INTRODUCTION
In the United Kingdom the use of dynamic elastomeric Fabric Orthoses (DEFO) in the treatment of children with cerebral palsy has increased with various subjective outcomes reported, however apart from local internal service audits of service, there has been not been a general review. This paper will report on clinical note interrogation for a number of paediatric rehabilitation services to identify current practice in the area of neuropathic onset scoliosis to provide an indication of the outcomes experienced. The use of these orthoses have been in use for over 15 years and have linked in with the neurodevelopmental therapy principles with interesting outcomes. There is a paucity of evidence, although a handful of single case conference aural presentations and published papers in recent years have reported changes in Cobb angle, improved patient symmetry and compliance. This paper provides an overview to enable clinicians to develop the field of evidence for dynamic orthoses.

METHOD
The study interrogated clinical notes from 5 paediatric rehabilitation centres (mean age of 9 years 1 month, SD 4y7mo) to identify the current practice across the south of England for children with neuropathic onset scoliosis. The research was funded by the British government with interrogation, recording and analysis carried out by the University of Plymouth as part of a Knowledge Transfer Partnership. The author was involved in an advisory role only. University Ethics were obtained for the use of a search matrix to enable data collection over a period of 3 months referencing notes that ranged back up to 7 years. The matrix included 14 key terms including Cobb angle, therapy treatment, diagnosis, usage and types of orthotic intervention and physical abilities including the gross motor functional classification scale (GMFCS).

RESULTS
The study showed a collection of 180 sets of notes which fore filled the inclusion criteria over which 121 children had or were using DEFO suits to manage scoliosis. The demographic showed 53/47% mix of females/ males, with 44% cerebral palsy and 23% with developmental delay. Of the children with cerebral palsy 64% were GMFCS level 4 or 5. Eighty percent of the children presented with a typical “C” shaped curve with the remaining 20% showing an “S” curve. Seventy two percent presented with a mild curve [Medan Cobb Angle 22.6° (SD7.4°)] and 14% moderate [mean Cobb angle 50.2° (SD 8.0°)]. Of the 77 children with confirmed scoliosis 39 (45%) used DEFOs, 18 (23%) used spinal TLSO braces and 20 (32%) used no bracing. Sixty percent were using DEFO suits as a prophylactic intervention whilst 43 used the suits with developing curves. Seven out of eight children with Cobb angle recorded over time show < 10 degrees of curve progression. Five out of fifteen children (33%) had spinal surgery with reported complications.

DISCUSSION
The use of the DEFOs suits in the treatment of scoliosis was more common in the management of less severe curves and as a preventative measure due to the knowledge that the low tone trunks seen in many of the children in particular those with developmental delay and cerebral palsy are known to proceed to require spinal interventions. It known that all children with GMFCS level 4/5 will require surgery (Graham, 2013) and that it currently costs between $50-72K per operation (Diefenbach et al., 2013). Therefore by acting earlier it is possible to prevent or slow scoliosis development (Matthews and Crawford, 2006) and has recently been shown that by stabilising the trunk early on to encourage learned patterning to occur it can improve gross motor function (Curtis, 2015).

By early intervention, the DEFOs encourage learning of body position and can provide translator and compressive forces to enable control of smaller curves without the need for semi / rigid thoracic lumbar sacral orthoses (TLSO) whose compliance is questionable for this population. This suggests that we are treating the unbalanced muscle tone and not the Cobb angle in enable a learned pattern of movement indeed it is understood that the child with cerebral palsy has a different internal model of self, compared to the normal population suggesting that this increases the challenges for correct motor sequential planning (Kurz, 2014). The use of DEFO can therefore improve this due to the feedback feedforward loop and assist in learning balance and improved core stability. The latter being the requirement for good sitting posture.

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A review of current clinical practice in five centres in the UK providing dynamic elastomeric fabric orthoses as an orthotic intervention for scoliosis management in children with neuropathic onset scoliosis.

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CONCLUSION
This paper provides a basis for further research, but does at least enable an overview of outcomes to be acknowledged. Dynamic elastomeric fabric suits for spinal management does have a place in the early intervention in children presenting with scoliosis.

CLINICAL APPLICATIONS
Dynamic Elastomeric Fabric Orthoses can provide spinal correction for children with neuropathic onset scoliosis.

REFERENCES