# Perceived Barriers and Benefits of Using Transcutaneous Spinal Cord

# Stimulation on Children With Spina Bifida from Carer's Perspectives.

Jessica Truman<sup>1</sup>, Holly Spencer<sup>2</sup>

<sup>1</sup>Cardiff and Vale University Health board, <sup>2</sup>School of Healthcare Sciences, Cardiff University



## INTRODUCTION

**Spina bifida** is a congenital condition caused by incomplete closure of the neural tube during foetal development (Brea et al. 2025). The most common and severe form, myelomeningocele, involves the spinal cord and nerves protruding through an opening in the spine, affecting motor, sensory, and autonomic function (Karsonovich et al. 2025).

**Transcutaneous spinal cord stimulation (tSCS)** is a promising non-invasive neuromodulation technique that delivers electrical currents to the spinal cord via skin electrodes. By doing so it aims to facilitate neural activation and improve motor and autonomic function (Taylor et al. 2021), helping to address the impairments associated with spinal cord damage in spina bifida.

Existing research on tSCS is promising but limited with a focus on quantitative results, including improved muscle activation (Keller et al. 2021; Motavalli et al. 2019), gait speed (Hofstoetter et al. 2020) and autonomic function (Kreydin et al. 2022). The **experiences of families and carers using this intervention remain unexplored** despite them playing an important role in facilitating the treatment at home.

# PURPOSE

**tscs** from the **perspective of carers** to help identify factors influencing the use of tscs in children with spina bifida and guide future areas of research.

Abstract No: 783 Theme: Transformational Technology

### **METHODS**

**Design:** Qualitative interpretive.

Participants: Carers of children with spina bifida who have used

tSCS within the past 12 months (N = 3).

Recruitment: Purposive sampling via a gatekeeper.

**Data collection:** Online focus group. Audio recordings were transcribed verbatim.

Analysis: Reflexive thematic analysis was used to interpret the

data and generate themes for discussion.

## <u>IDENTIFIED THEMES (4) AND SUB THEMES (11)</u>

#### **Mobility**

"I think it got my child walking. I genuinely think it gave them the tone to start"

"Since they've been doing it, their legs have got stronger and stronger. They're moving them really purposefully, like they're able to take steps now which I think is amazing"

"[My child] wanted to walk but they were heavily reliant on an aid...then we started [tSCS] and within four weeks they took their first independent steps"

#### **External Observations**

"It's been the same physio they've seen since they were a baby... they think the [tSCS] is a big part of why they're making such progression... they've recommended it to other families."

"My extended family have noticed the difference in them when we've been doing the [tSCS] and when we haven't."

#### Cost

"The reality is nobody is going to fund this equipment [tSCS], because they don't know what it's going to do. There's no evidence."

"I imagine that some people wouldn't be able to afford [tSCS]."

"I don't think you should be penalised if you can't afford the equipment."

#### **The Learning Curve**

"I was always really scared that I was going to put the number [intensity] too high and it would hurt them"
"I suppose the more I did it, the more confident I got with it...

to the point that I could probably have stuck [the electrode pads]
on with my eyes shut"

#### **Worth the Effort**

"I'll do it for as long as it seems to benefit them."
"We'll keep using it as long as we're seeing that
[my child] is improving, even [though] I don't know
how much it is and isn't impacting."

#### Finding a Balance

"I think it's worth it, so we have muddled through. But it is a lot. It can feel quite intense when you've already got so much to remember for your child."

"My biggest challenge has been trying to fit it in."

## Tolerance

**Physical Awareness** 

"Since they've been doing [tSCS], they have become more

and more aware of when they're doing a bowel

movement

"[I saw my child] linking their head to the rest of their

body, almost acknowledging there was something below

their belly button"

"They'd get a little bit fed up of being sort of stickered up and what have you but... that's just an age thing. I don't think it ever hurt them."

"You can sort of see them looking as if to say, 'are you doing that to me?', 'what's going on?'. Other than that, they weren't phased in the slightest."

# Impact Practicalities

**Physical** 

Safety

Rationale and understanding

#### The Current Evidence

"I was trying to find any research I could and there wasn't anything."

"I probably would have done it sooner if there was more out there, but that I just couldn't find anything. So, I was quite sceptical."

#### Low Percieved Risk

"Stickers on their back. It can't do anything negative... It'll either do nothing or do something positive. As far as we were concerned, we just sort of said, yeah go for it." "We came to the conclusion that it was very unlikely it was going to do anything harmful for them. But there was a chance that it might do something to improve their mobility."

#### **Awareness of The Intervention**

"I was speaking to professionals about if they were aware of [tSCS] and no one seemed to be aware of anything."

"It's sad it's not better known about"

"I wasn't 100% sure that it was like a genuine thing when they first mentioned it. I was like, I'm not sure about this."

#### CONCLUSION

Four key themes emerged: current evidence, safety, practicalities, and physical impact. Within these, carers identified several benefits of tSCS, reporting it was well tolerated and improved their children's mobility and physical awareness. Carers also viewed tSCS as a low-risk intervention, increasing their willingness to trial it.

Despite its promise, successful implementation depends on addressing barriers such as high equipment costs, availability of carer education, limited evidence, and low awareness among professionals. Although the initial learning curve was demanding, carers adapted quickly. Balancing tSCS with other caregiving duties was difficult but did not prevent long-term use, and all carers found the intervention worthwhile.

**IMPLICATIONS** 

Further research is needed to strengthen the evidence base and establish clinical guidelines for tSCS in children with spina bifida. Improving professional awareness and access to carer training, as well as addressing cost and access barriers, will be key to supporting safe and equitable use of the intervention in paediatric neurorehabilitation.

#### ACKNOWLEDGEMENTS

This research was not funded. We sincerely thank the carers who generously gave their time and shared their experiences.

#### ETHICAL APPROVAL

Ethical approval was granted in 2024 by the Cardiff University School of Healthcare Sciences Ethics Committee.



# Scan me

## CONTACT US

To receive a copy of the complete research project or to ask any questions please email us at:

Jesstruman@icloud.com

SpencerHL@cardiff.ac.uk

CSP Student
Conference
20 November

