

Exploring health professionals understanding of evidence based treatment for idiopathic toe walking: a cross-sectional study.

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Abstract

Background Idiopathic toe walking (ITW) is an exclusionary diagnosis and varies in severity, from those children with full range of ankle motion, to those with associated ankle equinus. In the absence of a consensus in the treatment for this gait pattern, many clinicians are faced with challenges in understanding available evidence-based treatment options. The research aim was to understand agreement between health professionals' knowledge of evidence for common treatment strategies for idiopathic toe walking (ITW) and if health professionals supported these strategies being used in clinical practice. Methods: An international online survey was opened to registered health professionals who treat children with ITW between July 2017 and March 2018. The survey had two components: 1) demographic variables and variables relating to knowledge of evidence about ITW treatments and 2) support for common treatment strategies. Additional data on strategy use, referrals, and preference were collected. Kappa statistics described intra-rater agreement between evidence knowledge and support. Multivariable regression analyses identified factors associated with the 10 most commonly preferred treatments. Results: There were 908 international responses. Kappa agreement for paired correct responses determined a fair agreement for evidence support knowledge for four strategies including Watch and Wait (Kappa=0.24), Stretching (Kappa=0.30), Sensory Integration Strategies (Kappa=0.40) and Motor Control Strategies (Kappa =0.24) and moderate responses for thirteen others. No strategies had greater than moderate agreement between correct knowledge of evidence and strategy support. Profession, location, number of children seen in practice, and not correctly identifying the evidence factored into many of the most commonly used strategies for ITW ($p < 0.05$). Conclusions: The results from this study confirm a variety of interventions are utilised in the management of ITW around the world. Furthermore, there remains a disconnect between clinicians understanding of the evidence of common treatment strategies of ITW and a consensus for the treatment of this condition.

Introduction

Idiopathic toe walking (ITW) is a diagnosis by exclusion (1) and often associated with fixed ankle equinus. (2, 3) The estimated prevalence of ITW in young children with no medical conditions known to cause, or be associated with toe walking gait, is up to 5%. (4) Factors hypothesised to contribute to ITW include orthopaedic issues (shortening of the gastrocnemius or soleus), (3, 5) behavioural challenges (sensory processing challenges),(6, 7) or mild motor skill delays.(7, 8)

Management strategies target ankle equinus or aim to correct the gait pattern. Researched treatment options have included watchful waiting or no active treatment, (9, 10) stretches,(10) serial casting,(11) Botulinum Toxin A,(12) orthotics,(13) motor control strategies(14) or surgery.(3) While some interventions demonstrate successful resolution of equinus,(3,9) no single treatment has demonstrated widespread long-term success in changing the toe-walking gait pattern.

The difference in approaches to management of ITW may be attributed to a complex variation in training pathways of the treating clinicians, referral pathways between medical and allied health professionals,

health service resource allocation (public funded or individual/insurance funded), or access to treatment options within the community. Where there is a paucity of evidence, the management of any condition has potential for personal bias and employment of a treatment strategy that may not align with current best evidence.(15) In ITW management, clinicians are potentially challenged between reducing signs of ITW and the lack of consistent evidence regarding the best way to achieve this.

The primary aim of this study was to determine the agreement between health professionals' knowledge of the evidence base for common ITW treatment options; and the professionals' level of support for these options. Secondary aims included: Understanding the frequency of use of different treatment options, frequency of referral for different treatment options and what variables were associated with the use of the most common treatment options.

Method

Study Design

An international cross-sectional survey of registered health professions who assess or treat children with ITW.

Participants and setting

Due to the range of countries and the indeterminable number of health professionals targeted, no denominator was calculated. The survey was promoted to, but not limited to, Medical Practitioners (including Paediatricians, Orthopaedic Surgeons and Neurologists), Physiotherapist (Physical Therapists), Podiatrists and Orthotists. The survey was advertised in Australia, New Zealand, United Kingdom and United States of America. It was advertised through local conferences, profession specific newsletters, authors networks and online social media (Facebook, LinkedIn and Twitter). As the survey was geographically diverse, participants were required to confirm were a registered health professional within their country.

Measurements and procedure

Data were collected from 10th July, 2017 to 13th of March, 2018. All participants consented and completed the survey through Qualtrics (16) (Appendix 1- Full survey). The survey consisted of two components; general demographic variables; and variables relating to knowledge and utilisation of ITW treatment options. It was pilot tested with ten health professionals who routinely see children with ITW.

General demographic variables included gender, age group, country and recency of practice and profession, including any specialisation. Participants were requested to identify how many paediatric

patients were seen in an average week and approximately how many of these patients were diagnosed with ITW.

The list of health professionals advertised or common treatment options was developed through a search using google using the search terms idiopathic, toe, walk* and treat*. Authors compiled a comprehensive list of all treatments for ITW from these. The evidence to support each treatment option was developed through a rapid literature review undertaken during survey development, including a published systematic review (17). The level of evidence assigned to each treatment option was through a Delphi panel of authors led by two authors (VP and KG). In this process, all authors were provided with the evidence (peer reviewed and grey literature) and asked to rate the evidence level for each treatment option. The evidence was rated as *Yes*: if there was substantial Level I, or II evidence (I.e. Systematic review with meta-analysis, randomised control trial or cohort studies where participants were followed for longer than 12 months), *Unsure*: Where there was both support for or against the treatment option in a randomised control trial where no systematic review existed, or *No*: where there was case series or author reports only. The final list of treatment options included in the survey:

Treatments with substantial evidence (*Yes*):

Serial casting(12, 18)

Surgery(3)

Treatments with evidence for and against (*Unsure*):

Watch and wait (3, 9, 10)

Treatments without substantial evidence or an absence of effect (*No*):

Botulinum Toxin A(12)

Articulated foot orthoses(13)

Foot orthoses(13, 19)

Motor control strategies(14)

Whole body vibration(20, 21)

Sensory motoric insoles(22)

Verbal Reminders(23)

Stretching (embedded into many studies however no isolated research)

Carbon fibre plates(13)

Heel lifts/raisers (websites only)

Prism Lens (websites only)

Reflex integration strategies (websites only)

Vision training (websites only)

Sensory integration strategies (websites only)

Biofeedback (websites only)

Participants were firstly asked to rate which treatment option, from the pre-determined list, had strong evidence supporting its use to manage ITW (Answers: Yes, No, Unsure). This question was designed to take into account the variable nature of ITW and the asked the participants to consider this in answering. Participants were prompted that strong evidence was defined as a systematic review with meta-analysis or randomised control trials,(24) while case control studies or expert opinion were not to be considered as strong evidence. Participants were then asked to identify which of the remaining options they supported being utilised for management of ITW. (Answers: Yes, No, Unsure). Participants could add up to two additional treatment options. Participants were asked to consider treatment options, including any self added, and respond if they had utilised or referred for any of these treatments. Finally, participants ranked their five preferred treatment options. Participants were also offered a free text comments box for anything about the treatment of ITW not covered by the survey. To reduce order effect bias, the survey platform's inbuilt randomisation function was enabled to ensure participants received treatments in varying order. The survey was set to force answers to ensure internal fidelity of each section and non-completion was treated as missing data for the remaining non-completed variables.

Analysis

Data were analysed using Stata 15.(25) Descriptive statistics were used to report on variable distribution. Demographic data were summarised in frequencies(%). The Kappa statistic was used to describe the intra-rater agreement between clinician knowledge of evidence and their support for utilising that treatment. The Kappa value was interpreted as <0.20 Poor, 0.21-0.40 Fair, 0.41-0.60 Moderate, 0.61-0.80 Good and 0.81-1.00 Very Good.(26)

The ten commonly preferred treatment options were explored with a backwards stepwise multivariable logistic regression. Univariate regression analyses initially identified variables for the model. This preliminary multivariable model was then reduced by removing variables one at a time based on the variable with the highest p-value. This backward step removal continued until all variables remaining in the model had a p-value <0.05. Complete case analysis was applied and only data from participants where all treatment options and demographic data were answered were included.

Basic inductive thematic analysis of the open text questions was undertaken by a single researcher. This analysis allowed for the content of each statement to be analysed in full, particularly where concepts or categories can be derived from the data.(27) The full statements were manually grouped into concepts and reviewed with developed themes. The analysis took an iterative approach, where new themes were developed, any earlier statements were recoded.

Patient and public involvement

Public/participants had no involvement in the study design.

Discussion

There were 1195 individual responses. Following the removal of location, and gender only responses, there were 908 responses for analysis. Table 1 displays the demographics of participants accounting for any missing data from non-completion due to an early exit from the survey. Majority of participants were from the United Kingdom (n=549, 60% of responses and physiotherapists were the highest represented profession grouping (n=621, 68%). There were few differences in the percentage of children with ITW seen by clinicians across countries (3-7% of caseload).

The evidence of knowledge for a treatment option was collated together with the support for the same treatment option (Table 2). No options had greater than moderate agreement between evidence knowledge and treatment support. There were 12 different treatment options used or referred for by >10% of participants (Table 3). The most frequently employed treatment options were *Stretching* (n=711, 83%), *Motor Control Interventions* (n=643, 76%) and *Verbal Reminders* (n=611, 72%). None of these options had Level I or II evidence supporting their use. There were a variety of treatment options referred for, however, no treatment options were referred by greater than 35% of the participants.

Participants ranking of preferred treatments captured those most frequently employed when ITW presented in variability of severity (Table 3). Stretching and motor control strategies were preferred by 83% (711 of 848 participants) and 67% (643 of 848 participants) participants respectively. Multiple regression analysis determined which variables were more or less likely to be associated with treatments (Table 4). Participants utilising stretching were more likely to be a physiotherapists (OR=1.48, 95%CI=1.08 to 2.04, p=0.015), living in the UK (OR=1.57, 95%CI=1.12 to 2.22, p=0.009) or Australia (OR=1.69, 95%CI=1.05 to 2.72, p=0.032), seeing more children in clinical practice (OR=1.00, 95%CI=1.00 to 1.01, p=0.007) but less likely to correctly identify the evidence about stretching (OR=0.39, 95%CI=0.28 to 0.55, p<0.001). Motor control strategies were less likely to be used by a medical practitioner (OR=0.25, 95%CI=0.09 to 0.70, p=0.008) or an orthotist (OR=0.22, 95%CI=0.12 to 0.43, p <0.001), more likely to be used by a physiotherapist (OR=2.52, 95%CI =1.74 to 3.67, p<0.001), living in the USA (OR=2.19, 95%CI=1.38 to 3.46, p=0.001), or living in Australia (OR=2.12, 95%CI=1.34 to 3.35, p=0.001), seeing more children in clinical

practice (OR=1.00, 95%CI=1.00 to 1.01, p=0.022) and less likely to correctly identify the evidence supporting this treatment (OR=0.43, 95%CI=0.30 to 0.64, p<0.001).

There were four central themes identified from the 291 participant comments at the end of the survey.

Theme 1 No evidence is not an absence of evidence

Many participants commented on the challenge of a list of treatments that are easily found in the literature and through other health websites without evidence of effect. Many challenged the notion that there may be some effectiveness, but the strategy had not been researched at this point. Responses such as *"The evidence base is inconclusive for ITW, particularly for long-term outcomes. Good clinical analysis and problem solving, the systematic use of outcome measures, clinical reasoning and experience are therefore indicated to address ITW. Research needs to be guided by what seems to be working clinically. If we only applied strategies that already had existing evidence, how would we ever discover a better way of doing things?"* (p64)

and *"As a [health professional], there is only poor/scant evidence for most of what I do all day because of the lack of strong research, so even when you are being "evidenced-based," you have to get used to combining strongly evidenced management (of which there is little) with treatments that have evidence of poor quality (this makes up the main bulk of what we have to work with) and a bit of what just ends up working for that particular child. This is true for any diagnosis/patient problem."* (p1065), highlighted these challenges.

Theme 2: My way has worked for me before, I have treated it like this with great results

Many of the comments related to treatment choice reasoning was based on previous experience. This was particularly related to conservative interventions (heel lifts or stretching) rather than more invasive or expensive interventions such as surgery. These comments appeared to justify their choices. One podiatrist stated, *"Clinical expertise - the third pillar of evidence-based practice"*(p699) another physiotherapist concluded with *"It works and I get good results"*(p701), this was mirrored by a doctor *"Clinical experience and perceived benefit on my part"* (p672). There was also the challenge of preference of treatment being based on who was in charge of the clinical team. This sentiment was highlighted with the comment *"I have worked in a few different [work places] and all have different strategies depending on what profession is in charge"*(p293).

Theme 3 Challenges of providing person centred care

Participants reflected that while they were aware of the limited evidence for some treatments, parents wanted intervention. Clinicians felt conflicted about providing these therapies stating, *"Parents like to see some intervention"*(p48). Another reflected that *"Parents are rarely satisfied with no intervention"*(p243). There were concerns that of treatment provision instead of waiting to see if problem arose. Parent engagement in decision making was highlighted in the statement, *"Routinely, I discuss natural history (benign) with families and decide with them whether they wish or need to undergo treatment...I either treat completely or not at all."*(p184).

Theme 4: Is ITW even a singular entity or a problem?

Participants expressed frustration and belief that no one treatment will work due to variable severity ITW presentations (fixed equinus versus ability to get heels to the ground). Many participants reflected on these disparities for when treatment should be introduced. For example *"... if the functional abilities of the child are compromised e.g. pain, tripping and falling, then I feel I would need to address even if poor evidence to support strategy"*(p212). Another stated *"Evidence appears very sparse for a lot of the intervention we use [in ITW], partly due to the variability and eclectic presenting condition... I have changed my thinking away from curing toe walkers, rather moving over to implementing strategies and managing the condition, after all, we don't see many adults walking around on their toes."*(p234). The diagnosis complexity was specifically highlighted *"A lot of young children we see who toe walk are ultimately given a diagnosis of ASD [Autism Spectrum Disorder]. This perhaps clouds our ability to separate out what works best for different groups of patients."*(p779). Lastly, many participants expressed frustration regarding the lack of long-term risk or treatment benefits. One response of *"Most make a mountain out of a molehill ... undoubtedly some do get better over time irrespective of what treatment you give them."*(p215).

Conclusion

This study suggests clinicians aim to provide the 'best patient-centred care' available, however their basis for 'best care' may be limited by knowledge base; and influenced by family (patient) preferences. This may be because of the variable published evidence. Future research should target commonly used treatments.

Declarations

Acknowledgements:

Nil

Consent for publication

No applicable

Ethics approval and consent to participate

Monash University Human Research Ethics Committee, Victoria, Australia, approved this study. (MUHREC approval –9631). All participants consented to participate prior to data collection.

Availability of data and materials

All data sets are available from the corresponding author on reasonable request.

Conflict of Interest:

The authors have no conflict of interest to disclose.

Competing interests

The authors declare they have no competing interests.

Author's contributions

CW, KG and VP conceived and designed the study. All authors contributed to the survey design and data collection. CW undertook the data analysis. All authors contributed to the interpretation of the data. CW and KG drafted the manuscript draft and circulated to authors for contribution. All authors approved the current manuscript version of the manuscript for publication.

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