Overview of the Development Phases of the Oxford Ankle Foot Questionnaire for Children

Morris C[1], Doll H[1], Theologis T[2], Wainright A[2], Davis N[2], Churchman D[3], Willet K[2], Fitzpatrick R[1]

Abstract

Objective: The Oxford Ankle Foot Questionnaire for Children (OxAFQ-C) was designed to supplement clinical assessment methods to evaluate the effectiveness of interventions.
Methods: The development of the questionnaire was conducted in three phases.
1) Items devised through interviews with relevant focus groups;
2) Test versions evaluated to enable scale development;
3) A prospective study was conducted with trauma and elective patients to assess performance.
Results: In our prospective study for the assessment of trauma patients, mean changes in percentage scores were as expected large and all effect sizes were large (>0.8). For elective patients, the mean improvement in scores and effect sizes were moderate.
Conclusions: The results from the study demonstrated the longitudinal validity and responsiveness of the domain scales. The OxAFQ-C uniquely offers an expedient means to evaluate the effectiveness of the treatment of childrens foot or ankle problems from both the child and parent/ caregivers perspective.

Introduction and Objectives

Ankle and foot problems are a common reason for children to present in clinic, and often treated using orthoses. The Oxford Ankle Foot Questionnaire for Children was designed to satisfy the need for an appropriate outcome measure to provide better evidence in clinical assessments to evaluate the effectiveness of interventions from both the child and caregivers perspective. Here we present the development phases of the questionnaire along with potential applications.

Methods

The development of the Questionnaire was conducted in three phases:-

Phase 1 – Understanding the patients experience of their condition through qualitative research.

Focus groups were convened with children affected by foot and ankle problems (along with their parents) in three age groups, 5-7, 8-11 and 12-15 years.

Initial activities included agreeing or disagreeing with statements about children with Foot and ankle problems and exploring a typical 'day in the life' of such a child, see Figures 1 and 2. The parent group followed a similar structure in parallel. The focus groups were audio-recorded, transcribed and analysed to identify themes participants reported as important. Consistent themes identified by all groups were:

1) physical symptoms,
2) activity limitations,
3) reduced participation in certain contexts,
4) self-consciousness due to appearance and other people's attitudes.

This work identified a list of issues that affected children themselves felt to be important, and the results formed the basis of the questionnaire.

Phase 2 – Evaluation of test version in order to develop scales

Questions were constructed using 25 issues raised by children and parents; three additional items were suggested by clinicians concerning the appearance of the foot, the way in which the child walked and swelling, giving a total of 28 items. Item responses are rated on a five-point scale indicating how frequently the issue affects the child, from never (score=4) to always (score=0). A survey of 158 children and their parents was carried out to determine the scaling, reliability and validity of the instrument. We used exploratory factor analysis and Rasch analysis to devise the scales and refine the scaling.

Three domain scales were identified: Physical (6 items), Emotional (4 items), and School & Play (4 items).

As in classical approaches to measurement, domain scores are calculated as the total of the scale item scores and are transformed to a percentage scale (0-100), where a higher score represents better functioning. Although an item asking about 'being able to wear the shoes you want' did not fit with the scales, it was salient to many children and to most girls. The item has strong face validity and is included as a categorical descriptive variable but not allied to any domain scale. The remaining items were either redundant or did not improve the scaling and were dropped.

The three domain scales were shown to be internally consistent. The scales' scores were also found to be stable at retest within two weeks, and to vary little whether reported by child or parent.
Face and content validity were also found to be satisfactory, and construct validity demonstrated by appropriate convergence and divergence with the domain scores from the Kidscreen questionnaire (a generic quality of life measure for children).

Figures 1 and 2 - day in the life of a child with a foot and ankle problem; issues provided by children recorded by the facilitator.

Phase 3 – Prospective study and further testing

In the third phase, a prospective study was conducted with 80 children attending trauma and elective orthopaedic clinics to assess responsiveness and longitudinal validity of the domain scales. Children and parents completed questionnaires at an initial outpatient appointment (baseline) and again within two weeks (retest), and finally a third set of questionnaires to complete again after two months (follow-up). The follow up questionnaires included an additional global rating of change 'transition' item asking respondents to indicate whether they thought, overall, the foot or ankle problem was about the same, better or worse, on a seven point scale, using increments of 'slightly', 'quite a bit' and 'a lot' better or worse. The global rating of change provided a patient-based anchor for comparing the magnitude of changes in domain scores.

Results

In our study, trauma patients had poorer scores than elective patients at baseline, and showed greater improvement at follow up. For trauma patients, mean changes in percentage scores were large and all effect sizes were large (>0.8). For elective patients, the mean improvement in scores and effect sizes were more moderate. The Minimal Detectable Change (MDC90), which is an indication of measurement error, ranged from 6 to 8 on the percent scores. The Minimal Important Difference could only be calculated for elective patients (9 child and 13 parent ratings), these ranged from 7 to 17. Half the standard deviation of baseline domain scores, which is often found to closely equate to Minimum Important Differences, ranged from 11 to 18 on the percent scale.
The findings of this phase of development support the responsiveness and longitudinal validity of the domain scales. Changes in domain scores of, or exceeding, the MDC90 (6-8 on the percent scale) are likely to be beyond measurement error. Further work is required to refine the estimate of smallest change that can be considered important.

Nevertheless the changes in scores we observed generally tended to exceed potential measurement error and can therefore considered reliable in terms of signal to noise.

Conclusion

Having established that the Oxford Ankle Foot Questionnaire meets prevailing standards, the questionnaire can now be used for clinical and research purposes, to evaluate the effectiveness of interventions used to treat foot or ankle problems in children of 5 to 16 years. The application of this instrument will allow the evaluation of interventions from the perspective of what is important to the child. While the instrument is appropriate for a range of diagnoses it is not suitable for children who are unable to walk, or who have a significant proximal lower limb component to their disability.

The Oxford Ankle Foot Questionnaire makes it possible to evaluate the effectiveness of many applications for lower limb orthoses with children and provides information on how the child feels it makes a difference, not only from a functional perspective, but also emotionally and socially.

It will also be possible to assess the use of orthoses in conditions that cause pain and loss of function. Potentially, different types of orthoses could be compared using this questionnaire to see which children find more beneficial and acceptable. Orthoses could be compared with other interventions such as casting to assess which children rate most highly when recovering from ankle and/or foot trauma, or orthoses compared with medication for managing inflammatory conditions.

The Oxford Ankle Foot Questionnaire has broad utility both in routine clinical settings or applied research comparing different treatment programmes used in paediatric orthopaedics, trauma and rheumatology.

1 University of Oxford, Health Services Research Unit, Oxford, UK; 2 University of Oxford, Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, Oxford UK; 3 Isis Outcomes, an Isis Innovation business, Summertown Oxford, UK