Technoleg Iechyd Cymru
Health Technology Wales

Topic Exploration Report [1]

Dynamic elastomeric fabric orthoses for children and young people with neurological conditions

What is a Topic Exploration Report?

Topic Exploration Reports are not health technology assessments. These reports provide a high-level briefing on new topics submitted to Health Technology Wales and are not based on exhaustive or systematic literature searches. Instead, they rely on a focussed scan of key resources.

What evidence is used in a Topic Exploration Report?

Priority is given to summarising the most relevant or useful evidence, rather than covering all possible evidence. Information reported is typically based on abstracts and study authors' own conclusions, rather than detailed scrutiny of full texts.

What are the aims of a Topic Exploration Report?

Topic Exploration Reports offer an overview of the available evidence on a topic and aim to highlight any uncertainties or gaps in the evidence. These reports outline the quantity and type of evidence found, but no critical appraisal or formal evidence synthesis is conducted.

How should a Topic Exploration Report be used?

Topic Exploration Reports can be used to indicate what evidence may be available for a topic, and do not provide definitive guidance on how a technology should be used. The evidence presented within the reports should be interpreted with caution.

[1] Cyfieithu dogfennau HTW wedi'u cyhoeddi o'r Saesneg i'r Gymraeg
Translation of published technical HTW documents from English into Welsh

Topic exploration report number	TER628
Topic	Dynamic elastomeric fabric orthoses for children and young people with neurological conditions
Summary of findings	Dynamic elastomeric fabric orthoses (DEFOs) are garments that consist of sections of compressive elastic material, that can cover the whole body or a particular area. They are designed to provide support and sensory information that will improve the functional ability of people with conditions that are characterised by limitations to sensory and proprioceptive abilities and movement, such as cerebral palsy. HTW previously produced a topic exploration report (TER) on this topic in 2021, and we performed an update search to determine whether more recent evidence was available for children and young people specifically. We identified one systematic review on the effect of DEFOs on the spatio-temporal gait parameters in children with cerebral palsy and two randomised controlled trials (RCTs). The systematic review concluded DEFOs, in combination with physical therapy, appear to have a positive effect on spatio-temporal gait parameters, but that evidence is limited. The two RCTs compared conventional physical therapy to wearing DEFOs in addition to physical therapy. There were statistically significantly greater improvements in outcomes for the DEFO-wearing group compared with the control group in one RCT, whilst the other trial only showed greater improvement in the DEFO-wearing group for stride length and pelvic tilt compared with the control group. Areas of uncertainty include notable heterogeneity between studies, including the device types used, and it is also unclear whether all devices have appropriate regulatory approval. Sample sizes were generally small and there is variety in the outcome measures used in different studies. Additionally, there is little evidence on indications other than children with cerebral palsy and no economic evidence was identified.

Introduction and aims

Dynamic elastomeric fabric orthoses (DEFOs) are garments that consist of sections of compressive elastic material, for example Lycra, of varying thickness stitched together using specific tensions and directions of pull. They are made-to-measure and can cover the whole body or a particular area. The orthoses are designed to provide support and sensory information that will enable the user to 'feel' their body more and then use this sensory information to improve their functional ability. Dynamic elastomeric fabric orthoses can be used in conditions that are characterised by limitations in sensory and proprioceptive function and movement, such as cerebral palsy. Examples of DEFOs include Elements Body (Allard UK), DMO products (DM Orthotics), and TheraTogs (TheraTogs, Inc). DMO products appear to have an appropriate CE mark, however we were unable to determine whether other devices have regulatory approval.

Currently available management options for children with cerebral palsy include physiotherapy, occupational therapy, rigid orthoses, botulinum toxin injections, and surgical interventions. Dynamic elastomeric fabric orthoses are used as part of a multidisciplinary neurorehabilitation approach, often as an adjunct to physiotherapy and occupational therapy.

Health Technology Wales researchers searched for evidence on the clinical and cost effectiveness of DEFOs for children and young people with neurological conditions.

Evidence overview

Previous topic exploration report

This topic was the subject of a previous HTW topic exploration report: TER312 (HTW 2021). This earlier TER looked at the use of DEFOs in a broader population than the current report, but acknowledged that the majority of the evidence was for children with cerebral palsy. TER312 referenced a 2013 scoping report by Health Improvement Scotland that concluded there was limited clinical effectiveness evidence, and no cost effectiveness evidence, on the use of DEFOs for children with cerebral palsy. HTW then identified primary and secondary evidence published after this scoping report; three systematic reviews on the use of suit orthoses in children and adolescents with cerebral palsy and several primary studies for different indications were identified. Studies were generally non-randomised with small sample sizes and the evidence included in systematic reviews was of low quality. Based on the evidence identified in TER312, HTW's Assessment Group decided not to add DEFOs to the work programme due to insufficient evidence for full appraisal.

We have performed a high-level update search for evidence published since the search dates of TER312 (September 2021) and this is outlined below.

Guidance

Two NICE guidelines that are relevant to the population of this TER were identified: NG62 Cerebral palsy in under 25s: assessment and management (NICE 2017) and CG145 Spasticity in under 19s: management (NICE 2016). However, neither of these guidelines mentions DEFOs.

Secondary evidence

A systematic review published just after TER312 was completed was identified. This review investigated the effect of dynamic suit orthoses on the spatio-temporal gait parameters in children with cerebral palsy (Belizón-Bravo et al. 2021). Twelve studies were included and there was significant heterogeneity in the study designs, sample sizes, and interventions used. Study quality was also variable (as assessed by study authors using the Checklist for Measuring Study Quality), though higher quality studies showed significant changes in walking speed, cadence, stride length and step length symmetry post-intervention. The authors concluded

Evidence overview

dynamic suit orthoses in combination with physical therapy appear to have a beneficial effect on spatio-temporal gait parameters, but that evidence is limited.

Primary evidence

Two randomised controlled trials (RCTs) were identified. Emara et al. (2024) investigated the effect of TheraTogs dynamic orthotic garments on foot pressure distribution, postural control and endurance in children with spastic diplegic cerebral palsy. Thirty-four children, aged 8 to 10 years, were randomised to a control group that received conventional physical therapy or an intervention group that wore TheraTogs in addition to receiving physical therapy. The intervention group demonstrated significant improvements in foot pressure distribution, paediatric balance scale, trunk control measurement scale, trunk position sense, and six-minute walking distance. The control group also showed improvement, however, improvements were statistically significantly greater in the study group.

Another RCT investigated the effects of DEFOs applied to the lower trunk and pelvis on balance, gait parameters, and pelvic symmetry in children with cerebral palsy (Bezgin et al. 2025). Twenty-six children (aged 4 to 10 years) were randomised; though after four withdrawals, 10 remained in the control group and 12 in the orthosis group. The control group received an 8-week, twice-weekly physiotherapy and rehabilitation programme and the orthosis group received this as well as wearing lower body and pelvis DEFOs. There was no change in gait speed or cadence, and there was no difference in balance scores between the groups. Only stride length and pelvic tilt in the frontal plane of the pelvis improved significantly in the orthosis group compared to the control group.

Areas of uncertainty

- We were unable to confirm whether all identified DEFOs had appropriate regulatory approval to be used in the UK.
- There is notable heterogeneity between studies across various aspects, including study designs, sample sizes, and interventions used.
- Sample sizes in most studies were small, however, this may be reflective of the small population.
- There is variety in outcome measures that have been used in studies.
- There is little evidence available in indications other than cerebral palsy.
- No cost-effectiveness evidence was identified.

Literature search results

Health technology assessments and guidance
HTW. (2021). Dynamic elastomeric fabric orthoses for neuromuscular disease and central nervous system conditions. Topic exploration report TER312. Health Technology Wales. Available at: https://healthtechnology.wales/reports-guidance/dynamic-elastomeric-fabric-orthoses/ [Accessed 16 October 2025]. NICE. (2016). Spasticity in under 19s: management. Clinical guideline CG145. National Institute for Health and Care Excellence. Available at: https://www.nice.org.uk/guidance/cg145 [Accessed 16 October 2025]. NICE. (2017). Cerebral palsy in under 25s: assessment and management. NICE guideline NG62. National Institute for Health and Care Excellence. Available at: https://www.nice.org.uk/guidance/ng62 [Accessed 16 October 2025].
Evidence reviews and economic evaluations
Belizón-Bravo N, Romero-Galisteo RP, Cano-Bravo F, et al. (2021). Effects of dynamic suit orthoses on the spatio-temporal gait parameters in children with cerebral palsy: a systematic review. Children. 8(11). doi: https://doi.org/10.3390/children8111016
Individual studies
Bezgin S, Novak I, Çobanoğlu G, et al. (2025). Effects of dynamic elastomeric fabric orthoses in children with cerebral palsy: A single-blind randomized controlled trial. Prosthet Orthot Int. 49(2): 220-7. doi: https://doi.org/10.1097/pxr.0000000000000425 Emara HA, Al-Johany AH, Khaled OA, et al. (2024). Effect of the dynamic orthotic garment on postural control, and endurance in children with spastic diplegic cerebral palsy: a randomized controlled trial. Journal of Multidisciplinary Healthcare. 17(null): 419-28. doi: https://doi.org/10.2147/JMDH.S438474

Date of search	16 October 2025
Concepts used	Dynamic elastomeric fabric orthosis, dynamic suit orthoses, Lycra garments, neurorehabilitation, cerebral palsy, children, paediatric, young people

Proposed research question and evidence selection criteria (if selected)

Proposed Research question	**What is the clinical and cost effectiveness of dynamic elastomeric fabric orthoses for children and young people with neurological conditions compared to standard care?**

	Inclusion criteria	Exclusion criteria
Population	Children and young people with neurological conditions, such as cerebral palsy	
Intervention	Dynamic elastomeric fabric orthoses in addition to standard care	
Comparison/ Comparators	Physiotherapy Occupational therapy Rigid orthoses Botulinum toxin injections Surgical interventions	
Outcome measures	Spatio-temporal gait parameters Postural control/endurance Balance measures Patient adherence Patient acceptability Health related QoL Resource use Economic outcomes	

Proposed specialities	**Paediatrics, physical disability**