

# Effect of continuous intrathecal baclofen therapy in children: a systematic review

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## PUBLICATION DATA

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## ABBREVIATIONS

AACPDM	American Academy of Cerebral Palsy and Developmental Medicine
ICF-CY	International Classification of Functioning, Disability and Health: Children and Youth
ITB	Intrathecal baclofen
IVB	Intraventricular baclofen
MAS	Modified Ashworth Scale

**AIM** To investigate the effects of continuous intrathecal baclofen (ITB) therapy in children with cerebral palsy (CP) and other neurological conditions.

**METHOD** This systematic review was conducted using standardized methodology, searching four electronic databases (PubMed, Embase, CINAHL, Cochrane Library) for relevant literature published between inception and September 2017. Included studies involved continuous ITB as an intervention and outcome measures relating to all International Classification of Functioning, Disability and Health: Children and Youth (ICF-CY) components.

**RESULTS** Thirty-three studies were identified, of which one, including 17 children with spastic CP, produced level II evidence, and the others, mainly non-controlled cohort studies, level IV and V. Outcomes at body function level were most frequently reported. Results suggest continuous ITB may be effective in reducing spasticity and dystonia in CP, as well as other neurological conditions, and may improve the ease of care and quality of life of children with CP, but the level of evidence is low.

**INTERPRETATION** Despite three decades of applying ITB in children and a relatively large number of studies investigating the treatment effects, a direct link has not yet been demonstrated because of the low scientific quality of the primary studies. Further investigation into the effects of continuous ITB at all levels of the ICF-CY is warranted. Although large, controlled trials may be difficult to realize, national and international collaborations may provide opportunities. Also, multicentre prospective cohort studies with a long-term follow-up, employing harmonized outcome measures, can offer prospects to expand our knowledge of the effects of continuous ITB therapy in children.

Since the 1980s the use of intrathecal baclofen (ITB), administered continuously through an implanted pump has been described.<sup>1</sup> While ITB is primarily employed to reduce intractable spasticity, it has also been reported for treatment of dystonia.<sup>2</sup> Although studies in children have focused mainly on spastic cerebral palsy (CP), in practice ITB therapy is also applied in dyskinetic CP and other stable or progressive neurological conditions.<sup>3</sup> The aim of ITB therapy in children is to reduce spasticity and/or dystonia with the goal of improving comfort and facilitating gross motor function and personal care.<sup>4</sup>

Baclofen, a  $\gamma$ -aminobutyric acid agonist, acts selectively on  $\gamma$ -aminobutyric acid B receptors in the brain and the spinal cord,<sup>5</sup> and produces an inhibitory effect on presynaptic transmitter release and an effect at postsynaptic terminals, decreasing neuronal activity by decreasing potassium conductance.<sup>6</sup> The administration of continuous ITB requires neurosurgical intervention. The ITB pump is placed abdominally and an attached catheter is placed in

the intrathecal space. Through this system, the baclofen is directly delivered into the cerebrospinal fluid and bypasses the blood–brain barrier. This makes the required dose lower and the beneficial effect larger at the intended site, preventing side effects such as sedation, which can limit application of oral baclofen in children.<sup>7</sup>

There is evidence that ITB is an effective therapy for reducing spasticity in children with CP in the short term, mainly from single-bolus trial studies.<sup>8,9</sup> Since 2000, three systematic reviews on ITB treatment in children with CP have been published. The systematic review by Butler and Campbell,<sup>4</sup> following American Academy of Cerebral Palsy and Developmental Medicine (AAPDM) guidelines, included studies published from inception (first study published in 1991) to March 2000, reporting the effect of ITB in spastic and dystonic CP (14 and four studies respectively). Level I evidence from two studies for the effect of single bolus injections on reducing spasticity at the level of body function was determined. Evidence of the effects of

continuous ITB was mostly of low quality (level IV and V evidence) and the authors concluded that only a possible linkage of continuous ITB to long-term reduction in muscle tone or to improvements in function, ease of care giving, comfort, and decreased musculoskeletal deformity in spastic CP could be suggested. For dystonic CP, evidence was characterized as preliminary because of the very limited number of studies, which were all of small sample size and low level of evidence.

Following on from this work, Kolaski and Logan published a systematic review in the succeeding time period,<sup>10</sup> also applying AACPDm methodology. They were able to include 29 studies on the effects of ITB in children with CP published between March 2000 and April 2007. Studies on a mixed population were also allowed, although they were reported on separately and conclusions were focused on CP. Again, studies on outcomes of continuous ITB in children were mainly of scientific evidence level IV and V, thus not challenging Butler and Campbell's conclusions regarding the lack of the evidence for continuous ITB in CP.<sup>4</sup>

Hasnat and Rice conducted a Cochrane systematic review on ITB for treating spasticity in children with CP, including only controlled trials up to September 2013.<sup>11</sup> They identified randomized controlled trials, of which only one involved continuous ITB, with a follow-up of 6 months, and the other four concerned the short-term effect of a single bolus, mainly on spasticity measures. The conclusion was that there is some evidence that ITB is effective for reducing spasticity in children with CP in the short term. The effect of ITB on long-term spasticity outcomes was reported as less certain. The authors reported some evidence that ITB improves ease of care and comfort and quality of life of patients, but small sample sizes and methodological issues in the studies mean that these results should be interpreted with caution.

The purpose of the current systematic review is to summarize and appraise the current level of evidence for the effect of continuous ITB therapy through an indwelling pump in children with CP, and other stable and progressive neurological conditions. Although studies outside CP are generally of small sample size due to rarity of the diseases, an increasing number of reports on the effects of ITB in other diagnoses has emerged.<sup>3</sup> We did not include single-bolus or external-pump studies as these studies do not allow conclusions on longer-term effects, especially not in the domain of activities, participation, and environmental factors, or other dimensions such as quality of life. We aimed to identify the outcomes at the various levels of functioning as defined by the International Classification of Functioning, Disability and Health: Children and Youth (ICF-CY).<sup>12</sup>

## METHOD

A systematic review was performed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.<sup>13</sup> The AACPDm methodology for

## What this paper adds

- There is low-level evidence for continuous intrathecal baclofen (ITB) in children with cerebral palsy.
- Continuous ITB is effective in reducing spasticity and dystonia in non-controlled cohort studies.
- Evaluation of individual goals and systematic assessment of long-term effects in large cohort studies are required.

systematic reviews was used as a guideline for the process.<sup>14</sup>

## Search strategy

To identify all relevant publications, searches were performed in the PubMed, Embase, CINAHL (via EBSCO), and the Cochrane Library (via Wiley) databases from inception to 8th September, 2017. The following terms were used (including synonyms and closely related words) as index terms or free-text terms: 'intrathecal' and 'baclofen' and 'children'. The references of the identified articles were searched for relevant publications. Duplicate articles were excluded. All languages were accepted if the abstract was available in English. The full search strategy for all databases can be found in Appendix S1 (online supporting information).

## Study selection

Studies were included if (1) a paediatric population (age <18y) was described; (2) continuous ITB or intraventricular baclofen (IVB) was administered through an implanted pump; and (3) the outcome was reported based on at least one of the ICF-CY components 'body function and structure', 'activities', 'participation', and/or 'environmental factors' (e.g. ease of daily care). Studies were excluded if all participants were 18 years of age or older. In case of a mixed paediatric and adult population, studies were included if over 90% of the population was younger than 18 years of age. If less than 90% of the population were younger than 18 years, studies were included only if the results could be extracted for the paediatric patients from the publication itself or by contacting the authors. For these studies, only the results of the paediatric population are reported.

Two authors (BHMM and CGVR) screened titles and abstracts to identify potentially eligible studies. Any discrepancies in study selection were resolved in a group discussion with all authors. Full texts of the selected studies were retrieved and independently assessed by author pairs to check for inclusion and exclusion criteria. Any disagreements were again discussed in group consultation with all authors.

Level of evidence and methodological quality were assessed independently by two authors (varying author pairs) following AACPDm guidelines.<sup>14</sup> Differences were resolved in group consultation. According to the AACPDm methodology, only studies with level I, II, and III evidence were rated for quality. Studies graded as level IV and V were not judged for quality because the study designs limit the internal validity of the evidence.

## Data extraction

Data extraction was completed independently by two authors (varying author pairs) independently and agreed upon in group consultation. Study characteristics were recorded and summarized. Outcomes were categorized according to ICF-CY components.

Owing to the heterogeneity of patient groups, low quality of the studies (lack of control groups), and different follow-up times and notation of outcomes, it was not possible to perform a meta-analysis. In order to present the magnitude of differences on different outcome measures before and after intervention, we calculated effect sizes. The most important condition to be able to perform this calculation was that the data in the studies were presented as mean and standard deviation before and during ITB treatment, or that we could ascertain these from the data provided. As most results were normally distributed, effect sizes ( $d$ ) were calculated by means of a Cohen's  $d$  analysis, with 0 representing no effect; 0.20 a small effect; 0.50 a moderate effect; 0.80 a large effect; and over 1.0 a very large effect (Fig. 1).<sup>15</sup> Confidence intervals (CI) were calculated using the formula presented in Figure 2.<sup>16</sup> Results were categorized based on the ICF components and diagnosis group ('CP' and 'other neurological conditions').

## RESULTS

The initial database search yielded 1140 results. After removing duplicates, abstracts of the remaining 709 articles were screened for inclusion, of which 622 articles were subsequently excluded. Forty-seven articles remained for full-text review. Of these, 33 articles met the inclusion and exclusion criteria (see Fig. S1, online supporting information).

One study produced level II evidence; the other 32 studies were level IV (cohort studies without a concurrent control group) and level V (case reports).<sup>14</sup> This was a small, randomized controlled trial,<sup>17</sup> which included 17 children with spastic CP of gross motor function classification system (GMFCS) levels IV and V (Table SI, online supporting information). The children were randomized to receive an indwelling baclofen pump after either 1 month or after 6 months (waiting-list control group). After 6 months of follow-up, greater improvements were seen in the

$$d = \frac{\bar{x}_{\text{post}} - \bar{x}_{\text{pre}}}{SD_{\text{pooled}}}$$

$$SD_{\text{pooled}} = \sqrt{\frac{(n_{\text{post}} - 1)SD_{\text{post}}^2 + (n_{\text{pre}} - 1)SD_{\text{pre}}^2}{n_{\text{post}} + n_{\text{pre}}}}$$

**Figure 1:** Formula for calculating effect sizes ( $d$ ), where  $\bar{x}$  represents the mean of the outcome before (pre) and after (post) intervention,  $SD$  is standard deviation (pooled), and  $n$  is the number of patients.

$$95\% \text{ CI} = d \pm 1.96 \times SD[d]$$

$$SD[d] = \sqrt{\frac{n_{\text{post}} + n_{\text{pre}}}{n_{\text{post}} \times n_{\text{pre}}} + \frac{d^2}{2(n_{\text{post}} + n_{\text{pre}})}}$$

**Figure 2:** Formula for calculating confidence intervals (CIs) of effect sizes ( $d$ ), where  $\bar{x}$  represents the mean of the outcome before (pre) and after (post) intervention,  $SD$  is standard deviation (pooled), and  $n$  is the number of patients.

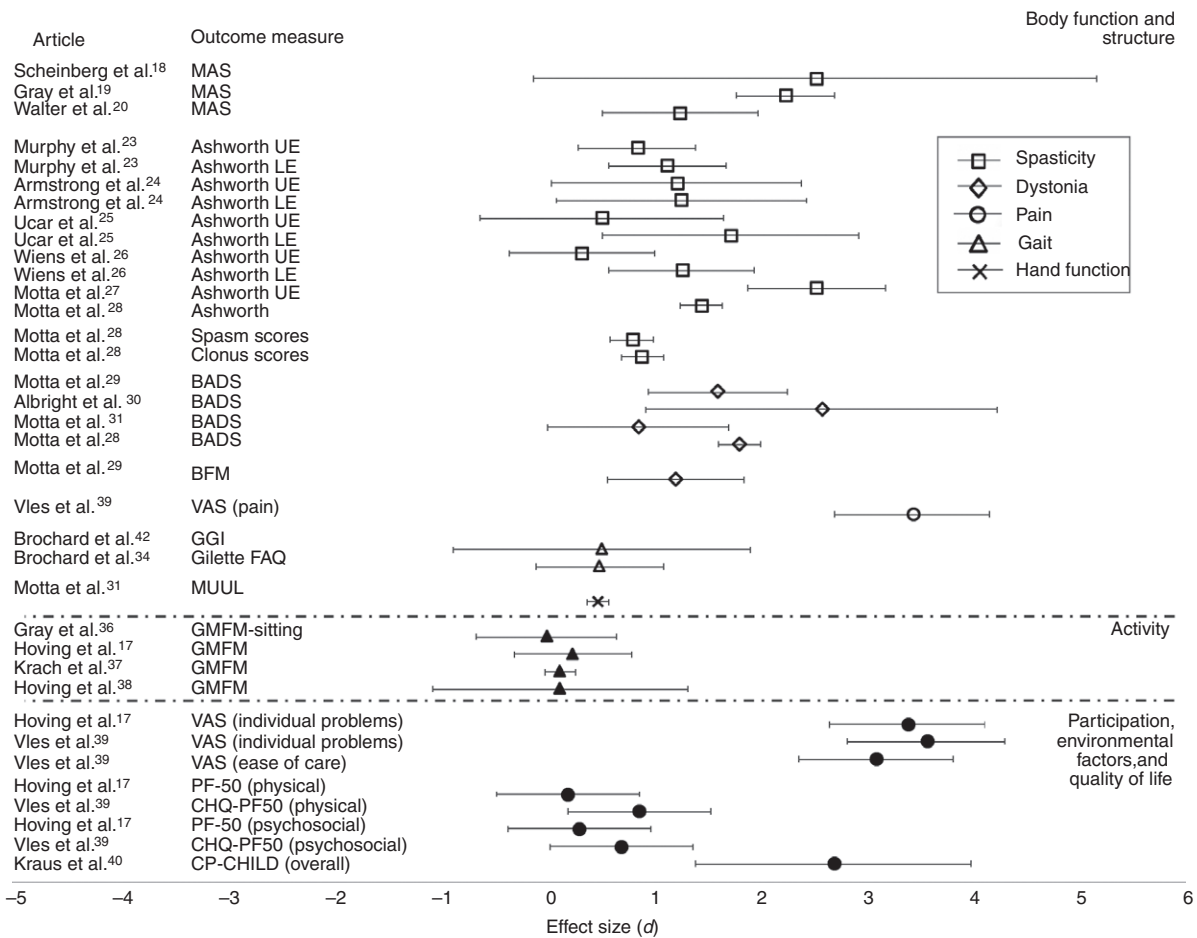
treatment group compared with the control group on all domains of the ICF-CY. Limitations were the small sample size, and patients and investigators not being blinded to a baclofen pump being implanted or not.

A summary of the characteristics of all included studies is given for CP (Table SII, online supporting information) and for other neurological conditions (Table SIII, online supporting information). Most studies ( $n=25$ ) included children with CP exclusively. Eight studies included other neurological conditions (anoxia, head injury, near-drowning, and progressive neurological disorders). Studies mainly included non-walking children (for CP: GMFCS levels IV and V). Study populations ranged from single case studies to a cohort of 200 patients. Duration of follow-up varied from 1 month to 9 years after pump implantation. For the one publication of level II evidence study quality was scored, as 6/7 points (Table SIV, online supporting information).

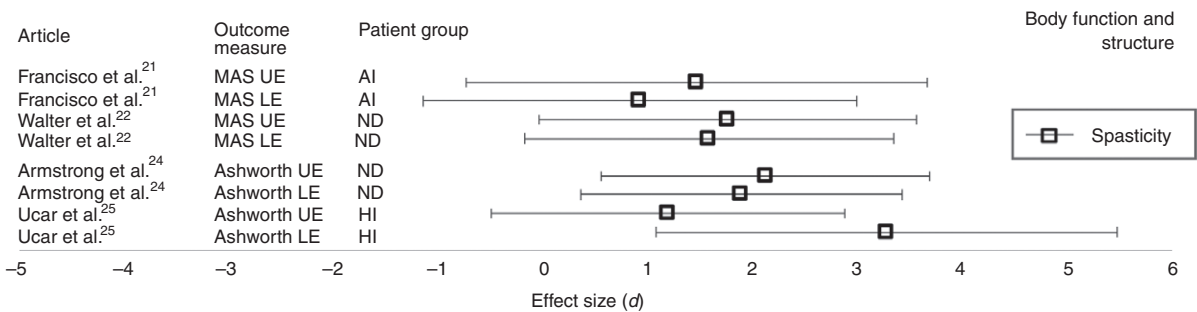
## Body function and structure

For the studies for which we were able to compute effect sizes, small-to-very-large effect sizes were found for reduction of spasticity, measured with the Ashworth or Modified Ashworth Scale (MAS) in children with CP (Fig. 3).<sup>18–28</sup> Broad confidence intervals (CIs) were found for most outcomes, owing to small sample size. Two studies in children with CP included a larger number of patients (37 and 200 respectively).<sup>19,28</sup> In these studies, a large effect was found for reduction of spasticity on both the MAS and Ashworth scores ( $d=2.25$  [95% CI 1.78–2.71] and  $d=1.46$  [95% CI 1.27–1.66] respectively). Large-to-very-large effect sizes were found for improvement of dystonia measured with the Barry-Albright Dystonia Scale in children with dyskinetic CP.<sup>28–31</sup> Two articles reported Barry-Albright Dystonia Scale outcomes after IVB treatment.<sup>30,32</sup> These results were similarly positive. Various other spasticity or dystonia measures, such as spasm and clonus scale and the Burke–Fahn–Marsden scale, all showed moderate-to-large effect sizes for improvement in CP.<sup>28,29,31</sup>

For improvement of gait quality (measured with the Gillette Gait Index), a moderate effect size was reported.<sup>33,34</sup> For the quality of arm/hand function (measured with The Melbourne Assessment of Unilateral Upper Limb Function), a moderate effect size was found for children with CP.<sup>31,33,34</sup>



**Figure 3:** Effect sizes of intrathecal baclofen (ITB) on different domains of the International Classification of Functioning Disability and Health: Children and Youth (ICF-CY) mode in patients with cerebral palsy. MAS, Modified Ashworth Scale; UE, upper extremity; LE, lower extremity; BADS, Barry-Albright Dystonia Scale; BFM, Burke–Fahn–Marsden scale; VAS, visual analogue scale; GGI, Gillette Gait Index; FAQ, Functional Assessment Questionnaire; MUUL, Melbourne Assessment of Unilateral Upper Limb Function; GMFM, Gross Motor Function Measure; PF50, Parent Form 50; CHQ-PF50, Child Health Questionnaire Parent Form 50; CP-CHILD, Caregiver Priorities and Child Health Index of Life with Disabilities.



**Figure 4:** Effect sizes of intrathecal baclofen (ITB) on different domains of the International Classification of Functioning Disability and Health: Children and Youth (ICF-CY) mode in other neurological conditions. MAS, Modified Ashworth Scale; UE, upper extremity; LE, lower extremity; AI, anoxic injury; ND, near-drowning; HI, head injury.

Studies of children with neurological conditions other than CP reported that outcome measures of spasticity and dystonia were all level IV to V, with small sample sizes (varying from 1–16 patients). Improvement of spasticity (measured with MAS and Ashworth score) was observed in several stable neurological disorders: anoxic brain damage,



traumatic brain injury, and near-drowning,<sup>21,22,24,25,30</sup> showing moderate-to-large effect sizes (Fig. 4). One case study showed improvement of spasticity (MAS and Ashworth scores) in a child with Sjögren-Larsson syndrome.<sup>33</sup> One study reported on two children with Lesch-Nyhan syndrome, one child with amyotrophic lateral sclerosis, and one with Dandy-Walker syndrome but as part of a bigger (mainly CP) group, and MAS results were not separately reported for these patients.<sup>35</sup> Dystonia (measured with the Barry-Albright Dystonia Scale) improved after intervention in case studies of patients with traumatic brain injury, anoxic brain injury, methylmalonic aciduria, panthothenate kinase deficiency, and adrenoleukodystrophy.<sup>30,32</sup> A case study of a patient with striatal lesions showed no improvement of dystonia.<sup>30</sup>

### Activities

Small effect sizes were found for improvement of gross motor function measured with the Gross Motor Function Measure when comparing results before and after intervention in children with CP in the level II study and three level IV to V studies.<sup>17,36–38</sup>

For neurological conditions other than CP, no studies were found that addressed outcomes in the activities domain.

### Participation and environmental factors

In the included studies, outcome measures of participation were rarely reported. As most children on ITB treatment have very limited independent mobility and are largely dependent on the care of others, participation goals are often individual and associated with environmental factors such as ease of care for caregivers. Some studies report outcomes in this domain, mainly using quality-of-life instruments. Results of evaluation of individual goals by means of a visual analogue scale showed significant improvement on these goals for children with spastic CP ( $p < 0.05$ ) in the single level II study.<sup>17</sup> As there were two studies reporting this measure that included the same study group, only the study with the longest follow-up period is presented in Figure 3.<sup>38,39</sup> A small improvement was also observed by caregivers using the Child Health Questionnaire Parent Form 50 for physical and psychosocial items in the same study.<sup>17,39</sup> The other reported outcomes in this domain were of low level of evidence (IV and V). A large effect was observed for the overall Caregiver Priorities and Child Health Index of Life with Disabilities score.<sup>40</sup>

In a retrospective study of patients with progressive neurological disease, improvement of daily care was observed in approximately 25% of the patients, with deterioration in approximately 13%.<sup>41</sup>

### Complications

Complications of ITB therapy were not reported systematically. Wound infection and meningitis after ITB therapy were described.<sup>23</sup> Scoliosis (not compared with natural

development), pump migration, catheter rupture, and leakage of cerebrospinal fluid were also reported.<sup>19,20,23,34,35</sup>

## DISCUSSION

ITB therapy is being used by an increasing number of centres worldwide in the treatment of spasticity and dystonia in children with CP and other neurological conditions. Establishing the effectiveness of this treatment in paediatric populations and ascertainment of attainable goals is crucial. In the present systematic review, we have sought to summarize the current level of evidence for the effect of continuous ITB therapy in children. This review identified 33 studies reporting the effects of continuous ITB (or IVB) via an implanted pump, in children with CP and other neurological conditions, on the various components of the ICF-CY. This systematic review is the first to summarize effects of continuous ITB for all paediatric diagnoses.

The level of evidence of the available studies is generally low. We identified only one level II study; the other studies were of level IV and V evidence. This limits our ability to draw any definitive conclusions on the effects of continuous ITB in children. However, by expanding the review to other diagnoses, and reporting effect sizes of before and after intervention outcome measures on various levels of the ICF-CY, we can add some aspects of interest to the findings from the preceding systematic reviews on ITB in children with CP.<sup>4,10,11</sup>

The outcome measures of spasticity and dystonia on the level of body function in the current review of the literature all point in the same direction, suggesting that there might be a positive effect of ITB therapy on the level of body function and structure in children with CP and other neurological disorders. Although the level of evidence is low, this is in line with the high level of evidence found for the effect of intrathecal bolus injection on spasticity.<sup>11,17</sup>

Regarding activity level, there is some evidence to suggest that gross motor function might improve in CP; however, the number of studies reporting outcomes on this level is limited and effect sizes are small. Small effects are in line with expectations when considering that most patients in the reports are non-walking (GMFCS level IV or V), and improvement of gross motor function in this population is not likely.

Outcome measures for participation and environmental factors are rarely reported. In the one level II study, improvement of individual goals in this domain was significant.<sup>17</sup> Most children on ITB treatment have very limited independent mobility and are largely dependent on the care of others, making participation goals individual and associated with environmental factors such as ease of care for caregivers. Quality of life, including measures of care burden, individual goals, and Caregiver Priorities and Child Health Index of Life with Disabilities scores, might improve for patients with CP.<sup>17,39,40</sup> Sufficient evidence on quality of life outcomes was not available for other neurological conditions.

Regarding the effects of ITB in different diagnosis groups, the effect sizes on the level of body function and structure appear to be comparable between CP and other stable neurological diagnoses, although the level of evidence is low for these mostly rare disorders, owing to very small patient groups and poor study design. With regard to the other components of the ICF-CY, there are not enough studies to compare results between diagnoses. For the progressive neurological diagnoses, only case reports are available on body function and structure outcome measures, limiting any conclusions on the effect of ITB in this group of children. Owing to the rarity of these diseases, evidence will always be of a lower level simply as a result of the low numbers. In our opinion, despite all the limitations, reports of treatment effects are valuable for evaluation of individual treatment plans in these often devastating diseases. A different course can be expected compared with stable disorders, and even though ITB might be effective, the disease progression itself is associated with deterioration of function, requiring a different approach to setting goals for treatment.<sup>41</sup>

Complications of ITB therapy were not reported systematically in the included studies. Overall, the complication rate is estimated at approximately 0.40 per pump per year.<sup>35,42</sup> Complication risk is an important consideration to take into account when deciding on ITB therapy, especially as children who are eligible for pump implantation often have a vulnerable physical condition.<sup>43</sup>

### Limitations of the study

The vast majority of studies have a low level of evidence, limiting the possibility of drawing firm conclusions about the effects of continuous ITB in children. We identified only one level II study, which was a small randomized controlled trial. A limitation in this trial was that patients and researchers were not blinded to the child having a baclofen pump or not.<sup>17</sup> The state of evidence reflects the limitations of randomized controlled studies in (paediatric) rehabilitation medicine and, in particular, problems with this kind of design where long-term outcomes are concerned.<sup>44,45</sup>

Low levels of evidence for studies on continuous ITB in children, combined with small and heterogeneous patient groups and varying outcome measures, did not enable us to provide a meta-analysis. However, we gave an impression of the magnitude of before intervention and after intervention differences on different domains and different patient groups by presenting effect sizes. Nevertheless, one must be aware that effect sizes can be biased when applying these to cohort studies and are likely to be overestimated.<sup>46,47</sup>

### CONCLUSION

Despite three decades of applying ITB in children, and a relatively large number of studies investigating the treatment effects, a direct link has not yet been demonstrated

because of the low scientific quality of the primary studies providing the evidence. There is low-level evidence of reduction of spasticity and dystonia in children with CP and other stable neurological conditions on level of body function. At the level of activities, participation, and environmental factors, evidence is even more limited.

### Recommendations for clinical practice

Treating children with severe neurological conditions with ITB is complex. While there is some low-level evidence of the effectiveness of the treatment on measure of spasticity and dystonia, goals directed at activities of daily life and environmental factors (such as burden of care) need to be well defined in order to make adequate treatment decisions for the individual patient and their caregivers. There is a considerable risk of complications, which caregivers, as well as the medical team, should be aware of. These considerations make it clear that excellent management and dedication (of doctors, patients, and caregivers), a multidisciplinary approach and adequate infrastructure of the health care system are crucial.

### Future directions for research

To obtain a better understanding of implications of ITB treatment for children and their caregivers, future research should address all ICF-CY components, including the activities and participation domain, environmental factors, attainment of individual goals, health-related quality of life, and patient/caregiver satisfaction measurements. Systematic analysis of complications in the different diagnosis groups is also warranted. Although large controlled trials may be difficult to realize, especially for rare neurological disorders, national and international collaborations may provide opportunities. Also, multicentre collaborations and international agreement on the use of a comprehensive set of measures would enable pooling of data to increase sample sizes and allow meaningful prospective cohort studies.<sup>48</sup> Emerging national and international networks and registry-based infrastructures offer opportunities to expand our knowledge of the effects of continuous ITB therapy in children.

### ACKNOWLEDGEMENTS

The authors have stated that they had no interests that might be perceived as posing a conflict or bias.

### SUPPORTING INFORMATION

The following additional material may be found online:

**Appendix S1:** Search strategy.

**Figure S1:** Flow chart of selection process.

**Table SI:** Evidence table (cerebral palsy)

**Table SII:** Summary of studies (cerebral palsy)

**Table SIII:** Summary of studies (other neurological conditions)

**Table SIV:** Conduct of group-design studies

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**RESUMEN****EFEITO DA TERAPIA COM BACLOFENO INTRATECAL CONTÍNUO EM CRIANÇAS: UMA REVISÃO SISTEMÁTICA**

**OBJETIVO** Investigar los efectos de la terapia con baclofeno intratecal continuo (BIT) en niños con parálisis cerebral (PC) y otras condiciones neurológicas.

**METODO** Esta revisión sistemática utilizó metodología estandarizada, buscando en cuatro bases de datos electrónicas (PubMed, Embase, CINAHL, Cochrane Library) literatura relevante publicada entre el comienzo de BIT y septiembre del 2017. Los estudios incluidos involucraron BIT continuo como una intervención y la medición de resultados incluía todos los componentes relacionados a la Clasificación Internacional del Funcionamiento, de la Discapacidad y de la Salud para niños y jóvenes (ICF-CY en inglés).

**RESULTADOS** Treinta y tres estudios fueron identificados, de los cuales uno, incluyó 17 niños con PC espástica, produciendo un nivel II de evidencia, y los otros, principalmente estudios de cohorte no controlados nivel IV y V. Los resultados sobre el nivel de función corporal, fue reportado con mayor frecuencia. Los resultados sugieren que la BIT continua puede ser efectiva en reducir la espasticidad y la distonía en PC, así también en otras condiciones neurológicas, y puede facilitar el cuidado y la calidad de vida de los niños con PC, pero el nivel de evidencia es bajo.

**INTERPRETACIÓN** A pesar de tres décadas de aplicación de BIT en niños, con un relativo largo número de estudios investigando los efectos del tratamiento, el impacto terapéutico aún no ha sido bien demostrada debido a la baja calidad científica de los estudios primarios. Investigaciones posteriores sobre el efecto de la BIT continúa en todos los niveles de la ICF-CY son necesarios. A pesar de que estudios controlados prolongados pueden ser difíciles de realizar, colaboración nacional e internacional puede proveer oportunidades para su realización. Además, estudios de cohortes prospectivos con un seguimiento a largo plazo, utilizando mediciones de resultados estandarizadas, pueden ofrecer perspectivas que expandan nuestro conocimiento sobre los efectos de la terapia continua con BIT en niños.

**RESUMO****EFEITO DA TERAPIA COM BACLOFENO INTRATECAL CONTÍNUO EM CRIANÇAS: UMA REVISÃO SISTEMÁTICA**

**OBJETIVO** Investigar os efeitos da terapia com baclofeno intratecal (BIT) contínuo em crianças com paralisia cerebral (PC) e outras condições neurológicas.

**MÉTODO** Esta revisão sistemática foi realizada usando metodologia padronizada, buscando quatro bases de dados (PubMed, Embase, CINAHL, Cochrane Library) pela literatura relevante publicada desde o início até setembro de 2017. Os estudos incluídos envolveram BIT contínuo como intervenção, e medidas de resultado relacionadas a todos os componentes da Classificação Internacional de Funcionalidade, Incapacidade e Saúde: crianças e jovens (CIF-CJ).

**RESULTADOS** Trinta e três estudos foram identificados, dos quais um, incluindo 17 crianças com PC espástica, produziu evidência de nível II e os outros, principalmente estudos de coorte não controlados, níveis IV e V. Os resultados no nível de função corporal foram os mais frequentemente relatados. Os resultados sugerem que o BIT contínuo pode ser efetivo para reduzir espasticidade e distonia em PC, assim como outras condições neurológicas, e pode melhorar a facilidade do cuidado e qualidade de vida de crianças com PC, mas o nível de evidência é baixo.

**INTERPRETAÇÃO** Apesar de três décadas de aplicação de BIT em crianças, e do número relativamente alto de estudos investigando os efeitos do tratamento, uma relação direta não foi demonstrada ainda devido à baixa qualidade dos estudos primários. Futuros estudos investigando os efeitos do BIT contínuo em todos os níveis da CIF-CJ são necessários. Embora estudos grandes e controlados sejam difíceis de realizar, colaborações nacionais e internacionais podem dar esta oportunidade. Ainda, estudos multicêntricos de coorte prospectivos com acompanhamento de longo prazo, utilizando medidas de resultados harmonizadas, podem oferecer perspectivas para expandir nosso conhecimento sobre os efeitos da terapia com BIT contínuo em crianças.