Identifying safe care processes when GPs work in or alongside emergency departments: realist evaluation

Abstract

Background

Increasing pressure on emergency services has led to the development of different models of care delivery including GPs working in or alongside emergency departments (EDs), but with a lack of evidence for patient safety outcomes.

Aim

We aimed to explore how care processes work and how patient safety incidents associated with GPs working in ED settings may be mitigated.

Design and Setting

We used realist methodology with a purposive sample of 13 EDs with different GP service models. We sought to understand the relationship between contexts, mechanisms and outcomes to develop theories about how and why patient safety incidents may occur, and how safe care was perceived to be delivered.

Method

We collected qualitative data (observations, semi-structured audio-recorded staff interviews and local patient safety incident reports). We coded data using 'if, then, because' statements to refine initial theories developed from an earlier rapid realist literature review and analysis of a sample of national patient safety incident reports.

Results

We developed a programme theory to describe how safe patient care was perceived to be delivered in these service models including: an experienced streaming nurse using local guidance and early warning scores; support for GPs' clinical decision-making with clear governance processes relevant to the intended role (traditional GP approach or emergency medicine approach); and strong clinical leadership to promote teamwork and improve communication between services.

Conclusion

Our findings can be used as a focus for more in-depth human factors investigations to optimise work conditions in this complex care delivery setting.

249/250 words

Introduction

Patient safety is described by the World Health Organization as a serious global public health concern,(1) but new healthcare service models are frequently introduced without evidence for patient safety outcomes.(2) An example is the implementation of general practitioner (GP) services in or alongside emergency departments (EDs), advocated (and resourced) in England as an approach to manage increasing patient demand.(3) As a result, these service models have increased in England by 81- 95% (2017-2019),(4) despite a lack of evidence for their effectiveness and safety outcomes.(5)

Urgent and emergency healthcare services are complex adaptive socio-technical systems.(6) The environment is unpredictable and challenging with pressures of time and uncertainty as a wide variety of patients present with undifferentiated problems.(7) GP service models associated with EDs may be situated: *inside* the emergency department, integrated with the emergency medicine service (inside-integrated) or as a separate parallel service (inside-parallel); or *outside* the emergency department, on the hospital site (outside-onsite) or separate to the hospital site (outside-offsite).(7) Previous analysis of a sample of national patient safety incident reports describing diagnostic error associated with these service models (UK Coroners' and National Reporting and Learning System reports) highlighted key areas for improvement including: streaming processes; GPs' clinical decision-making; and communication between services.(8) Understanding how work conditions may influence the way GPs work (human factors) and how processes can be optimised to mitigate such events and support GPs in these different service models is overdue.

Quantitative analysis of routinely collected hospital data may not capture the complexity of these services, how they work and why outcomes may occur, and may also be limited by poor data quality.(9) Qualitative methods are required to improve understanding about how complex non-linear phenomena may contribute to patient safety incidents (a 'Safety-I' approach).(10) They can also be used to explore how human factors enable work to be conducted safely in both expected and unexpected conditions, understanding work-as-done rather than work-as-intended (a 'Safety-II' approach).(11) Theory-driven realist methods are well suited to evaluating such services to explain what works, for whom, in what circumstances and why, incorporating formal theory to describe how contextual factors may facilitate or inhibit patient safety outcomes.(12)

We aimed to test and refine initial theories developed through an earlier rapid realist review,(13) and analysis of national patient safety incident reports,(8) with qualitative data from a purposive sample of 13 case study sites, to explain how care processes are most likely to prevent or mitigate patient safety incidents associated with GPs working in ED settings.

Method

Realist methodology is a theory-driven approach to evaluation, identifying mechanisms (M) that explain how or why contexts (C) relate to outcomes (O) to generate theories described as context-mechanism-outcome (CMO) configurations; specific terminology is defined in Table 1.(12) We followed RAMESES reporting and publication standards, Supplementary Table 1.(14)

Case site selection

Case sites (hospitals) were recruited from respondents to a national survey, followed up by a key informant telephone interview with the site clinical lead.(15) An online survey (www.onlinesurveys.co.uk) was sent to the clinical directors of all type 1 emergency departments (24-hour consultant-led units with full resuscitation facilities) in England (n=171) and Wales (n=13) on behalf of both the 'GPs in EDs',(16) and 'GPED',(17) study teams (both with the same funder). The aim was to capture data about the GP services being provided in or alongside emergency departments and how they worked, to inform a taxonomy of GP-ED models for both studies. The published taxonomy contains further information about the survey process and results.(7)

We had survey responses from 71 English and 6 Welsh sites (n=77/184, 42%). The GPED team also provided data for 41 English departments from Care Quality Commission reports and NHS England, totalling information on 62% (n=118/189) of type 1 emergency departments in England and Wales.(7) As a gauge of non-response bias, our 71 English survey responders included 82% (n=58/71) that had applied for capital bid (GP streaming) funding, compared with 84% of our 100 non-responders in England. The 13 case sites were purposively selected according to variables listed in Box 1 to ensure

they covered a range of models and contexts. The included sample of anonymised case study sites and characteristics is listed in Supplementary Table 2. Classified by the taxonomy, these included:

- 3 'inside-integrated' models
- 4 'inside-parallel' models (one was reclassified following the visit)
- 3 'outside-onsite' models
- 3 sites with no GP service model

Data collection

Two researchers (ME, qualitative expertise; AC, GP and PhD candidate) visited all sites with a GP service (n=10) for two to four days (mean three days) and individually conducted a one-day visit at control sites (ME, (n=2); AC (n=1)); between January 2018 and April 2019. We conducted: observations including informal interviews, semi-structured audio-recorded realist interviews and analysed local patient safety incident reports.

Observations

We spent time in reception and clinical areas (but did not observe clinical consultations) and observed triage and streaming processes. We opportunistically introduced ourselves to a wide range of staff and asked questions to test various theories. When it was not possible to talk with staff we observed how the systems worked, taking handwritten fieldnotes which we typed the same evening.

We met every two hours during the day to discuss findings, refer to the list of initial theories and identify evidence gaps for theory testing. Eight visits were conducted midweek (usually Monday to Wednesday) with six visits including observations in the evening. Two visits were conducted over a weekend. Where possible an exit interview was held with the clinical director, before leaving, to assist theory refinement.

Staff realist interviews

The clinical director and other emergency department staff and GPs were recruited during case site visits for audio-recorded interviews on site in a private area or, at a later date, via telephone; these were then transcribed verbatim. The realist teacher-learner interview technique was used where initial theories are presented to the participant to explore how mechanisms in different contexts may result in intended and unintended outcomes; see Supplementary Table 3 for example of interview guide.(18)

Local patient safety incident reports

Up to four separate requests were made for reports relevant to the GP service at each participating site (excluding those with no GPs). These data were usually in the form of printed anonymised reports that were given in person to the researcher (AC) who copied the free text directly onto a remotely accessed secure computer platform (PISA platform) at Cardiff University.

Data analysis

We analysed themes based on the initial theories generated through a rapid realist review,(13) and analysis of national patient safety incident reports (see Table 2).(8) We used NVivo 11 (QSR International) to support categorisation of data with separate folders for documents relevant to each GP service model (inside-integrated, inside-parallel, outside-onsite and no GPs). We coded data using 'if, then, because statements' to capture the nuance of different contexts.(19) We classified the level of qualitative evidence supporting these statements in a hierarchy based on meta-ethnography principles.(20) We discussed findings weekly within the study team (ME, AC, FD, AE) and co-applicants including patient and public representatives, going back to the data for further information or clarification as required.

Data synthesis

High level themes and positive and negative outcomes, grouped with mechanisms at individual, department and wider system levels, were used as a coding framework to categorise the statements across folders. We then used Microsoft Excel for Mac (version 16.35) to consolidate statements into Context-Mechanism-Outcome configurations (CMOCs).(19) We mapped CMOCs developed for each GP service model between service models, synthesising using Pawson's theory-building processes (juxtaposition, reconciliation, adjudication and consolidation).(21) We then developed a master Excel file to capture the whole process and populate the evidence (where available) for refined CMOC development.

Incorporating formal theory

We then incorporated Croskerry's dual-process model of reasoning to help explain GPs' clinical decision-making in emergency department settings.(12,22) The model is based on two distinct decision-making processes: 'System I' and 'System II', originally described by Kahneman.(23) 'System I' is fast, effortless, intuitive and automatic; it is typical in diagnostic decision-making by experienced clinicians who rely on pattern recognition or shortcuts (heuristics). 'System II' is slow, laborious and logical.(23) Croskerry applied this to clinical medicine and specifically to emergency department settings, describing the risks of cognitive biases in these settings.(22,24–26) Findings were structured around the diagnostic process of generation, evaluation and verification.(25,26)

Stakeholder feedback

A national stakeholder event was held in Bristol in December 2019 with a wide range of English and Welsh-based attendees (n=56) including policymakers or commissioners (n=4), managers (n=6), patient and public contributors (n=13), ED doctors (n=6), nurse practitioners (n=2), GPs (n=5), academics including study co-applicants (n=17) and administrators (n=3). Results were presented and feedback was collected from small group facilitated discussions.

Patient and public involvement

Patients and public members were involved in the study design and co-applicants in the funded study.(16) They used their experience as NHS patients to contribute to this research. They supported recruitment and involvement of public and patient contributors to the stakeholder event. They were involved in discussing the draft data and preparing this paper.(27)

Results

We included data from 66 staff interviews (Supplementary Table 4), fieldnotes from researcher observations at the purposive sample of 13 case site sites and 14 local patient safety incident reports relevant to the GP services (Supplementary Table 5).

Clinical directors from nine of the 10 hospitals with a GP service had no patient safety concerns and did not describe any patient safety experiences related to the GP service. Two clinical directors from inside-integrated model sites perceived that since GPs had been working in the department, overall patient safety had *improved* because more experienced, permanent GPs could also give advice to other staff members (Hospitals 3 and 8). Safety incidents (and potential risks) regarding the GP service were described by senior staff at one case site with a GP service (inside-parallel model) and at a site that no longer had GPs working there. These supported our initial theories developed through earlier analysis of a sample of national patient safety incident reports describing diagnostic error associated with GP service models.(8)

Refined theories from these case site qualitative data focussed on staff perceptions about how patient safety incidents described in our initial theories could be mitigated. They are presented under the following care processes: facilitating appropriate streaming decisions; supporting GPs' clinical decision-making; and improving communication between services (Table 2).

Table 2: Initial and refined theories described as context – mechanism – outcome (CMO) configurations

Please insert Table 2 here

1. **Facilitating appropriate streaming decisions**

Streaming nurses having difficulty identifying patients with appropriate conditions

for the GP service was a common theme reported by ED doctors, nurses and GPs across

many case study sites (Hospitals 4, 6, 9, 10).

> *"It's a **bit hit and miss**, it **depends on what the help of the triage nurse is**…*
> *sometimes patients you're seeing are inappropriate, I've seen epiglottitis which*
> *really I shouldn't be seeing as a GP in A&E, but there's **lots of things that I could***
> ***be seeing which I don't end up seeing, because they're deemed to be an A&E***
> ***case**." GP Hospital 4 (inside-parallel model)*

An experienced Advanced Nurse Practitioner (ANP) described junior triage nurses'

inexperience as negatively influencing streaming decision-making (Hospital 10). He

described how inexperienced nurses may not explore *why* patients had presented to the

emergency department with the risk of missing 'red flag' symptoms such as the possibility of

cauda equina syndrome when a patient with chronic back pain presents with a history of

incontinence. Understaffing in one case study site was also reported to delay the streaming

process and triage because the streaming nurse then also had to administer treatments.

Many hospital case study sites were happy to share learning about how and why the

streaming process worked well and how it had been modified, such as measuring basic

observations, to ensure appropriate patients were streamed to the GPs.

> *"So to give you **an example of how we've learned**… **we had a child seen in the***
> ***triage room, had the eyeball, went to Urgent Care**… **thankfully the GP picked up***
> ***that this was a sick child, got them to the resus room, ended up in intensive***
> ***care**. So we had a **very rapid learning** and a very rapid PDSA cycle there." Clinical*
> *Director, Hospital 3 (inside-integrated model)*

Guidance relevant to the local GP service was considered important but an

experienced streaming nurse who could use their clinical judgement was felt to be essential

(Hospitals 7, 9, 10). Appropriate communication between services allowed the streaming

nurse to understand the capacity of the different streams (situation awareness) which again influenced streaming decisions (Hospital 10).

2. Supporting GPs' clinical decision-making

There was some evidence of GPs working within integrated service models seeing a wider range of patients, with some reports of fracture mismanagement (Hospitals 4, 14) and not following standard emergency department child safeguarding protocols (Hospitals 3, 4).

> *"A child was seen who was **known to have had input from social services**… and* *the GP had seen them**, and they **really should have rung social services** just to* *alert them that the patient had been seen… but **they just seemed to maybe not** **have quite the right level of concern and appreciation of the need to keep social** **services involved**." Clinical Director, Hospital 4 (inside-parallel model)*

Unclear governance processes across different commissioning organisations, including job description, induction and supervision requirements, were felt by a senior consultant at one site to contribute to confusion about which patients the GP service should be managing.

> *"**I was concerned from the outset really**, about the **lack of clarity behind where** **was the governance**, what were they supposed to be seeing, was it within their* *normal scope of practice… We had **an incident of a missed cervical spine** **fracture**." Emergency Consultant, Hospital 4 (inside-parallel model)*

Table 3: Factors described to influence different approaches to GPs' clinical decision-making in emergency department settings

Please insert Table 3 here

Four CMOCs were developed from GP interview data (Table 3) to describe how working in ED settings influenced (or not) their use of acute investigations and clinical decision-making: a usual GP approach; a more cautious GP approach; the choice to take a GP approach or an emergency medicine approach; and the expectation to adopt an emergency medicine approach. Croskerry's framework was then applied to consider the risks of cognitive errors at different stages of the diagnostic process and further refine these theories. (25,26)

Diagnosis generation

Generation of one or more diagnostic hypotheses begins early in the process, even before the clinical encounter with the patient has begun.(25) GPs described making early clinical decisions, before the patient had been seen, based on the written triage notes, sending inappropriate patients back to the ED if necessary. Establishing the *acuity* of the patient's condition was a common strategy described by GPs working in ED settings: categorising patients into those that required immediate medical attention or investigation and those that did not, rather than focussing on a specific diagnosis.

> *"It's **a different approach to working in the community** where there's usually nothing serious – it's important not to miss a serious diagnosis. My approach: **Are there red flags? If not – can I treat it? Can I redirect**?" Comments from GP Fieldnotes, Hospital 9 (inside-parallel model)*

GPs' perceptions of the 'pre-test' *prevalence* of serious disease and whether the cohort of patients was similar to usual primary care patients or a higher risk group was described to impact their clinical decision-making. GPs who perceived the cohort of patients was at higher risk described a different level of concern and managing risk in the ED

than in usual primary care. Initial information-gathering from the patient, to understand why they had presented to the ED that day, and the background of the presenting complaint, was described by some experienced GPs as key to diagnostic decision-making.

Diagnostic evaluation

Many GPs described excluding serious disease by ruling out 'worst case' as the priority,(28) often through careful history and examination even if acute investigations were available. However, some GPs described a lower threshold to admit patients for investigation to exclude serious disease than they would in the community setting because of the increased prevalence of serious illness in ED settings.

Diagnostic verification

GPs described the priority being to exclude serious disease rather than making an actual diagnosis, which may not be possible due to limitations of the service.

> *"For me my sort of mental triage system is **'do I need to admit you, yes or no, and can I deal with your issue now'**, i.e. is it **long-term in which case I probably can't do very much**, because **I don't have access to all of your notes** and it's not very practical**, I can't organise blood tests, I can't organise scans… in which case I'll have to send you back to your GP.**" GP, Hospital 7 (inside-parallel model)*

The strategy of 'safety netting' was described as good practice to help manage diagnostic uncertainty – advising patients of potential worsening symptoms and when further medical advice should be sought.(29)

3. **Improving communication between services**

Some hospital case sites were observed or reported to have limited communication between the GP and ED services. Incompatible computer systems were linked to two patient safety incidents where patient assessment and treatment had been delayed (Hospitals 3, 6), Supplementary Table 5. Receptionists at another case site described how they had three different computer systems to operate (for the ED, the GP-ED service and the GP out-of-hours service), which led to duplicate patient entries on different systems and increased the likelihood of patients becoming lost in or between the different systems (Hospital 7).

The lay out of the department, with distance between the services limiting face-to-face communication, was felt to contribute to very limited communication between services at one site (Hospital 11). An 'us and them' culture was observed and reported at another site (despite there being good opportunity for face-to-face communication with the GPs working out of an ED cubicle). At this site juniors were not encouraged to ask the GPs for advice (Hospital 4).

> *"We're **not very integrated with the ED** and we don't, we don't feel very integrated, **it still feels a bit us and them**." GP, Hospital 11 (outside-onsite model)*

Another site however, with a separate GP service, reported good communication through the senior nursing team - reviewing on-the-day capacity and skillsets and moving staff between services to meet patient demand. The integrated GP services reported good communication which was perceived to promote interprofessional learning. At these sites the GPs were employed on a regular rather than locum basis and there were good opportunities for face-to-face communication. GPs were described not only to give clinical

advice but also provide advice on primary care referral pathways which ED staff reported as helpful. We observed a sense of multidisciplinary respect, trust and teamwork with clear ED clinical leadership (Hospitals 3, 8, 14). Strong GP leadership was seen at several case study sites and also reported to improve communication between the services and perceived to improve patient safety (Hospitals 3, 10, 14).

Programme theory

Our findings are summarised in a programme theory, conceptualising the complexity of patients and pathways, to describe factors perceived to facilitate GPs delivering safe patient care in or alongside EDs (Supplementary Figure 1).

Discussion

Summary

A programme theory was developed from observations, incident reports and in-depth realist interviews to describe how safe patient care was perceived to be delivered when GPs work in or alongside EDs: experienced streaming nurses using early warning scores and local guidance to facilitate appropriate streaming decisions; clear governance processes to support GPs' clinical decision-making depending on the intended role (traditional GP or emergency medicine clinician); and compatible computer systems, experienced regular GPs and strong clinical leadership to encourage communication and teamwork between the emergency and GP services.

Strengths and limitations

Thirteen case study sites were purposively recruited for theory testing and refinement (including different service models in different sized hospitals, geographically spread across England and Wales). These were visited by the same two researchers who applied a consistent realist approach testing and refining initial theories developed from the literature,(13) and analysis of national patient safety incident reports,(8) through realist teacher-learner interview techniques to explore how human factors influenced clinical risk and work-as-done rather than work-as-intended, when GPs practiced in this setting.(11,18) Longer visits and observations of clinical consultations, rather than interview data subject to staff and researcher perceptions, would have provided stronger evidence about 'work as done'. Quantitative data are required to understand the effects of GPs working in EDs on safety outcomes, and on comparative effects with other professional groups.

The work was conducted as part of a larger study which dictated the sampling approach. Selecting sites from a national survey with a response rate of 42% limited sampling although we had information on an additional 20% of hospitals, collectively with no evidence of non-response bias.(7) No sites were recruited where GPs screened patients at the front door in a *gatekeeper role*, however there may be departments operating this service model of which we were unaware.

Comparison with existing literature

GPs are recognised as low patient safety incident reporters, which may have contributed to the low number of local reports identified.(30) There is little national guidance on which emergency department patients should be streamed to GP services,(5,31) or by whom, with our work supporting an experienced senior nurse over algorithmic methods.(32)

The dual process model of reasoning has previously been applied to GPs working in a similar high-risk setting, out-of-hours, where they would not know their patients.(33) Similar management approaches were described: dividing patients into those with serious (or potentially serious) conditions and patients likely to have non-serious conditions; and using 'safety netting' to manage diagnostic uncertainty.(33) An initial patient-guided search, or the 'golden minute' is described as key in the information-gathering stage of the well-known Calgary-Cambridge clinical consultation.(34,35) GPs described how they used their communication skills to gather information, and to exclude serious disease, which may explain their reduced use of acute investigations.(36)

Communication failures, exacerbated by hierarchical differences and conflicting roles and role ambiguity, are associated with increased patient safety incidents,(37,38) while

interventions to improve communication between healthcare professionals such as briefings, or 'huddles', are associated with improved patient safety outcomes.(39,40) Clinician involvement in leadership positions in hospitals is associated with improved quality of patient care.(41)

Implications for practice/policy

Since this work was conducted, urgent and emergency care services along with almost all NHS service provision have changed due to the COVID-19 pandemic, including telephone screening of emergency department 'walk-in' attendances,(42) and remote GP consultations.(43) The learning from this work and human factors concepts can be applied when evaluating these new services for quality improvement purposes, including: how streaming (or telephone screening and 'care navigation') decisions are made; how remote consultations may impact on GPs' clinical decision-making; and how to promote communication between new emergency service models to ensure improved patient safety.(44)

Conclusion

The complexity of the ED setting and the patients presenting to it, who are often seen by more than one staff member who do not know them or their previous state of health, provides particular challenges for staff including GPs. We propose a programme theory to describe how safe care is perceived to be facilitated when GPs work in or alongside emergency departments including: appropriate streaming decisions; supporting GPs' clinical decision-making; and improving communication between services. Our findings

can be used as a focus for more in-depth human factors investigations to optimise work conditions in this complex care delivery setting.

3918/4000 words

How this fits in

- Experienced streaming nurses using local guidance and early warning scores communicating with the GPs about capacity and skillsets can facilitate appropriate streaming decisions.
- GPs should be aware that the ED patient cohort is likely to be at higher risk, with greater pre-test probability of serious disease, compared to usual community primary care and understand where the risks of cognitive biases are and how to mitigate them.
- GPs adopting an emergency medicine role will require clarification of experience and skillset, scope of practice, standard operating procedures and understand the process for feedback, review and supervision in the department.
- Compatible computer systems, experienced regular GPs, opportunity for face-to-face communication between clinician groups and strong clinical leadership may encourage communication and teamwork between the emergency and GP services.

Ethical approval

The fieldwork for case study site visits, local patient safety incident report analysis and staff and patient interviews were carried out after ethical approval from Wales Research Ethics Committee on 23/07/2017 (ref 17/WA/0328).

Conflicts of interest

None

Author's contributions

AC, ACS, FD, LD, PA, MC, JD, BE, BH, JH, PH, TH, AP, AS, HS and AE are co-applicants and were involved in the conceptualisation of this study. ME assisted in data collection and analysis. AC prepared the first draft of the manuscript which was reviewed and critically appraised by all authors.

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Table 1: Realist definitions(12,13)

Context (C)	Pre-existing conditions which influence the success or failure of different interventions or programmes
Mechanism (M)	Characteristics of the intervention and people's reaction to it; how it influences their reasoning
Outcome (O)	Intended and unintended results of the intervention as a result of a mechanism operating within a context
Initial rough theory	An early theory, informed by available evidence, about how, why, for whom, and in what circumstances the intervention is thought to work, described as a context-mechanism-outcome (CMO) configuration
Refined theory	An initial theory that has been refined using primary or secondary evidence
Programme theory	An overall high-level theory summarising how the intervention works, developed using the theories refined from the data
Formal theory	Existing social theories used as a lens through which to examine the data; otherwise known as middle range or substantive theory

Box 1: Variables used to purposively sample emergency departments

- GP service implemented in the emergency department since 2010
- Different service models: Inside integrated; Inside parallel; Outside on site; and sites with no GP service
- Spread of geographical locations in England and Wales
- Variety of contexts – including hospitals in rural and urban locations/towns, small and large hospitals, higher vs lower attendances
- Variation in patient streaming methods – who streams, streaming criteria and guidance
- Variation in the physical layout of the GP service in relation to the ED
- Variation in relationships with the GP out-of-hours service