Gait assessment among physiotherapists in Ireland

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Summary
There has been little research into the knowledge of physiotherapists in Ireland regarding gait assessment. This study evaluated the level of experience and training of physiotherapists regarding gait assessment, and how therapists in the clinical setting assess gait.

A questionnaire, based on a similar study in the UK, was distributed to three clinical interest groups of the Irish Society of Chartered Physiotherapists. Three hundred and two questionnaires were distributed and 185 completed questionnaires were returned (response rate of 61%). Management of gait constituted a major aspect of physiotherapy practice with most respondents (86%) treating patients with gait disorders. Ninety-three percent of respondents relied on visual observation, and almost half of these used no other method of gait assessment. Thirty-nine percent of respondents referred patients to gait laboratories, and the use of gait laboratories influenced clinical practice. Video images of gait were typically collected without the use of standardised protocols. Although most had received formal training in gait assessment, 94% of clinicians stated a need for more. Gait assessment appears to be an important part of physiotherapy practice, however further training and standardisation of approaches used to analyse gait in the clinical environment may be required.

Key words
Gait, Assessment, Visual observation.

Introduction
Gait assessment is an important component in the physiotherapy evaluation of many patients. It is used for diagnostic purposes, treatment planning and treatment evaluation in many different patient populations. A major issue of concern is how to accurately measure the performance of this complex movement pattern. The measurement used depends on the experience of, and resources available to, the therapist. Instrumented gait analysis remains the gold standard for providing kinematic, kinetic and muscle activity data. In everyday clinical practice however, access to a gait laboratory rarely exists due to their complexity, cost and inconvenience. As a result of these difficulties, therapists commonly use visual observation to assess gait. Visual observation relies on the observer being able to assess the body's movements, in multiple planes, during the rapidly repeating gait cycle.

The situation is further complicated by the need to compare limbs in asymmetrical gait, as well as considering trunk and upper limb movement patterns. The visual assessment of gait may therefore be difficult, even for experienced practitioners. As visual observation of gait is subjective in nature, this leads to poor reliability both between-raters and within-raters, when compared to more objective instrumented gait analysis systems.

Despite attempts to standardise visual observation, reliability of visual observation remains poor, possibly due to inadequate observational ability, poor training, observer bias and experience, limitations of visual perception and uncertainty of what gait parameters to assess. Video images are used throughout the literature in an attempt to increase reliability of visual observation. Video analysis is suggested to help address the limitations of the therapist in using visual observation by allowing more time and the opportunity to decrease the gait speed. It is also clinically helpful for patients since it induces less subject fatigue, allows for feedback of results, and for comparison of pre- and post-treatment gait patterns. There appears, however, to be no standardised procedure for collecting or analysing gait based on video images, and its reliability is still moderate at best.

Previous research, evaluating gait assessment amongst physiotherapists in the United Kingdom (UK), found that although management of abnormal gait constituted a major aspect of physiotherapy practice there was no systematic use of standardised gait assessment tools. Clinicians also indicated that there was a need for more training and that guidance was needed at a national level. No similar study has yet been done in Ireland. Therefore the main aims of this study were to determine the level of experience and training amongst physiotherapists in Ireland, and the methods used by them for assessing gait in the clinical setting.

Methodology
Ethical approval was obtained from the University of Limerick research ethics committee. The questionnaire design drew, with permission, on the work of Toro et al, by replicating some questions used in their study. Based on this previous survey a questionnaire was designed which examined the following: (1) physiotherapist details, (2) patient details, (3) physiotherapist experience and training, (4) current practice in gait assessment and (5) physiotherapist opinions on gait assessment.

The questionnaire consisted of both open and closed questions, and also a non-parametric ordinal rating scale. It was initially piloted among six physiotherapists external to the study population who were all familiar with, or actively involved in, analysing gait. The validity and
reliability of the original questionnaire has been previously determined by the authors. After analysing the pilot questionnaire, minor typographical and formatting changes were made according to the feedback received, to enhance user-friendliness. The final questionnaire (Appendix 1) was sent to members of three clinical interest groups (CIG's) of the Irish Society of Chartered Physiotherapists; neurology/gerontology, paediatrics and sports medicine. These three CIG's were chosen as the authors believed they would provide a broad spectrum, and variety, of patients presenting with gait disorders. Permission was obtained from the committee of each CIG prior to distribution. A total of 302 questionnaires were distributed by post to all members of the CIG's for whom contact details were available. The gerontology group accounted for 150 (50%) of the participants, paediatrics accounted for 89 (29%) and the sports medicine group accounted for 63 (21%).

Data were analysed using Statistical Package for the Social Science (SPSS) software (version 11.0). All responses were initially coded and data was analysed for normality of distribution. Comparison of responses was analysed using descriptive statistics. Cross-tabulations were used to compare responses between the different groups. Associations between categorical variables were analysed using the Chi-squared test. For all tests, the level of statistical significance was set at p < 0.05.

Results

One-hundred and eighty-nine questionnaires were returned. Four respondents were not currently in practice and therefore returned an uncompleted questionnaire. Thus, the data analysed was comprised of the responses of 185 participants (response rate 61%). The response rates for the neurology/gerontology, paediatrics and sports medicine groups were 64% (n=96), 47% (n=42) and 74% (n=47) respectively.

Physiotherapist and patient details

The overall female to male ratio was approximately 6:1, although this varied between CIG's from 13:1 (paediatrics) to 2.5:1 (sports medicine). Most respondents held senior physiotherapist positions (62%, n=115) and had degree qualifications (55%, n=101). Almost all respondents (94%, n=174) assessed patients with gait difficulties and 86% (across all CIG's) were currently treating people with gait disorders. There was a strong association between the amount of time the respondents had been qualified (p<0.05) and the level of confidence in analysing gait on a scale of zero (no confidence) to five (very confident), the mode response was three. Over three-quarters of those who received formal training rated themselves on the higher end of the scale (>4), whereas all those who did not receive any training rated themselves at either two or three.

Physiotherapist experience and training

Ninety-one percent (n=168) of respondents had received formal training in gait assessment, primarily at undergraduate (57%, n=105) and in-service education (56%, n=103) level. Only 39% (n=72) however, had referred subjects to a gait laboratory. There was a statistically significant difference in the use of gait laboratories between the CIG's, with significantly (p<0.05) fewer sports medicine members (12.5%, n=6) referring subjects to a gait laboratory than either the neurology/gerontology (40.2%, n=38) or paediatric CIG's (45.7%, n=19). Of the small number of respondents who actually referred patients to a gait laboratory, 90% (n=67) reported the results influenced their clinical practice, although only one-third of these (n=22) understood the findings.

Current practice

Of those assessing patients with gait difficulties, 93% (n=172) reported using visual observation as a means of assessing gait pattern. Almost half (43%, n=80) of these did not use any other gait assessment tool or method (table 1). 'Other' forms of gait assessment tools reportedly used included the Gait-rite System and the Rivermead Visual Gait Assessment. Managers and clinical specialists were the most common users of gait assessment tools (75% and 71% respectively), whereas less than half of basic grade (47%) and senior physiotherapists (40%) used these. The main reasons given by participants for not using a standardised gait assessment tool included budgetary, time and space constraints, as well as physiotherapists not having access to a suitable tool (table 2).

One-third of all respondents (n=62) used video equipment for assessing gait, yet 41% of these (n=25) did not use a standard protocol, and the plane used for video analysis varied considerably. The paediatric group most commonly used video analysis (66%, n=38). Sixty-four percent of all respondents (n=184) had some form of additional gait assessment equipment available, yet even basic equipment such as video cameras were only present in approximately one-third of workplaces (table 3). Those who used video for assessment of gait were significantly more likely to have the equipment readily available to them in their own department, compared to those who did not use video assessment (p<0.05). When rating their confidence in analysing gait on a scale of zero (no confidence) to five (very confident), the mode response was three. Over three-quarters of those who received formal training rated themselves on the higher end of the scale (>4), whereas all those who did not receive any training rated themselves at either two or three.

Seventy percent (n=129) of respondents referred patients for further gait assessment, most commonly to orthotists (44%, n=57) and other physiotherapists (43%, n=56). Significantly more (p<0.05) paediatric physiotherapists (86%, n=36) referred patients for further assessment, with almost half (45%, n=19) referring patients for instrumented gait analysis. The main reasons given for referring patients onwards were for further analysis (24%), an expert opinion (23%) or for orthotic prescription (19%).

Physiotherapists opinion / views on gait analysis

Ninety six percent of respondents (n=178) felt that gait assessment plays an important role in managing gait problems. No consensus emerged on whether there is a need for a universal gait assessment tool for all clinical specialties (48% yes / 27% no / 25% unsure), although 30% (n=55) of respondents reported neurology/gerontology and paediatrics groups should have their own specific tool. Ninety four percent (n=174) believed that there was
Table 1

Most common methods of gait assessment used by physiotherapists (n=185). *Therapists were allowed to enter multiple categories, therefore the total exceeds 100%.

<table>
<thead>
<tr>
<th>Method</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual observation</td>
<td>93</td>
</tr>
<tr>
<td>Visual observation only</td>
<td>43</td>
</tr>
<tr>
<td>Visual observation chart / form</td>
<td>35</td>
</tr>
<tr>
<td>Video recording</td>
<td>34</td>
</tr>
<tr>
<td>Standard gait assessment form</td>
<td>26</td>
</tr>
<tr>
<td>Still photography</td>
<td>15</td>
</tr>
<tr>
<td>'In-house' gait assessment form</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
</tr>
<tr>
<td>None of the above</td>
<td>22</td>
</tr>
</tbody>
</table>

Table 2

Most common reasons given for not using a gait assessment tool (n=185). *Therapists were allowed to enter multiple categories, therefore the total exceeds 100%.

<table>
<thead>
<tr>
<th>Method</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget constraints</td>
<td>60</td>
</tr>
<tr>
<td>Lack of time</td>
<td>56</td>
</tr>
<tr>
<td>Lack of space</td>
<td>46</td>
</tr>
<tr>
<td>Lack of available tool</td>
<td>40</td>
</tr>
<tr>
<td>Workplace unsuitable</td>
<td>31</td>
</tr>
<tr>
<td>Standard tool unnecessary</td>
<td>21</td>
</tr>
<tr>
<td>Unaware of standard tool</td>
<td>20</td>
</tr>
</tbody>
</table>

Table 3

Gait assessment equipment available to physiotherapists (n=185). *Therapists were allowed to enter multiple categories, therefore the total exceeds 100%.

<table>
<thead>
<tr>
<th>Method</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video camera</td>
<td>37</td>
</tr>
<tr>
<td>Video recorder</td>
<td>36</td>
</tr>
<tr>
<td>Access to a computer</td>
<td>33</td>
</tr>
<tr>
<td>Digital Camera</td>
<td>30</td>
</tr>
<tr>
<td>Television</td>
<td>25</td>
</tr>
<tr>
<td>Designated room / space</td>
<td>17</td>
</tr>
<tr>
<td>Camera</td>
<td>13</td>
</tr>
</tbody>
</table>

Discussion

In a previous survey examining the status of gait assessment amongst physiotherapists in the UK, it was found that although gait assessment constituted a major aspect of physiotherapy practice, physiotherapists requested more training and guidance. This current study highlights similar important issues concerning gait assessment amongst physiotherapists in Ireland. Although the numbers within this study were quite small, the good response rate (61%) implies that the results should represent a large cross-section of the chartered physiotherapists who are members of the neurology/gerontology, paediatric and sports medicine CIG's in Ireland. While the lower response rate in the sports medicine and paediatrics groups may bias the results, the broad range of clinicians involved in these three diverse CIG's implies that the results may be representative of current practice in Ireland.

Physiotherapist experience and training

Given that 86% of physiotherapists were currently treating people with gait problems, it was encouraging to see that 91% had received formal training. This contrasts with only 42% of physiotherapists in the UK having received training in gait assessment. This may be related to a higher proportion of those sampled in Ireland having degree qualifications and working as senior physiotherapists, as few UK therapists with diploma qualifications had received formal training in gait assessment. The higher proportion might also be influenced by the fact that the CIG's surveyed were more likely to have had specific gait training, due to the nature of their work. The fact that the vast majority of physiotherapists in all the different CIG's were dealing with patients with gait difficulties re-emphasises the point that gait assessment is a fundamental part of practice across many domains of physiotherapy. In addition, the length of time physiotherapists had been dealing with patients corresponded to the length of time they had been qualified, indicating that gait assessment is an integral and ongoing component of clinical practice. In addition, previous research indicates that experienced observers are more reliable than inexperienced observers, although the current study did not investigate this. Training was most commonly received at an undergraduate level, however 94% also believed more training was needed at this level. This may indicate that the standard and amount of
training in undergraduate gait assessment has been insufficient. Similar results were found in the UK, with over 60% of physiotherapists stating a need for more training. On average, respondents were relatively confident with their ability to assess gait visually. This is consistent with research on physiotherapists both in Canada and the UK. Those with formal training were more confident than those without formal training, as previously reported. Despite this reported confidence, therapists still reported a need for more training and for guidance at a national level, similar to UK therapists.

Gait assessment: current practice

The most commonly reported gait assessment method used by physiotherapists was visual observation. This is in common with physiotherapists in the UK, despite the poor reliability reported in the literature. The reasons for the high use of visual observation may be due to the fact that it is easy to use, has no cost and it provides a quick way of identifying a patient's gait pattern, especially when access to equipment is limited. Very few therapists used other forms of gait assessment despite the fact that approximately two-thirds of respondents reported having some form of equipment available to them. Similar to findings in the UK, budget constraints, a lack of space and time were clear barriers, while a lack of awareness of a suitable gait assessment tool for their patient group was also commonly reported, especially amongst the sports medicine group.

Visual observation gait assessment tools have been widely reported, especially amongst adult neurology and paediatric populations. The reliability of many of these tools is debatable however, and even those that are reliable are not necessarily valid when compared to 3D instrumented gait analysis. This may explain their poor uptake by clinicians. There has been no systematic approach to developing and testing current gait assessment tools, and existing tools have grown out of clinical need and practical use.

In accordance with the existing literature, managers and clinical specialists were the most frequent users of gait assessment tools, as the uptake and performance of using a gait assessment tool has been associated with experience, training and underlying knowledge. This lends back to the need for better training in gait analysis, as early training could serve as a good foundation for an improved standard of gait assessment amongst physiotherapists. In this survey few therapists reported using video analysis as a measure in routine clinical practice, although it has been suggested to enhance the observational skills of the therapist by allowing repeated viewing at slower speeds and freezing frames for closer inspection. This may be related to time, resource and budget constraints, for example only one-third had videos available to them, as well as difficulties regarding consent, confidentiality and standardisation of measurement. As expected, those who had videos on location were more likely to use them.

Given the potential value of video recording, the lack of standardised protocols is a concern. As reported in the literature, training should also incorporate the ability to recognise the importance of standardisation in the value of the video data. Of interest is the variability in video data collection procedures, especially since the sagittal plane is proposed to be more reliable and more sensitive at detecting abnormalities in gait.

Seventy percent of physiotherapists had referred their patients to other health care professionals for further gait assessment. No study has previously identified the frequency with which this occurs. Just over one-third referred patients to gait analysis laboratories for instrumented gait analysis, which is a slightly higher percentage than therapists surveyed in the UK. This may again be related to the fact that this study may have focussed primarily on those therapists most likely to deal with gait assessment. It is understandable that paediatric therapists, in particular, would refer patients to other professionals for expert opinion, and to gait laboratories for instrumented gait analysis, as they are likely to deal with more severe, complex gait disorders. However, many other physiotherapists also sought further analysis from other therapists possibly indicating that there is inadequate training and possibly inconsistency amongst therapists in this field. Despite therapists reporting confidence in visual observation skills, the high referral rate may imply that therapists are unsure of what to address when analysing gait. It lends weight to research indicating little agreement of what to assess in observational gait between therapists, and therefore it is not surprising that poor intra- and inter-rater reliability has been found by many researchers.

The reluctance to refer patients to gait analysis laboratories may, in part, be due to very few physiotherapists understanding the results, since interpretation of biomechanical data can be complex and time consuming. This, added to the issue of transferring the knowledge gained from the laboratory to the therapy situation, may be a cause for lack of use. This is unfortunate since there is considerable evidence that 3D gait motion analysis systems are more reliable, and detect more gait abnormalities, than visual observation or video analysis. It is at least encouraging to know that the data gained in laboratories influenced clinical practice, as previously reported. This implies that increased awareness of instrumented gait analysis parameters could have a tangible effect on clinical practice.

An important question is whether this possible impact on patient outcomes in clinical practice, would justify the significant human and financial costs associated with building and staffing instrumented gait laboratories. As has been previously been identified, a good sense of the biomechanics of normal gait is essential if therapeutic gait analysis is to be undertaken. The reliability of visual observation appears to be better if the observers are specifically trained in the assessment of normal gait parameters. In addition, it appears that even with complex instrumentation a high number of gait cycles must be examined to be sufficiently reliable. It may be that specific gait assessment training, using more gait cycles and a more standardised approach would improve the reliability of visual observation to a level which, even if not as precise or reliable as instrumented gait analysis, might increase reliability and potentially lead to better patient outcomes in the clinical environment.
Views and opinions of those surveyed

The Irish physiotherapists surveyed in this study believe that gait constitutes a major part of clinical practice. They believe that more training and guidance, and the development of appropriate tools, are required, in agreement with research in the UK. There does not seem to be a desire for a standardised gait assessment tool for all patient populations, again in agreement with the UK. The expressed need for the development of a gait assessment tool for paediatric and adult neurology population may be related to the frequency, and complexity, of gait assessment in this population, as identified in the UK. The main barriers to the use of gait assessment tools were the lack of budgetary resources, as well as time and space constraints, a point reiterated in the literature. A further complication is that even where there are tools available, such as the Rivermead Visual Gait Assessment, few physiotherapists surveyed seemed to be aware of them.

Study limitations

Although this survey has highlighted many important issues in relation to gait assessment, the reason why the therapist is performing the gait assessment must be taken into consideration. Physiotherapists working within different CIG's may be carrying out gait assessment for different reasons, or looking at different components of gait, and therefore different tools and methods of gait analysis may be used. This is a possible reason for the discrepancy between groups and may have influenced overall results. The reliability and validity of the questionnaire used has not been established, however it is largely based on a previous questionnaire with established reliability and validity. While the survey tried to sample a representative population of physiotherapists in Ireland involved in gait assessment, only three CIG's were surveyed, and this may affect the results obtained. Finally, the small sample size, and the different number in each CIG, limited the ability to detect statistically significant differences between the groups.

Study implications

The results may increase awareness of the need for improved accuracy and standardisation of gait assessment. As previously identified in the UK, there is a need for appropriate gait assessment tools, especially amongst those dealing with more complex gait disorders. The challenge lies in developing tools that find an appropriate balance between the practicalities of user-friendliness and cost, while still having scientific merit. Physiotherapists need valid and reliable tools that can be used easily and quickly within a busy daily schedule. In addition, the need for more training and standardised gait guidelines has been established. This goal might best be achieved through heightened awareness and further education of its importance amongst physiotherapists.

Conclusion

Gait assessment is a central task in physiotherapy practice. Although most physiotherapists have received some form of formal training, there is still a strong demand for more.

Budgetary, time and space constraints influence the choice of assessment method. Visual observation is still the most widely used method of analysing gait amongst physiotherapists, despite its limitations. Physiotherapists do not use instrumented gait laboratories routinely, although the data they collect at these facilities does appear valuable. Of those who use video analysis, very few use standardised protocols. Gait assessment tools that can be used easily and quickly without compromising reliability and validity are needed. The findings are broadly in agreement with research on physiotherapists in the UK.

Acknowledgements:

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Appendix I

University of Limerick
OLLSCOIL LUIMNIGH

Gait Assessment Questionnaire

The purpose of this questionnaire is to explore the status of gait assessment amongst physiotherapists in Ireland. Please complete the questionnaire by ticking the appropriate boxes, or by writing your response in the spaces provided. THE CONTENTS OF THIS FORM ARE ABSOLUTELY CONFIDENTIAL. INFORMATION IDENTIFYING THE RESPONDENT WILL NOT BE DISCLOSED UNDER ANY CIRCUMSTANCES.

Part 1. About You

a) What is your grade?
- Basic Grade
- Manager
- Senior
- Clinical Specialist
- Please specify

b) What are your qualifications?
(tick all boxes that apply)
- Degree
- MSc
- PhD
- Other, please specify

c) Please state how many years have you been qualified as a physiotherapist?

Part 2. Your Patients

a) Please state the patient group(s) you work with (i.e. adult neurology, paediatrics, orthopaedics, elderly care, sports injuries, etc.)

b) Please state what type of setting(s) you work in (i.e. hospital, private practice, rehab, etc.)

Part 3. Experience of Gait Analysis

a) Have you received any training in gait analysis?
If YES, please indicate at what level (tick all boxes that apply).
- Yes
- No
- Undergraduate
- Postgraduate
- Training/in-service based at your clinical site
- Weekend courses
- Other, please specify

b) Have any of your patients visited a gait laboratory for a full gait assessment? (e.g. motion analysis, force plate data, EMG, etc.)
- Yes
- No
- Don't know