

iCAHE JC Critical Appraisal Summary

Journal Club Details

Date of submission	June 2012
Journal Club location	Country Health SA
JC Facilitator	Heather Bean
JC Discipline	Physiotherapy

Clinical Scenario

What interventions (esp. shoe based) are effective for children who toe-walk?

Review Question/PICO/PACO

- P** children (prefer 0-8) who toe-walk – (idiopathic or autism related, ie not really looking at neurological conditions such as CP), other terms might be tippy toe walking?
- I** shoe based intervention including podiatry interventions such as shoe stiffening, orthotics, heel-raises, (also interested but less so in splinting and fixed plasters)
- C** physiotherapy and stretches or no intervention
- O** continuance/cessation of toe-walking, range of movement, calf length

Article/Paper

Clark E, Sweeney J, Yocum A & McCoy S (2010) Effects of Motor Control Intervention for Children With Idiopathic Toe Walking: A 5-Case Series, *Pediatric Physical Therapy*, 22: 417-426.

Please note: due to copyright regulations CAHE is unable to supply a copy of the critically appraised paper/article. If you are an employee of the South Australian government you can obtain a copy of articles from the [DOHSA librarian](#).

Article Methodology:	Case Series
Returned JC on:	June 2012
By CAHE staff member:	Olivia Thorpe



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Ques No.	Yes	Can't Tell	No	Comments
1	✓			<p>Was the purpose stated clearly? Yes, the purpose of this study was to describe and evaluate the effects of a motor control intervention in young children diagnosed with idiopathic toe walking.</p> <p><i>Population:</i> The included were 5 children aged 30 to 72 months with a parent estimate of toe-walking frequency to be 50% or more.</p> <p><i>Intervention:</i> 2 one-hour sessions per week over 9 weeks</p> <p><i>Outcome:</i> As mentioned on page 420, the primary objective of motor control intervention was to <u>facilitate a more erect standing and walking posture to secure the ground reaction force relative to the ankle axis</u>. In standing, additional treatment objectives were facilitated with a plantigrade foot, such as <u>neutral calcaneous alignment and neutral knee extension</u>. Measurements collected: gait measurement using gait event detector (GED); estimate toe walking using parent visual analog scale (VAS); ankle dorsiflexion range measurement.</p>
2	✓			<p>Was relevant background literature reviewed? Yes, relevant background literature has been provided in the introduction.</p>
3	✓			<p>Describe the study design. Was the design appropriate for the study question? YES A multiple case series design was used which was appropriate to address the purpose of the study. This design could adequately 'describe' the effects of the intervention.</p>
4	✓ ✓			<p>Was the sample described in detail? Yes, participant characteristics are included on table 1 (pg 419).</p> <p>Describe ethics procedures. Was informed consent obtained? Parents signed an informed consent, approved by Rocky Mountain University of Health Professions institutional review board.</p>
5	✓			<p>Were the outcome measures reliable? Were the outcome measures valid?</p>

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			<p>The test-retest reliability (0.85) for the GED is good. It was mentioned that the validity was moderate; technical difficulties became apparent with individual participants in the current study.</p>
6	✓		<p>Intervention was described in detail? YES The intervention was described in detail (p420). There was pre-intervention gait measurements followed by a 9 week intervention phase including one hour sessions twice a week. There were then follow-up examinations after the intervention was completed.</p>
7			<p>Results were reported in terms of statistical significance? The results were presented using percentages, p-values and rs values (to show correlation) in the text and graphs.</p> <p>Were the analysis method(s) appropriate? The analysis methods were appropriate. Due to the small sample size, non-parametric statistics were used (discussed on p 421).</p> <p><i>Bottom line result:</i> Intervention did improve ankle mobility (ankle range of motion), however, additional components appear necessary to attain spontaneous heel-toe gait.</p> <p>What was the clinical importance of the results? Were differences between groups clinically meaningful? <i>Journal Club answer:</i> Purpose</p> <ul style="list-style-type: none"> • Purpose was clear, discussion re author’s ideas about immaturity of gait and lack of upright posture. Some agreed with this in terms of poor central stability and overuse of extension for postural control and sometimes general hypermobility. • However also group feel sensory issues are important and child’s level of arousal (eg toe walk more when excited, change surfaces etc) and there is evidence re this (Carlie) Prematurity can be a contributor. <p>Literature</p> <ul style="list-style-type: none"> • Evidence mainly is for casting and surgery, much of the evidence is case series similar to this rather

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				<p>than RCTs and results are fairly inconclusive. Also discussed relapse rat if treat the tightness (consequence) rather than the cause- toe walking and its contributing factors.</p> <ul style="list-style-type: none"> The group was interested re use of botox, and unaware of it being used in SA for this purpose as eligibility for Botulinim toxin on PBS is “<i>Dynamic equinus foot deformity due to spasticity in ambulant paediatric cerebral palsy patients two to 17 years of age inclusive.</i>” (Medicare website) Claire was aware of planned use in a case in WA for ITW. Some discussion of natural history, some stop toe-walking spontaneously but is it “normal” in under 3’s as suggested by some authors. No evidence we know of or found in this search for orthotic, shoe based interventions such as stiffening or heel raises. Nil else re motor control strategies. <p>Study design</p> <ul style="list-style-type: none"> no further comments Sample- relevant age group to our work, noted that all walked by 12 months which if refers to independent is and early group, hence not representative of delayed group we often see it in. Variability of sample noted. Can’t generalise results sample of 5 anyway. Outcome measures GED-liked that it allowed measurement in natural environment however issues with function and validity of device. The group questioned validity of parent report as they might be attending more to child’s gait during treatment period due to focus on it. Intervention-The group liked the internet access to the appendix with detailed intervention description as this is rarely available. The podiatrists found it interesting to see what might be in a physio program. Program was very intensive 1-1 sessions 2x week for 9 weeks. No-one in CHSA can provide this intensity, usually home program for parents. <p>Results</p> <ul style="list-style-type: none"> Improvement in DF was significant however clinicians questioned the error in measurement, manually with a goniometer in this age group.
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			<p>Discussion re one clinician doing the testing and hence not being blinded to previous results.</p> <ul style="list-style-type: none"> Unstable heel-strike frequency is a feature of this group so hard to show a change. <p>Variable GED- not change, 1 did, 3 trended to and 1 worse!- variability in results noted.</p> <p>Clinical importance of the results Clinicians felt that when there is little evidence, case series such as this can start to build the evidence around treatment approaches. Low generalisability due to numbers, study design, variability between cases and results- hence more evidence is needed. Clinicians liked the attempt to treat via a multi-factorial approach rather than just treat the sequela (tightness) which is the only thing there is currently evidence around. This study does not really support this high level of intensive intervention but does not provide enough evidence to say it is not useful. It hence does not contradict using some of these activities in a home program but might influence what we say to parents re expected results.</p>
8	NA		<p>Drop outs reported? N/A (none did) Did any participants drop out from the study? No, it was a case series only involving five children and all participants were 'followed-up' and measurements obtained at 30 day post intervention.</p>
9			<p>What did the study conclude? Conclusions were appropriate given study methods and results? <i>Journal Club answer:</i></p> <p>Conclusion The summary was appropriate although they seemed reluctant to say results didn't really support use of their intensive program. They suggested extra elements were needed in conjunction or instead of. Did acknowledge more evidence needed.</p> <p>Further discussion points Discussion also referred to: Evans A (2010): The pocket podiatry guide- paediatrics. Churchill Livingstone. Chapter 11 Toe walking.</p> <p>What should we be doing?</p> <ul style="list-style-type: none"> Importance of differential diagnosis. Briefly discussed clinicians' awareness of CP, MD etc. Also noted that sometimes it can be the first

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				<p>entry to health system for child with autism and importance of sensitive holistic approach. Other considerations are global developmental delay, leg length discrepancy (esp. if unilateral but may be bilateral) and baby walkers and prone sleeping.</p> <ul style="list-style-type: none"> • Is it best to reassure and watch under 3 as suggested by Evans?- does toe-walking spontaneously resolve- what are people's impressions? Some felt we should provide ideas if parents are concerned, if DF is restricted or the child is on toes all the time. Emphasis on preventing tightness. Approaches used include sensory strategies, stretches, active stretch positions incl. walk on heels, awareness strategies including wet footprints. • What about orthotics, shoe stiffening, heel raises?- podiatry ideas in the absence of evidence. Several had experience of using heel raises, either in shoe or externally on heel (EVA and can grind down as progresses) to bring the floor up to the child, experience heel WB and then bring down. Anecdotally effective in a few cases. This approach is attributed to Beverley Cusick- I found reference to this (although not a journal article) at http://www.healio.com/orthotics-prosthetics/pediatrics/news/print/o-and-p-business-news/%7BC707B1FF-A793-4F21-8A98-93AFCB212FFE%7D/New-Approach-to-Equinus-Deformity-Management-Waiting-to-Gain-Traction • Some had used stiff soled boots or carbon fibre plates to stiffen shoe and prevent toe-walking although question re how well plates are tolerated. One had problem with reddening of dorsum of foot in boots when pushed up onto toes anyway. Several had used aquaplast orthotics to help with mid-foot collapse short term, esp. after serial casts to put the foot in a better position for muscle activity. One case a child starting to tighten again after serial casting- could use heel raise to bring down, but does this eliminate natural stretch during day, incl. squat? • Angela's book which relies on higher level evidence suggests only treat if reduced ROM. It
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				<p>was noted that WCH don't use serial plasters under 3 due to tendency to relapse. Exceptions to this are when tightness is preventing acquisition of walking skills- 2 cases noted of success, one subsequently diagnosed as CP although presentation atypical. Serial casting not done a lot in county, Claire has done in Pt Augusta with orthotist and possibly some at AHCHS. Access to WCH physio for fixed casting is more difficult- used to be direct referral physio- physio as we did screening. Now needs to go GP and then to ortho clinic to physio with long wait times especially as seen as low priority for orthopaedic clinic.</p> <ul style="list-style-type: none"> • Discussed use of night splints after casting- variable experience, WCH usually use for a few months after casting, ? relapse after come out if gait not heel-toe. • Kinematics- Brief discussion of language use in Angela's book- 1st, 2nd and 3rd rocker- many unfamiliar with this, not in common use in either profession. Refer to: http://www.oandp.org/jpo/library/1997_01_010.asp for a description of this and more common gait cycle terminology.
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