Please ask us if there is anything that is not clear or if you would like more information.

PART 1

What is the reason for the study?

Acquired brain injury (ABI) is brain lesions caused by trauma, tumours, bleeding or brain infections. It causes a loss of functional ability. Physiotherapy plays an important role in the rehabilitation of ABI patients. The variability of the physiotherapy treatment and the lack of standardised written documentation cause difficulties in evaluating its effectiveness. A system to identify and evaluate the physiotherapy practices and process in the treatment of ABI is needed. Such a system could also help to improve the rehabilitation services given for these people and generate important additional knowledge. This study aims to develop a method to evaluate the physiotherapy rehabilitation for people with ABI. The method will be developed using a questionnaire, interviews, clinical observation and clinical investigations at Cardiff and Vale University Health Board Neuro-rehabilitation service, United Kingdom. Evaluating the physiotherapy services provided to treat ABI patient in inpatient setting will help to inform policy makers regarding the best rehabilitation service for people with ABI and highlight important issues for further research. This study also aims to describe the physiotherapy rehabilitation services provided for ABI in inpatient rehabilitation service and build a model which will be used to evaluate different physiotherapy healthcare services

Why was this person chosen to take part in this study?

The person that you are a nominated consultee for has been invited to participate in the study as we are recruiting a group of individuals who have an acquired brain injury and are receiving their physiotherapy treatment in one of the United Kingdom hospitals

Does the person have to take part?

No, it is up to you to decide. We will describe the study and go through this information sheet with you. We will then give the information sheet to you. We will then ask you to sign a consent form to show you have agreed that the person you care for can take part in the study. You are free to withdraw the participant at any time, without giving any reason. This would not affect the standard of care that he/she is receiving.

What will happen if the person takes part?

The study will not require any change to the original physiotherapy treatment plan. The researcher will randomly select 4 different sessions of his/her physiotherapy treatment

sittings and video recording them. A digital video camera will be used to record these sessions from many different directions to make sure that the video recording shows all aspects of the treatment provided to the participants. A digital video camera will be used to record these sessions from many different directions to make sure that the video recorded shows all aspects of the treatment provided to your patient. The recorded video will be stored electronically on a secure password protected computer (and not placed on a server or network) located in the School of Healthcare Studies (SOHCS), Cardiff University. The saved files will not have any data that can identify any study participant. Patient's face will be shaded so the patient cannot be identified in the recorded video. Only the research team will access the saved data. All video records will be destroyed as soon as the study is completed.

The researcher will then record all of the rehabilitation process and practice which will include all of the admission criteria, assessment methods, goal settings and documentation method as well as the discharge plan. This information will be then used to evaluate the rehabilitation services provided for the participant.

What are the possible benefits of taking part?

We do not expect any specific benefits for the individuals taking part, however, the information we gather from this study will help to improve the quality of physiotherapy treatment provided for acquired brain injury patients in the future.

Is there any risk associated with the study?

The study will not make any change to the original treatment plan that is already provided to the participant. The video camera will be placed in a location that will not disturb the participant or the therapist during the treatment. Before and during the study you will be given the opportunity to discuss any concerns with the researcher in private. Your dignity will be respected at all times.

What if there is a problem?

Any complaint about the way you or the participant have been dealt with during the study or any possible harm you or the participant might suffer will be addressed. The detailed information is given in part 2.

What happens when the research study stops?

As soon as the last video recording has been recorded and all information about the participant's rehabilitation process has been gathered, his/her participation in the study will finish. After this time you will still be free to contact the researcher with any questions or queries you may have regarding the study.

Confidentiality

Will participation in this study be kept confidential?

Yes. We will follow ethical and legal practice and all information about participant, will be handled in confidence. The details are included in Part 2.

If the information in Part 1 has interested you and you are considering participation, please read the additional information in Part 2 before making any decision.

PART 2

What will happen if new information becomes available?

Sometimes we get new information that may be relevant for this topic. If this happens, we will tell you and discuss whether we should continue with this study or not. If you decide not to carry on, the clinical care of the participant will not be affected in any way. If you decide to continue in the study you may be asked to sign an updated consent form.

What will happen if I don't want the participant to carry on with the study?

If you withdraw the participant from the study, we will destroy all his/her identifiable information, but we will need to use the data collected up to his/her withdrawal. You are free to withdraw the participant from the study at any time and this will not affect his/her continuing medical care.

What if there is a problem?

It is unlikely that there will be a problem but if the participant is harmed by taking part in this research study, there are no special compensation arrangements. If he/she is harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, if you wish to complain, or have any concerns about any aspect of the way he/she has been approached or treated during the study, the normal National Health Service and University complaints procedures will be available to you.

Confidentiality-

Will participation in this study be kept confidential?

All information which is collected about the participant during the course of the research will be kept strictly confidential, and any information which leaves the University will have his/her name and all identifiable information removed so that they cannot be recognised.

Therapy team notification

We do feel that it is important for all therapists from other specialities who are involved in the participant rehabilitation programme to be informed of his/her participation. We would like to let them know if you agree to the participation in the study and we will supply them with a copy of this information sheet if it has been requested. However, please let us know if you would prefer that the other therapists are not informed.

What happens to the results of the research study?

The results of this study may be presented at conferences and published in scientific journals. If you would like, a summary of the results can be sent to you after completion of the study.

Who is organising the study?

The study is being organized by the Department of Physiotherapy, School of Healthcare Studies, Cardiff University. The study will be run by the main researcher Abdulrahman Altowaijri in collaboration with Dr Monica Busse, Professor Patricia Price and Dr Robert van Deursen.

Who has reviewed the study?

All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee to protect the participant's safety, rights, wellbeing and dignity. This study has been reviewed by the School of Healthcare Studies Ethical Committee on DD/MM/YY. It is also been reviewed by the Cardiff and Vale University Health Board Research and Development Committee on DD/MM/YY

Contact for further information

If you would like to discuss any part of the project in greater detail then please do not hesitate to contact Abdulrahman Altowaijri at:

Department of Physiotherapy,
Ty Dewi Sant,
Cardiff University, Cardiff
CF14 4XN
Tel: 029 206 87739
Email: altowaijria@cardiff.ac.uk

Thank you for your time and consideration
Abdulrahman Altowaijri
MSc PGC (Physiotherapy)

Appendix 1.7: Consent Form (Head of rehabilitation team)

Title of study: A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service

Name of Researcher: Abdulrahman Altowaijri

	Please Initial Box
I confirm that I have read and understood the information sheet, version 3 dated 01.11.2010 for the above study and have had the opportunity to consider the information, ask questions and to have had these questions answered satisfactorily.	☐
I understand that I will receive no compensation for my consent to participate in this study	☐
I understand that I am free to withdraw at any time without giving any reason.	☐
I am willing for the interview to be audio recorded and I understand that the audio recording will be used for research and educational purposes only	☐
I understand that the audio recorded will be used anonymously.	☐
I understand that all information obtained including the audio recording will remain the property of Cardiff University	☐
I understand that all information about me will be kept in a confidential way	☐
I understand that use of the recordings may include, but not necessarily be limited to, the following: - A direct quote will be used for research purposes including the final research report, presentations and other academic publications	☐
I agree to take part in this study.	☐

Name of interviewee _____ Date _____

Signature _____

Name of Witness (Researcher) _____ Date _____

Signature _____

When completed, 1 for interviewee, 1 for researcher site file

Appendix 1.8: Consent Form (Physiotherapist – Rookwood Hospital)

Title of study: A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service

Please Initial Box

I confirm that I have read and understood the information sheet, version 3 dated 01.11.2010 for the above study and have had the opportunity to consider the information, ask questions and to have had these questions answered satisfactorily.	☐
I understand that I will receive no compensation for my consent to participate in this study	☐
I understand that I am free to withdraw at any time without giving any reason.	☐
I am willing for a video recording of the treatment session provided to my patient to be taken and used for research and educational purposes only	☐
I understand that the video recorded will be used anonymously.	☐
I am willing for clinical information about my patient, stored in the medical file or any electronic database, to be used within this study.	☐
I understand that all material obtained including the video recording will remain the property of Cardiff University and it will be used for research and educational purposes only	☐
I understand that all information about me and my patient will be kept in a confidential way and destroyed once the study is completed.	☐
I agree for the video recordings obtained during this study to be provided for my physiotherapy department for the purposes of internal audit and training	☐
I agree to take part in this study.	☐

Name of physiotherapist _____ Date _____

Signature _____

Name of Witness (Researcher) _____ Date _____

Signature _____

When completed, 1 for physiotherapist, 1 for researcher site file

Appendix 1.9: Consent Form (Physiotherapists- Northwick Park Hospital)

Title of study: A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service

Name of Researcher: Abdulrahman Altowaijri

	Please Initial Box
I confirm that I have read and understood the information sheet, version 2 dated 01.11.2010 for the above study and have had the opportunity to consider the information, ask questions and to have had these questions answered satisfactorily.	☐
I understand that I will receive no compensation for my consent to participate in this study	☐
I understand that I am free to withdraw at any time without giving any reason.	☐
I am willing for the interview to be audio recorded and I understand that the audio recording will be used for research and educational purposes only	☐
I understand that the audio recording will be used anonymously.	☐
I understand that all information obtained including the audio recording will remain the property of Cardiff University	☐
I agree to take part in this study.	☐

Name of interviewee _____ Date _____

Signature _____

Name of Witness (Researcher) _____ Date _____

Signature _____

When completed, 1 for interviewee, 1 for researcher site file

Appendix 1.10: Consent Form (Patient with acquired brain injury)

Title of study: A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service

Name of Researcher: Abdulrahman Altowaijri

	Please Initial Box
I confirm that I have read and understood the information sheet, version 3 dated 01.11.2010 for the above study and have had the opportunity to consider the information, ask questions and to have had these questions answered satisfactorily.	☐
I understand that I will receive no compensation for my consent to participate in this study	☐
I understand that I am free to withdraw at any time without giving any reason and my decision will not affect my medical care or legal rights in any way.	☐
I am willing for a video recording of my treatment session to be taken and used for research and educational purposes only	☐
I understand that the video recorded will be used anonymously.	☐
I am willing for clinical information about me, stored in the medical file or any electronic database, to be used within this study.	☐
I understand that all material obtained including the video recording will remain the property of Cardiff University and it will be used for research and educational purposes only	☐
I understand that all information about me will be kept in a confidential way and destroyed once the study is completed.	☐
I am willing for other physiotherapists in the department to be informed of my participation in this study	☐
I agree to take part in this study.	☐

Name of subject _____ Date _____

Signature _____

Name of Witness (Researcher) _____ Date _____

Signature _____

When completed, 1 for patient, 1 for researcher site file

Appendix 1.11: Consent Form (Patients who is unable to give consent)

Title of study: A comprehensive analysis of physiotherapy practice and process for acquired brain injury in inpatient rehabilitation service

Name of Researcher: Abdulrahman Altowaijri

	Please Initial
I confirm that I have read and understood the information sheet, version 3 dated 01.11.2010 for the above study and have had the opportunity to consider the information, ask questions and to have had these questions answered satisfactorily on behalf of the person that I care for (the participants)	☐
I understand that I and the person that I care for, will receive no compensation for our consent to participate in this study	☐
I understand that I am free to withdraw the participant that I care for at any time without giving any reason and my decision will not affect his/her medical care or legal rights in any way	☐
I am willing for the treatment session of the participant that I care for to be video recorded and this video recording will be used for research and educational purposes only	☐
I understand that the video recorded will be used anonymously.	☐
I am willing for clinical information about the participant that I care for, which has been stored in the medical file or any electronic database to be used within this study.	☐
I understand that all material obtained including the video recording will remain the property of Cardiff University and it will be used for research and educational purposes only	☐
I understand that all information about the participant that I care for will be kept in a confidential way and destroyed once the study is completed.	☐
I am willing for other physiotherapists in the department to be informed of the patient's participation in this study	☐
I agree that the person I am a nominated consultee for, to take part in this study.	☐

Name of subject _____ Date _____

Name of nominated consultee _____

Signature _____

Name of Witness (Researcher) _____ Date _____

Signature _____

When completed, 1 for patient, 1 for researcher site file

Box

APPENDIX TWO

RESEARCH GOVERNANCE APPROVALS

Appendix 2.1: School of Healthcare Studies Ethical Committee (Cardiff University) approval

School of Healthcare Studies
Department of Administration
Research Administrator Liz Harmer BSc(Hons)
Ysgol Astudiaethau Gofal Iechyd
Adran Weinyddu
Gweinyddwr Ymchwil Liz Harmer BSc(Hons)

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

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E-mail *E-bost* HarmerL@cf.ac.uk
Prifysgol Caerdydd
Ysgol Astudiaethau Gofal Iechyd
Ail Llawr Tŷ Aberteifi
Mynydd Bychan
Caerdydd CF14 4XN

Mr Adbulrahman Altowaijri
PhD Student
SOHCS

30 April 2010

Dear Mr Altowaijri

A comprehensive analysis of the physiotherapy rehabilitation process and practice for adult acquired brain injury

I am writing to inform you that, at its meeting of 29 April 2010, the School's the Research Ethics Committee has **approved** the above research proposal.

However the Committee has asked that the following comments be passed onto you;

- You mention ACPIN in the lay summary, try to avoid using acronyms in lay summaries
- The research question only really covers the first aim
- Use the term Neurology Consultant not neuro
- For reliability study will you not need 3 physiotherapists to review?
- Fim & Fam training mentioned in costs section but not mentioned in previous sections so ethics will want to know why
- In the questionnaire for physiotherapists why do you want to know about their knowledge of what body parts are frequently affected how is this relevant to your study?

Please note that if there are any major amendments to the project you will be required to submit a revised proposal form. You are advised to contact me if this situation arises. In addition, in line with the University requirements, the project will be monitored on an annual basis by the sub-Committee and an annual monitoring form will be despatched to you in approximately 11 months time. If the project is completed before this time you should contact me to obtain a form for completion.

Finally, the sub-Committee has asked me to confirm that you will require approval from the appropriate Trust R&D offices, and from the NHS Research Ethics Service.

Please do not hesitate to contact me if you have any questions.

Yours sincerely

Miss Liz Harmer

Cc Monica Busse- Supervisor
Robert van Deursen – Supervisor
Patricia Price - Supervisor

Appendix 2.2: South-East Wales Research Ethical Committee approval

GIG CYMRU NHS WALES
Canolfan Gwasanaethau Busnes
Business Services Centre

South East Wales Research Ethics Committee Panel B
Telephone: 02920 376823
Facsimile: 02920 376835
Email: Carl.phillips@wales.nhs.uk

Dr Monica Busse
Senior Lecturer - Physiotherapy
Cardiff University
Room 2F08, Cardigan House
Heath Park Campus, Cardiff
CF14 4XN

29 September 2010

Dear Dr Busse

Study Title:	**A comprehensive analysis of the physiotherapy process and practice for people with acquired brain injury**
REC reference number:	**10/WSE02/55**
Protocol number:	**SPON838-10**

Thank you for your letter of the 23 September 2010, responding to the Committee's request for further information on the above research, and for submitting revised documentation.

The further information has been considered on behalf of the Committee by the Alternate Vice-Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation [as revised], subject to the conditions specified below.

Mental Capacity Act 2005

I confirm that the committee has approved this research project for the purposes of the Mental Capacity Act 2005. The committee is satisfied that the requirements of section 31 of the Act will be met in relation to research carried out as part of this project on, or in relation to, a person who lacks capacity to consent to taking part in the project.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

- Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.
- For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.
- Where the only involvement of the NHS organisation is as a Participant Identification Centre (PIC), management permission for research is not required but the R&D office should be notified of the study and agree to the organisation's involvement. Guidance on procedures for PICs is available in IRAS. Further advice should be sought from the R&D office where necessary.
- Sponsors are not required to notify the Committee of approvals from host organisations.
- It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).
- Your attention is drawn to the paragraph in all four *Information Sheets* headed *'Who has reviewed the study'*. In each case the paragraph is incomplete with dates shown as DD/MM/YY. In addition to which one of the paragraphs, the one in the *Information Sheet (Clinical Senior Staff)*, makes reference to ethical review by the South East Wales REC, whilst the other three do not.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

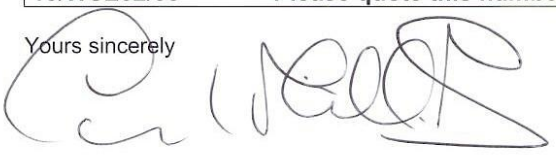
Document	Version	Date
Investigator CV	M Altowaijri	12 August 2010
Investigator CV	M Busse	12 August 2010
Investigator CV	R van Deursen	20 October 2009
Protocol	1	15 July 2010
'Letter for medical records'	1	10 August 2010
REC application	IRAS 3.0	12 August 2010
Covering Letter	M Busse	10 August 2010
Letter from Sponsor	Cardiff University	11 August 2010
Interview Schedules/Topic Guides	1	03 August 2010
Questionnaire	1	03 August 2010
Letter of invitation to participant	1	16 March 2010
Participant Information Sheet: Physiotherapist - Northwick Park Hospital	1	10 August 2010
Participant Information Sheet: Clinical Senior Staff	2	23 September 2010
Participant Consent Form: Participants unable to give consent	2	23 September 2010
Response to Request for Further Information		23 September 2010
Participant Information Sheet: Physiotherapist	2	23 September 2010
Participant Information Sheet: Patient with acquired brain injury	2	23 September 2010
Participant Information Sheet: Participants unable to give consent	2	23 September 2010
Participant Consent Form: Physiotherapist - Northwick Park Hospital	1	10 August 2010
Participant Consent Form: Physiotherapist	1	16 March 2010
Participant Consent Form: Patient with acquired brain injury	2	23 September 2010
Evidence of insurance or indemnity	Zurich Municipal	27 July 2010

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

10/WSE02/55 Please quote this number on all correspondence

Yours sincerely



Mrs S Warrell
Alternate Vice-Chair,
Panel B, South East Wales Research Ethics Committees

Appendix 2.3: Abertawe Bro Morgannwg University Health Board; Research and Development office (Swansea) approval

Research & Development Department NHS

Please reply to: Research & Development Department
Clinical Research Unit
Abertawe Bro Morgannwg University
Health Board
Morriston Hospital
SWANSEA
SA6 6NL

Telephone: 01792 704056
Fax:
E-mail: jemma.hughes@wales.nhs.uk

Dr Monica Busse,
Senior Lecturer - Physiotherapy
School of Healthcare Studies
Department of Physiotherapy
Cardiff University
Heath Park, CARDIFF
CF14 4XN

09 September 2010

Dear Dr Busse,

ID: S10PAMS971 **A comprehensive analysis of the physiotherapy process and practice for people with acquired brain injury**

I am pleased to inform you that the above research study, which you recently submitted for review, has been approved by Abertawe Bro Morgannwg University Health Board.

Approval has been granted conditionaly upon receiving a favourable ethical opinion. Please send a copy of your ethics approval letter(when received) to the R&D Department.

ABMU Health Board is Sponsor for this study, as required under the Research Governance Framework.

As a requirement of the Research Governance Framework, all research studies registered as active within ABM University Health Board will be subject to a randomised audit procedure to ensure appropriate standards of Research Governance (RG) and Good Clinical Practice (GCP) are being applied throughout the conduct of the research. Research Active Personnel must therefore ensure they familiarise themselves with the standards of RG and GCP. Details of GCP training are available from the R&D Office.

Researchers employed by ABM University Health Board, including those holding Honorary Contract status are indemnified against actions for negligent harm via standard arrangements with Welsh Risk Pool (WRP). Provision for 'no-fault' compensation is limited under the scheme and is only available on an ex gratia, discretionary basis.

ABM University Health Board reserves the right to suspend approval of any research study where deviation from appropriate RG & GCP standards is uncovered.

Please ensure that any changes made to the study are submitted to the R&D Department for review and approval, including:

- Notification of Amendment (copy of all documentation sent to Ethics is also required by R&D)
- Adding new Sites and Investigators(CV's to be included)
- Progress and Safety Reports
- Notifying of the End of study

May I take this opportunity to wish you well in undertaking the research. We will write to you in the future to request updates on the progress of the research and look forward to receiving outcomes of the study.

Appendix 2.4: Cardiff & Vale University Health Board Research and Development office (Cardiff) approval

GIG CYMRU NHS WALES
Bwrdd Iechyd Prifysgol Caerdydd a'r Fro
Cardiff and Vale University Health Board

Ysbyty Athrofaol Cymru
University Hospital of Wales

Heath Park,
Cardiff, CF14 4XW
Phone 029 2074 7747
Fax 029 2074 3838
Minicom 029 2074 3632

Parc Y Mynydd Bychan,
Caerdydd, CF14 4XW
Ffôn 029 2074 7747
Ffacs 029 2074 3838
Minicom 029 2074 3632

Eich cyf/Your ref
Ein cyf/Our ref
Welsh Health Telephone Network 1872
Direct line/Llinell uniongyrchol

Tel: 029 20746986
Fax: 029 20745311
CAV_Research.Development@wales.nhs.uk

From: Professor JI Bisson
R&D Director
R&D Office, 2nd Floor TB2
University Hospital of Wales
Cardiff
CF14 4XW

09 November 2010

Dr Monica Busse
Room 2F08, Cardigan House
Heath Park Campus
Cardiff
CF14 4XN

Dear Dr Busse

Project ID : 10/CLC/4929 : A Comprehensive Analysis Of The Physiotherapy Process And Practice For People With Acquired Brain Injury

Thank you for your recent correspondence addressing the points raised about the above project and supplying the following revised documents:

Document	Version number	Date
Covering Letter to Professor J Bisson		3 Nov-10
Information Sheet: Physiotherapist	3	1 No-10
Information Sheet: (Patient with acquired brain injury)	3	1 Nov-10
Information Sheet: Participants who are unable to give Consent	3	1 Nov-10
Consent Form: Physiotherapist	2	1 Nov-10
Information Sheet: Clinical Senior Staff	3	1 Nov-10
Information Sheet: Physiotherapist – Northwick Park Hospital	2	1 Nov-10

Your response and revised documents were reviewed by the Cardiff and Vale Research Review Service (CaRRS).

I am pleased to inform you that the Panel now has no objection to your proposal. You have informed us that Cardiff University has agreed to act as Sponsor under the Research Governance Framework for Health and Social Care.

I understand that you have already obtained:

Favourable opinion from the relevant School Research Ethics Committee
- Honorary research contracts/letters of access for all members of the research team who will require these

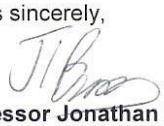
Cardiff and Vale UHB is therefore happy for the project to begin.

May I take this opportunity to wish you success with the project, and to remind you that as Principal Investigator you are required to:

- Ensure that all members of the research team undertake the project in accordance with ICH-GCP and adhere to the protocol as approved by the Research Ethics Committee
- Inform the R&D office if any external or additional funding is awarded for this project in the future
- Inform the R&D office of any amendments relating to the protocol, including personnel changes and amendments to the actual or anticipated start and end dates
- Complete any documentation sent to you by the R&D office or University Research and Commercial Division regarding this project
- Ensure that adverse event reporting is in accordance with the UHB adopted Cardiff and Vale NHS Trust Policy and Procedure for Reporting Research-Related Adverse Events (refs 164 & 174) and Incident Reporting and Investigation (ref 108)
- Ensure that the research complies with the Data Protection Act 1998
- Ensure that arrangements for continued storage or use of human tissue samples at the end of the approved research project comply with the Human Tissue Act 2004 (for further information please contact Sharon Orton, HTA Coordinator OrtonS@cf.ac.uk).

If you require any further information or assistance, please do not hesitate to contact staff in the R&D Office.

Yours sincerely,



Professor Jonathan I Bisson
Chair of the Cardiff and Vale Research Review Service (CaRRS)

CC Chris Shaw, Research and Commercial Division, Cardiff University
CC R&D Lead Mr Alun MorganAbdulrahman Altowaijri

Appendix 2.5: North-West London Hospitals Research and Development office (London) approval

The North West London Hospitals NHS
NHS Trust

R&D Office
Rooms 7N 014, Level 7, Maternity Block
Northwick Park Hospital
Watford Road, Harrow HA1 3UJ
Tel: 020 8869 2011
Fax: 020 8869 5081
E-mail: alan.warnes@nwlh.nhs.uk
Website: www.nwlh.nhs.uk/research

NHS Management Approval Letter for Research

To: Mr Stephen Ashford

From: Dr Alan Warnes (R&D Manager)

Date: 11th January 2011

Project Title: A comprehensive analysis of the physiotherapy process and practice for people with acquired brain injury (RD10/078)

I understand that you have received a favourable ethics opinion for the above project, with the condition that you do not undertake research in an NHS organisation until relevant NHS Management Approval has been received. I am therefore writing on behalf of the North West London Hospitals Trust to inform you that the project has been approved by the Trust and may now proceed.

To maintain this approval, the following conditions must be met:

1. All staff involved in the running of this study must adhere to Trust and Research Governance Framework requirements (see www.nwlh.nhs.uk/research).

2. As Chief/Principal Investigator you are required to formally advise the R&D Office of **ANY** changes to the project including:
   - Any changes to the status of the project, e.g. abandoned, completed etc
   - Any changes to the protocol – however minor.
   - Any changes to the funding arrangements.

3. The Chief/Principal Investigator is also required to:
   - Notify the R&D, in a timely fashion, any Serious Adverse Events relating to the Research and the appropriate urgent safety measures taken in line with ICH GCP requirements.
   - Ensure that the R&D Office has copies of all annual and final progress reports.
   - Ensure all researchers involved in the project hold the necessary expertise required and have Honorary Contracts should they need to.
   - Ensure adequate and accurate reporting and monitoring of said project.
   - Co-operate with all internal Trust monitoring and auditing procedures.

4. This approval will automatically lapse if no annual report on this study is received at the R&D office, 14 months from the date of this letter. A guidance note on Annual reports is available at the R&D Office.

Yours sincerely,

Dr Alan Warnes
Cc: Abdulrahman Altowaijri

Approved Working Documents (For R&D Reference)

Document	Version	Date
Interview schedule/Topic Guide	1	03 August 2010
Participant Information Sheet: Physiotherapist- Northwick Park Hospital	2	23 September 2010
Participant Consent Form: Physiotherapist- Northwick Park Hospital	2	23 September 2010
Questionnaire	1	03 August 2010

APPENDIX THREE

INTERVIEW AND QUESTIONNAIRE

Appendix 3.1: Semi-structured interview (Head of rehabilitation team)

The admission, goal setting and discharge criteria in in-patient rehabilitation services for adults with acquired brain injury

As part of a project to improve reporting outcomes, we are collecting information about the rehabilitation process for acquired brain injury. The interview is divided into 5 sections covering the process of patient admission, goal setting and discharge criteria. Hopefully, the interview will take less than 30 minutes to complete. All the information you provide will remain anonymous and confidential, and will be treated in line with the Data Protection Act.

Thank you for taking the time to this interview.

Section 1: Basic Information about yourself and working experience

1. You are a Consultant in Rehabilitation Medicine, Can you please briefly describe you role as a member of the MDT in rehabilitation unit?

_____
_____
_____

2. How long you have been working with ABI in Morriston Hospital?

_____

3. Can you describe the rehabilitation team in your unit, (Who are they, what are they doing,)

_____
_____
_____

4. Can you give a description of the pathway that patients would follow if they have an ABI?

_____
_____
_____

5. Do you admit any ABI patient from out of the Swansea area for rehabilitation n Morriston Hospital?

If yes, from which areas:

_____

6. How many beds do you have in your rehabilitation unit?

_____

7. What is the patient's average length of stay in your unit?

_____

Section 2: Admission Criteria

8. What admission criteria do you follow in your rehabilitation unit? Can you please rate them in term of importance?

_____

_____

_____

_____

_____

9. What is the importance of the following criteria if you have not already mentioned them in your previous answer?

- ☐ Patient has sustained significant loss of function
- ☐ Patient requires an intensive programme from two or more disciplines
- ☐ There is a reasonable expectation that the patient will benefit from therapy
- ☐ Physically able to tolerate a programme of activity (≥ 3 hours of therapy per day)
- ☐ Patient should demonstrate rehabilitation potential
- ☐ Has the capability to participate cognitively and behaviourally in the programme.
- ☐ Twenty-four hour rehabilitation nursing is needed

10. What considerations do you have when not accepting a patient for admission to your unit? Can you please rate them in term of importance?

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

11. What is the importance of the following reasons for not accepting a patient for admission to your unit (if not been already mentioned in previous answer)? Please rate your answer in term of important.

- ☐ Medically unstable due to untreated or undiagnosed conditions
- ☐ Requires medical interventions that limit participation in therapy
- ☐ Appropriate rehabilitation services are available in the local health region
- ☐ Goals can be met in outpatient or community based programmes
- ☐ Over the age of 65 and eligible for care in elderly rehabilitation services

12. What do you think are the advantages of your current admission criteria?

_____

_____

13. What are the disadvantages of your current admission criteria?

_____

_____

Section 3: Goal Setting

14. Do you meet to set goals for each patient?

☐ Yes ☐ No go to Q 16

If yes, how often

_____

15. Who attends these meetings?

_____

_____

16. How do you set patient's goals?

_____

_____

17. Do you use set goals as potential outcome measures?

☐ Yes ☐ No

How do you use set goals as potential outcome measures? Are you using the GAS?

_____

_____

Section 4: Discharge Criteria

18. What criteria do you follow for discharging the patient from your service (Please rate your answer in term of importance)

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

☐ _____

19. What is the importance of the following criteria (if not been already mentioned in previous answer) for discharging the patient from your service? Please rate your answer in term of important

- ☐ Goals met in all therapy areas
- ☐ No significant progress is evidenced towards goals
- ☐ Goals can be addressed in a less intense programme
- ☐ No longer needs for two or more therapy services ¨
- ☐ Appropriate discharge planning processes/follow-up care is completed
- ☐ Patient is unable or unwilling to actively participate in program
- ☐ No longer requires 24-hour medical or nursing supervision/treatment.
- ☐ Medically unstable - requires acute medical treatment.

20. What do you think are the advantages of your current discharge criteria?

_____

_____

_____

21. What are the disadvantages of your current discharge criteria?

_____

_____

_____

Section 5: Documentation

22. How does your team document the assessment, goals, treatments or intervention and discharge plan?

_____

_____

_____

23. What about the therapist documentation (if not been covered by previous answer)

_____

_____

_____

24. How is information shared between the team?

_____

_____

_____

25. Are the currently used methods optimal?

_____

_____

26. What do you think are the advantages of your current documentation method?

_____

_____

_____

27. What do you think are the disadvantages of your current documentation method?

_____

_____

_____

28. How do you think the method of documentation could be improved?

_____

_____

_____

29. What do you think about the electronic database and schedule to document the rehabilitation process?

_____

_____

_____

Thank you for your help

Appendix 3.2: Questionnaire (Physiotherapist who treat acquired brain injury patient in UK)

Physiotherapy Process and Practice for Acquired Brain Injury Patients (ABI)

As part of a project to improve methods for reporting on physiotherapy, we are collecting information about your treatments. This questionnaire is divided into 5 sections covering the initial assessment, goal setting and treatment. This should only take 10-15 minutes to complete. All the information you provide will remain anonymous and confidential, and will be treated in line with the Data Protection Act.

Thank-you for taking the time to complete the questionnaire.

School of Healthcare Studies
Department of Physiotherapy
Director Dr R W M van Deursen MCSP MSc PhD ILTM
Adran Ffisiotherapi
Cyfarwyddwr Dr R W M van Deursen MCSP MSc PhD ILTM

Please answer the following questions with respect to ABI patients only. Please tick one or more boxes, as appropriate. When requested, please provide written comments.

Section 1: Basic Information about yourself and working experience

1. Please state the number of months or years you have been treating patients with acquired brain injury.

_____

2. What is the best description of your place of work?

E.g. Hospital inpatient setting (Regional Rehabilitation Unit)

_____

3. What is your current band/level?

_____

4. Please state the average number of acquired brain injury **patients** that you treat every month.

_____

5. At what stage do you usually treat patients with acquired brain injury?
(Please tick one or more boxes as appropriate)

- ☐ Acute (Intensive Therapy Unit)
- ☐ Acute (Early rehabilitation)
- ☐ Rehabilitation (Hospital based)
- ☐ Rehabilitation (Community based)
- ☐ Other, Please specify _____

Version 3
10.02.2011

Section 2: Assessment

Please answer the following questions with respect to ABI patients only

6. Do you follow any guideline/s to support your assessment method?

☐ Yes ☐ No go to question 7

If yes, please specify what assessment guideline/s do you follow during your assessment process?

_____

_____

_____

7. Please describe your current assessment process

_____

_____

_____

_____

_____

8. When do you have to complete your **initial** assessment?

_____

9. What do you think are the advantages of the current **process** that you use when **assessing** acquired brain injury patients?

_____

_____

10. What do you think are the disadvantages of the current **process** that you use when **assessing** acquired brain injury patients?

_____

_____

Documentation of assessment

11. What kind of documentation format are you using to document your patient's initial assessment?

☐ Narrative format (your own format)
☐ SOAP
☐ Standardised assessment form (pro forma)
☐ Electronic database assessment form
☐ Other, Please specify _____

12. What are the advantages of your current **documentation method**?

_____

13. What are the disadvantages of your current **documentation method**?

_____

Outcome measures

14. During your assessment which outcome measures do you use to evaluate your patient. Use the table below to list the OM you use **most commonly**. Please also indicate what you use them to measure?

Outcome Measure	What do you use this OM to measure?
E.g. 10 meter timed walk	*Walking speed*

Section 3 Analysis and Goal Setting

15. Do you regularly have a meeting to set the goals for each patient?

☐ Yes ☐ No Please go to question 18

16 Who usually attends these meetings? (Please tick one or more boxes if applicable)

☐ Physiotherapy team only
☐ Multidisciplinary team only
☐ Physiotherapist, patient and his/her family
☐ Multidisciplinary team, patient and his/her family
☐ Other, please specify

17. How often do you meet to set the goals for each patient?

_____

18. How do you set the **physiotherapy** goals for each patient?

_____

_____

19. How often do you evaluate the **physiotherapy** goals set?

☐ Never
☐ Weekly
☐ Fortnightly
☐ Monthly
☐ Other, please specify

20. What do you do if the **physiotherapy** goal is not achieved?

_____

21. Do you use set goals as potential outcome measures?

☐ Yes ☐ No go to question 19

If yes, are you using Goal Attainment Scaling?

☐ Yes ☐ No

If No, please specify how you use the goals as potential outcome measures.

_____

_____

Section 4: Treatment

22. With respect to your patients' treatment and considering your caseload during the last six months, please specify which of the following **physiotherapy techniques** you are using with your patients. Please use the table below to specify how often you use each intervention?

Category	Physiotherapy treatment	Very regularly >= 1 a week	Regularly < 1 a week	Less Regularly >= 1 a month	Rarely < 1 a month	never used
Selective Movement	Manual Facilitation					
	Co-ordination					
	Alignment					
Balance	Balance re-education					
	Core stability re-education					
Task specific training:	Cognitive strategies					
	Perceptual training					
	Manual cueing & sensory inputs					
	External cueing					
	Demonstration/modelling					
	Soft tissue mobilisation (e.g. massage)					
Muscul-oskeletal interventions	Joint mobilisation (e.g. PPIVMs, PAIVMs)					
	Strengthening (Resistance from the therapist/ body weight or equipment)					
	Stretching					
	PROM					
	Positioning					
	Electrotherapy techniques (FES,TENS)					
Respiratory Care	Secretion management:- Suction, ACBT, Manual techniques or Positioning					
	Management of lung volumes					
	Hydrotherapy					
Exercise	Cardiovascular / Cardio-respiratory Exercise					
	Endurance Exercise					
Other, please specify	_					
	_					

23. With respect to your patients' treatment and considering your caseload during the last six months, please specify which of the following **treatment adjuncts** you are using with your patients. Please use the table below to specify how often you use each?

Category	Treatment Adjunct	Very regularly >= 1 a week	Regularly < 1 a week	Less regularly >= 1 a month	Rarely < 1 a month	never used
Education and advice	Patient					
	Ward staff [Care-giver]					
	Family [Care-giver]					
Medication	Botulinum Toxin Injection					
	Systematic spasticity medication					
	Pain relief					
Orthotics	Splinting					
	Casting					
	Ankle Foot Orthoses					
Equipment	Plinth					
	Tilt table					
	Electric standing frame					
	Oswestry standing frame					
	Gym ball					
	Sit-fit					
	Parallel bars					
	Free weights					
	Exercise bike					
	Treadmill or other gym equipment					
	Static bike					
	Motor bike					
	Walking stick					
	High walking stick					
	Quad/Tripod					
	Wheeled Rollator					
	Pick up Zimmer frame					
	Elbow crutches					
	Arjo walker					
	Computer games					
Specialised Equipment	Mattresses					
	Seating					
	Wheelchair					
	Cushions					
	T-roll					
Other, please specify,						

24. With respect to your patients' treatment and considering your caseload during the last six months, please specify which of the following **tasks and positions** you use with your patients. Please use the table below to specify how often you use each?

Category	Treatment Tasks and Positions	Very regularly >= 1 a week	Regularly < 1 a week	Less regularly >= 1 a month	Rarely < 1 a month	never used
Posture/ position	Lying—supine					
	Lying—Prone					
	Side lying					
	Sitting—supported					
	Sitting—unsupported					
	Standing—stride stand					
	Standing—step stand					
	Standing—single leg stand					
Transfers	Bed mobility (including rolling)					
	Lying to sitting (vice versa)					
	Sitting to standing (vice versa)					
	Stand and step around					
	Bed to chair/ toilet (vice versa) through sitting					
	Car transfer					
	Floor to chair (vice versa)					
Tasks	Stepping					
	Up and down stair activities					
	Turning around activity					
	Walking					
	Wheelchair handling and driving					
	Reaching and UL activities					
	Personal ADL					
	Domestic ADL					
	Leisure./ hobbies and sports					
	Work related activities					
Class activities	Circuit activities					
	Hydrotherapy					
Activities not related to function						
Other, please specify,						

Documentation of treatment

25. What kind of documentation format are you using to document your patient's progress notes?

- ☐ Narrative format (your own format)
- ☐ Standardised treatment form (pro forma)
- ☐ Other, Please specify
- ☐ SOAP
- ☐ Electronic database treatment form

26. What are the advantages of the method you use to document progress notes ?

_____

_____

27. What are the disadvantages of the method you use to document progress notes?

_____

_____

Section 5: Discharge

28. What do you consider when you discharge the patient from your service?

_____

_____

29. What outcomes measures do you use to guide your discharge planning?

_____

_____

30. what kind of documentation format do you use in your discharge reporting?

- ☐ None
- ☐ Narrative format (your own format)
- ☐ Letter
- ☐ Standardised discharge form (pro forma)
- ☐ Electronic database discharge form
- ☐ Other, Please specify

31. What are the advantages of the methods you use to document your discharge?

_____

_____

32. What are the disadvantages of the methods you use to document your discharge?

_____

_____

This is the end of the questionnaire

Thank you very much for your help

APPENDIX FOUR

FEEDBACK FORMS

Appendix 4.1: Questionnaire's validity and acceptability feedback form

Can you please write your comments on and opinions, and rank you acceptability of each part of the questionnaire.
Lowest rating (score 0) will correspond to "the questionnaire is not acceptable" and the highest rating (score 100) will correspond to "the questionnaire is very acceptable"

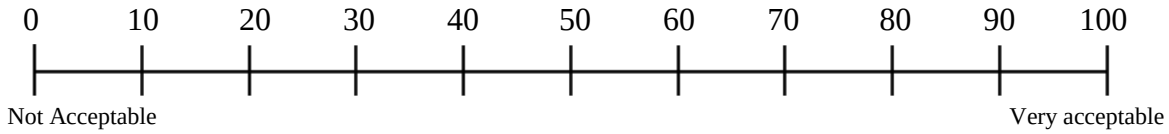
Section 1: Basic Information about yourself and working experience

Comments:
_____

_____

_____

_____



Section 2: Assessment

Comments:
_____

_____

_____

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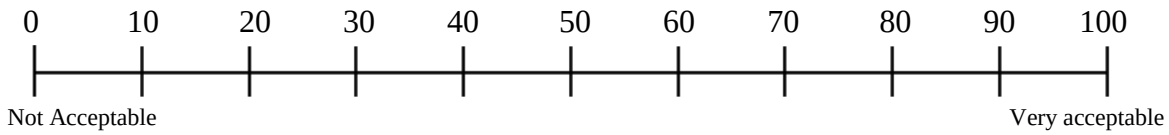


Section 2 Analysis and Goal Setting

Comments:

_____

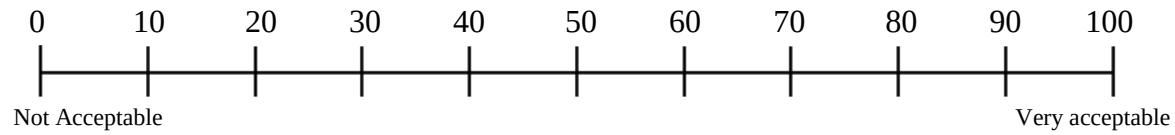
_____

_____

_____

_____

_____



Section 4: Treatment

Comments:

_____

_____

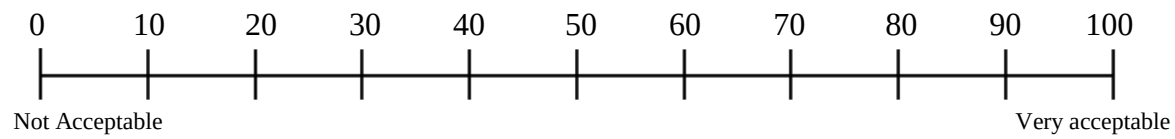
_____

_____

_____

_____

_____



Thank You

Appendix 4.2: Treatment recording tool validity and acceptability feedback form

Can you please write your comments on and opinions, and rank your acceptability of element of the treatment recording tool.
Lowest rating (score 0) will correspond to "this specific aspect of the treatment recording tool is not acceptable" and the highest rating (score 100) will correspond to "this specific aspect of the treatment recording tool is very acceptable"

1: Time to complete the treatment recording tool

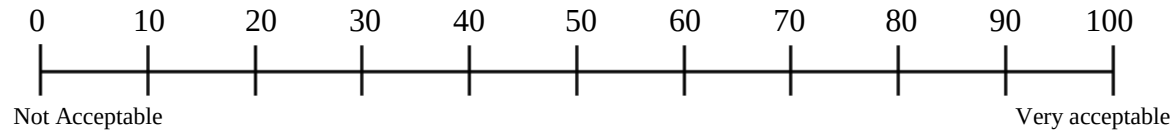
Comments:
_____

_____

_____

_____

_____



2: Accuracy of the treatment recording tool to describe the treatment session

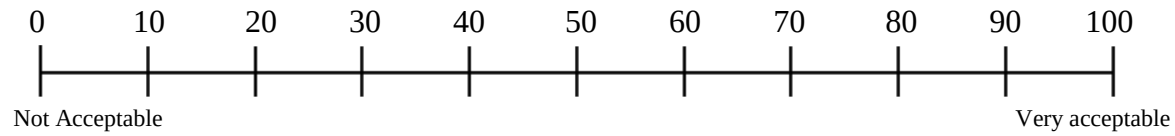
Comments:
_____

_____

_____

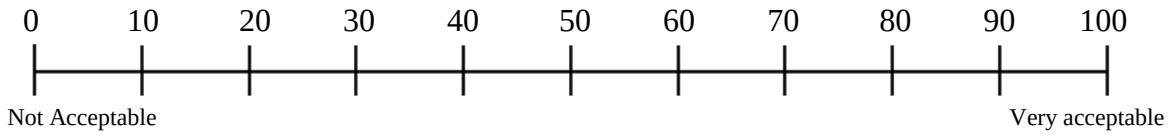
_____

_____



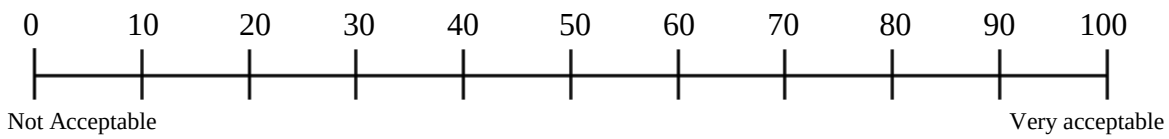
3: The comprehensiveness of the treatment activity list

Comments:



4: Overall

Comments:



Thank You

APPENDIX FIVE

TREATMENT RECORDING TOOL
AND
TREATMENT RECORDING TOOL GUIDELINES

Appendix 5.1: Description of the treatment activities included in the treatment recording tool

Treatment Task
T01 Reaching and upper limb activity: any activity related to the upper limb.
T02 Lower limb activity: any activity related to the lower limb.
T03 Bed mobility: including any activities based around daily tasks and involve any movement around the bed which might include turning to left or right on bed and/or bridging exercise.
T04 Laying to sitting: any activity which involves practising to sitting form laying position or laying from sitting position.
T05 sitting to Standing: any activity, which involves practising of sitting down or standing up.
T06 transfer: any activities which involve moving from one seated position to another. This may be involves practising the transfer from bed to chair and from chair to toilet and vice versa throughout the sitting position without asking the patient to stand up.
T07 Stand and step around: any activity during standing propitiation.
T08 Balance: any activity which aim to improve the postural adjustments and/or body alignment during any balance activity or task. This includes maintaining an upright position within base of support from anybody position and/or moving around the base of support within, and to, the limits of stability e.g. reaching, picking something up from the floor and/or other activities which aim to achieve this.
T09 Stepping: any activity which involves putting on foot in front of the other.
T10 Up and down stair activity: any activities which involve going up or down stairs, includes steps.
T11 Turning around activity: any activities which involve the patient rotating around the base of support**.**
T12 Walking:. Any activity includes moving from place to other by standing on one leg and placing the other leg in front of the other.
T13 other (specify): any other treatment task which has not been mentioned above.
Treatment Positions
P01 Lying supine: patient lying on his/her back.
P02 Lying Prone: patient lying on his/her abdomen.
P03 Side lying: patient lying on right or left side.
P04 Sitting supported: patient in a sitting position supported by the therapist or on chair with back and/or arm support.
P05 Sitting unsupported: patient sitting unsupported in armless chair or bed **.**
P06 Standing stride stand: patient standing with the feet are sideways apart.
P07 Standing step stand: patient standing with one foot raised and placed upon a stool or something of the kind.

P08 Standing single leg stand: patient stand on one leg.
Intervention code
Education and advice
ED1 patient: any instruction or information which might be given to patient that will alter his/her health behaviors or improve the health status. **ED2 Family:** any instruction or information provided to patient's family that will or might alter the patient health behaviors or improve his/her health status. **ED3 Staff:** any instruction or information given to any therapist in the MDT that will alter the patient health behaviors or improve his/her health status.
Selective Movement
SM1 Manual Facilitation: The performance of 'normal movement patterns' with the therapist guiding/leading the movements while providing stability to allow for selective movement in the limbs. The patient is physically passive or active-assisted. The movement is led/guided by the therapist. **SM2 Co-ordination:** focus on activities that involve more than one joint or muscle. **SM3 Alignment:** Any interventions which aim to improve the alignment of any body segments and/or to improve postural adjustments This may include maintaining an alignment or posture, moving around the base of support, or restoring the position of the centre of gravity within the base of support.
Exercise
EX1 Strengthening: exercises (may be active assisted or active) or specific training activities to promote muscle strength. **EX2 Stretching:** exercises (may be passive, active-assisted or active) to promote muscle and to prevents muscle shortening or contracture. **EX3 PROM:** exercises (may be passive, active-assisted or active) to promote joint range and to prevents joint stiffness. **EX4 Positioning:** any exercise related to correct the patient position including sitting, standing, laying, rolling etc. **EX5 Soft tissue mobilisation:** any manual therapy which aim to restore joint movement, power, and range of motion. **EX6 Cardiovascular Exercise:** any exercise to promote cardio-vascular fitness. It may include using the treadmill at speed or incline, fast walking, cycling, step-ups etc. Some monitoring of exercise intensity will normally take place to ensure a training effect is being achieved. **EX7 Endurance Exercise:** any exercise to increase the patient endurance.

Task specific training
TS1 Cognitive strategies: Any exercise that can help patient with cognitive impairments to successfully engage in activities that are rendered difficult by the condition. **TS2 Manual cueing & sensory inputs:** using the therapist hand and/or any equipment which stimulate the patient sensation to help them doing any activity. **TS3 External cueing:** using any equipment (such as mirror) to help patient doing thing. **TS4 Demonstration/modelling:** any physical demonstration of the treatment task (modelling) and activity to enhance the patient activity.
Balance
BA1 Re-education: any exercise to regain or improve the patient's control over balance. **BA2 Core stability:** any exercise which assist in the maintenance of good posture.
Treatment Adjuncts
Medication
M01: any medication used to improve patient physical activity.
Orthotics
O01: any orthotics or prosthesis device which may include splints or casts for upper or lower limb to prevent or treat contractures, shoulder pain or other impairments.
Equipment
E01 Plinth: treatment base. **E02 Passive standing device:** any equipment use to keep the patient in standing position. **E03 Gym ball:** Any gym ball. **E04 Parallel bars:** Parallel bars. **E05 Exercise bike:** any exercise bike including electronic upper or lower limb exercise bike. **E06 Walking aid:** any equipment use to aid patient walking, includes walking sticks, frames etc. **E07 Walking equipment:** any equipment use to help patient to walk such as Argo walker.
Specialised Equipment
SE1 Cushions: any type of cushions such as pillows, t-roll etc. **SE2 Wheelchair:** electronic or manual wheelchair.

Appendix 5.2 Guideline to complete the treatment recording tool

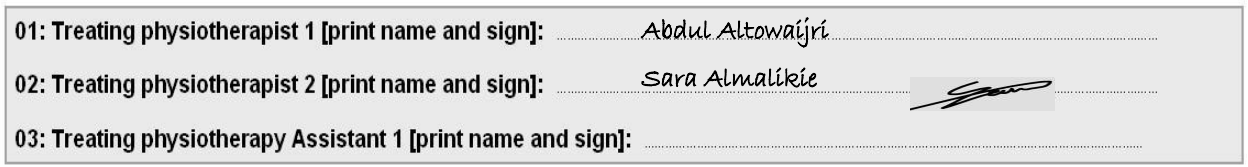
Step by step guide to fill in the treatment documentation tool

This guideline contains step-by-step notes on how to fill in the treatment documentation tool. If you have any questions, please contact me on my email altowaijria@Cardiff.ac.uk .

General guidelines

- Please use one form for each treatment session
- **Please complete the form as soon as you finish your treatment to avoid missing any necessary information**
- Please use no more than one letters or numbers for each box.
- To correct a mistake on the form put a line through it and write the correction as close as possible to the original.
- Mark choices in the boxes indicated with a cross [X].

Write the physiotherapist/s name signature In the top left corner of the form



Write patient's name and hospital reference number in the top right corner of the form

Write the date and time of treatment session on this box as shown

Indicate **Yes** or **No** as appropriate in the next two boxes

Informed consent	Yes	x	No	
Manual Handling Risk Assessment		x		

Indicate the appropriate option in the next box to describe the type of assessment that you have done during this treatment session

Write the number of unit/s you spent completing the assessment process of your patient. Each unit equals to 5 minutes or less.

Patient assessment:

Non [ ] initial [ ] re-evaluation [x] discharge [ ]

Duration: …….. Unit/s (1 unit = 5 minute)

Specify any outcome measures you used during your session. (None if not used)

Outcome measurement *10 MW: 23 step 2:5 minute*

Mark the appropriate box to describe the location of treatment. If other, give specific details

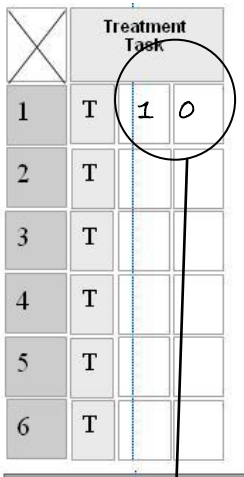
Treatment location	Gym	x	ward	
	Hydro		other	(specify) ……..

Write your treatment aim/s for the current physiotherapy session

Treatment aims: To improve patient walking activity

For each treatment, it is possible to describe a specific task, position and clinical activity (interventions). We need to gather all of this information

	Treatment Task			Treatment Positions			Intervention code			Adjuncts used in Treatment					
1	T			P											
2	T			P											
3	T			P											
4	T			P											
5	T			P											
6	T			P											



Refer to the codes shown at the bottom of the tool and write the code for each treatment task for every different intervention type you are providing for your patient. For example, when referring to walking the code is **T 10**

Treatment Task	
T01	Bed mobility
T02	Lying to sitting (visa versa)
T03	Sitting to standing (visa versa)
T04	Stand and step around
T05	Bed to chair/ toilet (visa versa) through sitting
T06	Balance
T07	Stepping
T08	Up and down stair activities
T09	Turning around activity
T10	Walking
T11	Reaching and UL activities
T12	ADL activity
T13	Other (specify) .....

Treatment Positions		
P	0	6
P		
P		
P		
P		
P		

For treatment position refer to the codes shown on the bottom of the tool to describe the predominant position
It is possible to have more than one position for each test. If position changes are used, please include the duration for each position. It is possible for the more generic interventions namely Education & Advice to not

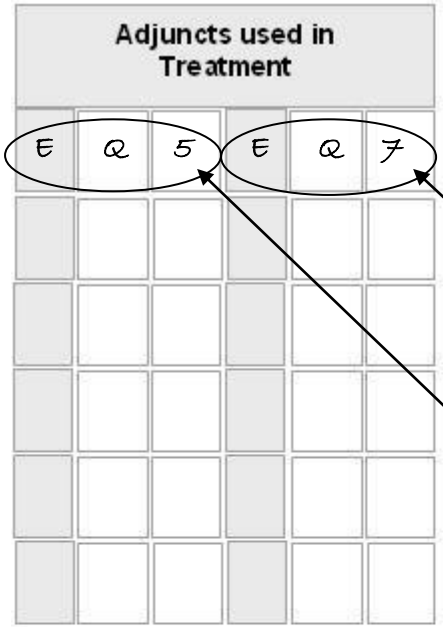
Treatment Positions	
P01	Lying—supine
P02	Lying—Prone
P03	Side—lying
P04	Sitting—supported
P05	Sitting—unsupported
P06	Standing—stride stand
P07	Standing—step stand
P08	Standing—single leg stand
P09	Other (specify) .....

Intervention code		
E	X	1

Write the code for the clinical intervention using the list at the bottom of the form. The intervention code list has been divided into 5 sections to make it easier and quicker for you to find the code. The sections are: Selective Movement; Exercise; Task Specific Training; Balance and Education and Advice.

Intervention code (Cont.)			
Selective Movement		**Task specific training**	
SM 1	Manual Facilitation	TS 1	Cognitive strategies
SM 2	Co-ordination	TS2	Manual cueing & sensory inputs
SM 3	Alignment	TS3	External cueing
Exercise (specify the body part/s when applicable)		TS4	Demonstration/modelling
EX 1	Strengthening ..Lower Limb.....	TS5	Other (Specify) ……..
EX2	Stretching ……	**Balance**	
EX3	PROM ……	BA1	Re-education
EX4	Positioning ……	BA2	Core stability
EX5	Soft tissue mobilisation ……	BA3	Other (Specify) ……..
EX6	Cardiovascular Exercise (Specify) ……		
EX7	Endurance Exercise ……		
EX8	Other (Specify) ……		

Intervention code	
(Education and advice)	
ED1	Patient
ED2	Family
ED3	Staff.



We also need to know about any treatment adjuncts that you used in your treatment. Please specify when appropriate and document any other adjuncts which you may have used and are not included in the list

Treatment Adjuncts (Cont.)	
Orthotics	
O01	Specify ……
Equipment	
E01	Plinth
E02	Passive standing device (specify) ……
E03	Gym ball
E04	Parallel bars
E05	Exercise bike
E07	Walking aid (specify) …… Walking stick ……
E08	Walking equipment (specify) ……
E09	Other gym equipment (specify) ……
Specialised Equipment	
E10	Cushions (Specify) ……
E11	Wheelchair (Specify) ……

Treatment Adjuncts	
Medication	
M01	Specify ……

Write the number of unit/s you spent for each intervention. Each unit equals 5 minutes or less. For example, write one unit if the time you spent in treatment is 4 minutes only.

Duration/ Unit
1

Write any extra comment on the comment Box or non if there is any

General comment

Thank you

APENDIX SIX

QUESTIONNAIRE'S DISTRIBUTION MAP

Appendix 6.1.questionnaire's distribution map