

# AN INTRODUCTORY GUIDE TO PUTTING RESEARCH INTO PRACTICE

## 6. Data collection

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Previous articles in this series have discussed research design and action research.<sup>1,2</sup> This article builds on these by looking at some of the ways in which the data needed for a variety of research designs can be collected, and at some of the important features of data collections methods.

### Data characteristics

The collection of data is the vital link in the research process between asking the research question (and hence designing the research study) and finding the answers. However, if the data collected are unreliable, inaccurate or don't represent what we wanted to measure then, at best, the results will be meaningless and, at worst, could be misleading or plain wrong. The key to collecting good data therefore is in defining appropriate measures. Good research design should ensure that the data are collected in a way that does not bias the results and answers the questions.

Data can take many different forms, and the type of data that is collected is determined by the type of study and what information is required. For example, in a study investigating why new patients seek podiatry care,<sup>3</sup> a qualitative line of enquiry was adopted: the data collected were verbal experiences and opinions, and the data collection method used was a semi-structured interview. However, a randomised trial investigating the efficacy of exercise therapy and orthoses in the treatment of knee pain<sup>4</sup> used quantitative measures: a pain visual analogue scale (VAS) in conjunction with two knee pain scales.

The basic requirements of good data are reliability and validity. Reliability refers to the consistency of the data, and

in quantitative methodologies usually means how repeatable the data are. Validity on the other hand refers to how accurate the data are (does it actually measure what it has been designed to do?). Data can be reliable but not valid (e.g. repeated weighings on bathroom scales with very little inherent variation but where the zero point was not set correctly) or valid but not reliable (e.g. scales with a good zero point, but where the recorded weight is highly dependent on where you stand so there is a great deal of variation on repeated weighings).

In qualitative methodologies, these characteristics take on rather different, but related, meanings. The concepts of reliability and validity are more difficult to define in qualitative research and may be best expressed as credibility (how truthful are the data?), transferability (would similar data be meaningful in different contexts?), dependability (could the findings be replicated in identical situations?) and confirmability (can researcher bias be ruled out?).<sup>5</sup>

### Measurement tools

Measurement tools (or instruments) are the mechanisms that enable data to be collected. They can range from simple mechanical instruments such as a goniometer to measure joint angles or a 10g monofilament to assess cutaneous

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sense, to more complex devices such as force platforms and in-shoe pressure sensors. However, the term is also used to include ways of capturing other information such as questionnaire-based indices (e.g. quality-of-life measurement using the SF-36, pain assessment using the McGill pain questionnaire).

Any measurement tool should be consistent (reliable), so the same score should be obtained if repeated on the same patient at the same time. A test-retest reliability can assess the stability of an instrument. Here the researcher will use the instrument on a number of patients at different times to see if the results are consistent.

Measurement tools also have to be accurate (valid) and should be tested to show this. Three separate criteria are often examined during the validation process: content validity (do the items in an instrument reflect the subject under investigation?), construct validity (does the instrument measure the subject under investigation?) and internal consistency (do items correlate well with each other and with the total questionnaire score?)<sup>6</sup>.

### Outcome measures in podiatry

The assessment of the effect of a particular treatment is an important factor in podiatry care and a number of specific podiatric outcome measures have been developed to measure such interventions.

**The Foot Function Index (FFI)** was formulated and validated in a study by Budiman-Mak *et al*<sup>7</sup> to assess the impact foot pathologies have on function in terms of pain, disability and activity restriction. It comprises a self-administered questionnaire with 23 items divided into three sub-sections, and was first used on patients with rheumatoid arthritis.

The scoring system is based on the supposition that the number of situations in which an individual experiences pain, difficulty or limited activity due to a foot problem, in combination with the intensity of that experience in each situation, determines how severely foot function is impaired. Therefore, the higher the FFI score the greater the impairment. This index was later evaluated in a study comparing the FFI scores of both feet (side-to-side reliability) in 30 people with rheumatoid arthritis and was found to be a reliable tool.<sup>8</sup>

**The Foot Health Status Questionnaire (FHSQ)** is designed to measure foot health-related quality of life and consists of three sections: a measure of foot health from a score of 0 (representing poor foot

health) to a score of 100 (for optimum foot health), a generic measure of health based on the Short Form 36 (SF36) quality-of-life questionnaire<sup>9</sup> and some demographic measures, such as socio-economic status and satisfaction<sup>10</sup>. A pilot study was conducted using the FHSQ on 107 subjects attending a podiatry clinic divided into three groups (minor problems - including corns, calluses and nail deformities; those with foot deformities; and people with more acute problems). The minor foot problem group was found to have the greatest foot health in terms of pain and foot function when compared with the other two groups.

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### “The aims and objectives of a research project should determine the data collection method used”

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The FHSQ was compared with the FFI by Bennet *et al*<sup>10</sup> on 111 subjects who completed both questionnaires. A subsequent clinical examination found the FHSQ was a more suitable measure than the FFI as it could help researchers identify changes in foot health status resulting from a therapeutic or surgical intervention. Landorf & Keenan<sup>11</sup> also compared the two measures to assess the effectiveness of foot orthoses in people with plantar fasciitis. They also found that the FHSQ was more sensitive in measuring health-related quality of life in this client group, and recommended this should be the preferred choice when assessing the effectiveness of foot orthoses.

The outcomes of podiatric surgery in 140 patients were investigated using the FHSQ,<sup>12</sup> and suggested that surgery gave favourable results for patients in relation to pain, physical function and improved general foot health. Positive results were also found in a similar study conducted in the UK measuring FHSQ scores before and after podiatric surgery, with the UK study demonstrating comparable results in all but one criteria.<sup>13</sup>

Some measures have been developed that are more patient centred. Garrow<sup>6</sup> developed and validated a tool to measure foot pain and disability sensitive to individuals with a range of different problems affecting mobility. It consists of 19 questions regarding daily activities and asks about pain experienced whilst conducting these, during the past month. There are three responses - *none of the time, on some days, on most or everyday*. This measure has been recommended for use in a variety of

clinical and population settings and was later used by Waxman and colleagues<sup>14</sup> in a randomised controlled trial (RCT) measuring the effect of a self-care foot programme for older people.

**The Podiatry Health Questionnaire (PHQ)** consists of both a questionnaire, which the patient completes regarding the effect their foot health has on their quality of life and a clinical measure from 1 – 5, which is completed by the podiatrist where a score of 5 would reflect gross foot problems<sup>15</sup>. This measure was piloted in individuals across four UK podiatry departments, and was found to be a useful tool to assess foot-related health.

**The Foot Impact Scale**<sup>16</sup> is based on the results of patient interviews and a postal survey. It consists of a 51-item questionnaire investigating impairments, footwear, activities and participation. Initial results suggest the tool has external validity and is reliable.

**The Bristol Foot Score**<sup>17</sup> was also formulated after consultations with groups of patients and on an individual basis, and consists of 15 items with various responses for each. Each possible answer for the different questions are numbered, the total score is calculated, and the higher the final score the more problematic an individual perceives their foot problem to be. It involves three inter-related topics; foot pain, footwear and general foot health. Once developed, it was used to assess outcomes of nail surgery and found that the pre and post-operative scores for the sample group showed a significant difference (the post-operative scores being lower), suggesting nail surgery was beneficial.

### Questionnaires and Surveys

Surveys can be used to elicit information from a sample of the population. They can take the form of interviews where the researcher asks a number of questions and records the response and can either be in person, via a telephone, or through a self-administered questionnaire<sup>18</sup>. Surveys are a popular research tool in podiatry and have been used widely to determine the incidence of foot problems in different populations,<sup>19,20</sup> whilst some involving podiatrists have assessed a variety of professional issues<sup>21,22</sup> or have been used to gauge the effectiveness of specific podiatric interventions.<sup>23,24</sup>

A number of advantages and disadvantages are associated with the use of different survey methods. Face-to-face interviews can allow more complex data

to be collected as the interviewer is on hand to clarify any problems, open-ended questions can be asked<sup>25</sup> and response rates are often higher when compared with postal surveys. Telephone interviews are cheap and quick to administer when compared with face-to-face interviews. However, those members of society without a telephone will automatically be excluded from the survey, which could introduce an element of bias.

Postal surveys using a self-completed questionnaire are probably the most common as they are cheap to administer when compared with face-to-face interviews, can cover a large geographical area for the cost of postage, eliminate the potential for interviewer bias found in the other two methods and avoid the potential of the respondents being unavailable.<sup>25</sup> However, Bourque & Fielder<sup>26</sup> recommend using an accurate and current list of the population under study before a sampling frame is determined. Response rates are also generally lower than in face-to-face and telephone interviews, allowing non-response bias to be a potential problem, though reminders are advocated to lessen this.<sup>27</sup>

It is recommended that postal survey questionnaires should be short, and easy to complete without the assistance of others,<sup>26</sup> though there is no guarantee that other members of the household would not complete the questionnaire on behalf of the respondent.

The actual format of the questionnaire has been discussed widely in the literature, especially the inclusion of *don't know* or a neutral response. Some authors recommend the omission of this response category as it does not affect response rates, presents a questionnaire in a simpler format<sup>28</sup> and avoids the respondent opting for the middle ground<sup>29</sup>. Hawkins & Coney,<sup>30</sup> however, advocate the use of a *don't know* option to reduce the rate of uninformed responses.

Response order has also been shown to affect survey results. Primacy effects where the first category is selected and recency effects where the last option is picked have been shown to occur in all types of surveys; though Schuman & Presser<sup>31</sup> believe primacy effects may be more likely to occur in postal surveys. To avoid this, it has been suggested to change the order of response categories for each question,

though this can make completion of the questionnaire more time consuming.

When given a statement that requires agreement or disagreement, Ayidiaya & McClendon<sup>32</sup> found that agreement was higher if the statement was written in a forced choice format, this is known as the 'acquiescence effect'. A space for free comments alongside each question has also been found to increase response rates.<sup>33</sup>

### Qualitative data collection methods

The commonest ways of collecting qualitative data are by one-to-one interviews, focus groups or by collecting textual information in the form of documents. These methods are described in more detail in article 4 of this series.<sup>1</sup>

If using interviews as a data collection method, the interaction between the researcher and participant is normally taped and later transcribed verbatim. This can be supplemented with notes that the researcher may make during or directly after the interview (field notes) of any ideas or thoughts that may have occurred which could aid the analysis and interpretation of data. During the analysis stage, narrative data is coded into themes,

which can be compared across the different participants who took part in the study.

Focus groups can be taped and later transcribed, but as they can consist of approximately 10 people with numerous interactions, this can be quite difficult to accurately record and later transcribe. To improve this method, an additional researcher can be included as well as the facilitator of the group who can make notes during the exchanges, noting any particular themes, issues or relevant details. If researchers have a lot of experience in running focus groups, they may just collect data via note taking. Using more than one researcher to do this who can then compare their notes at a later date, in the absence of taping the interactions, can improve the reliability of this method.

Documentary methods to collect data, once an appropriate sample of material has been collated, rely on ordering the information into themes. If using this research method, one of the most important considerations is to ensure that all the relevant documents are assembled. An incomplete record could probably affect the findings, which would be a form of bias. If large numbers of documents are involved, which could not possibly be analysed in a specific time frame, a random sample of the material is advised. Rodgers<sup>34</sup> advised retrieving a 20% sample when using concept analysis, a qualitative research method used widely in nursing.

## Conclusion

There are a wide variety of data collection methods that are of benefit to the podiatry profession. These can range from simple measures of assessing the efficacy of a treatment, such as assessing the reduction in the size of lesions or their resolution,<sup>35</sup> investigating the success and any potential complications of podiatric surgery using the PASCOM system,<sup>36</sup> or by utilising a previously validated measure to assess change in foot health as a result of a podiatric intervention.

Discussion with patients, carers and professionals in the form of focus groups and interviews can also yield important information regarding service delivery<sup>21</sup> and professional issues.<sup>37</sup>

The main characteristics of any form of data collection are that the data should be reliable and valid, and these terms may be interpreted in different ways to reflect the research design being used. The aims and objectives of a project or research study should determine which type of data collection method is used.

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