

A systematic review of psychometric evidence and expert opinion regarding the assessment of faecal incontinence in older community-dwelling adults

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Abstract

Objectives This review had two objectives: (i) to determine what is required in an assessment of faecal incontinence issues for older community-dwelling adults; and (ii) to determine the psychometric tools most effective for assessment of faecal incontinence in older community-dwelling adults.

Inclusion criteria For the review of psychometric tools, studies were included if they were concerned with people living in the community, included a significant proportion of the sample aged 65 years or over, and either examined psychometric properties of assessment tools or assessed sensitivity of assessment tools to non-surgical interventions available in the community setting. For the review of expert opinion, the search was limited to expert opinion provided by an expert in faecal incontinence that related to community-based assessment. Only articles published in English were eligible for inclusion and no limits were placed on publication dates.

Search strategy An initial search of Medline and CINAHL databases identified terminology frequently used in the literature with regard to assessment of faecal incontinence. An extensive search was then undertaken using all identified key words and index terms. The third step involved a search of reference lists and bibliographies of all relevant articles.

Methodological quality All identified studies that met the inclusion criteria were assessed for methodological validity in the case of studies considered for inclusion in the psychometric review. Validity of expert text was also assessed prior to it being included in the review.

Results The final search strategy identified approximately 7000 references. Full-text versions of 144 references were critically appraised for inclusion in the review. Of these, 25 sources were included in the review of expert opinion and 16 in the review of psychometric properties. In the review of expert opinion, 254 conclusions were extracted for synthesis. The 31 thematic categories were organised under five major themes: History-taking, bowel assessment, psychosocial aspects, physical examination and specialist referral. From the sources that survived critical appraisal, 52 conclusions relating to psychometric properties of assessment tools were derived. There was limited, if any, analysis of psychometric properties for the majority of assessment tools. The Wexner and Vaizey symptom severity scales demonstrated acceptable test-retest reliability and convergent validity. The Faecal Incontinence Quality of Life Scale (FIQLS) demonstrated reasonable reliability and good convergent and criterion-related validity. There was, however, some evidence questioning its discriminant validity.

Conclusions This systematic review represents an important first stage in developing guidelines for assessment of faecal incontinence in community-dwelling older people. Assessment should be comprehensive in nature. Gaps in expert opinion are evident regarding issues such as assessment of cognitive decline and specialist referral. Continence advisors need to be appropriately trained in using and interpreting results from assessment tools and conducting physical examinations. Although studies in the review of psychometric properties suffer from limitations such as inadequate sample sizes, the Vaizey and Wexner scales would appear to be the tools of choice. The FIQLS is clearly the tool of

choice at this stage for measuring faecal incontinence quality of life. Further validation of tests used in faecal incontinence assessments is required.

Background

The Medical Aids Subsidy Scheme, with the Queensland Health and Community Care department, recently developed clinical practice guidelines for the treatment of urinary incontinence in community-dwelling older people.¹ There was a desire also to develop similar guidelines for the assessment of faecal incontinence for this population. It quickly became evident that no such clinical guidelines existed. Furthermore, an extensive preliminary review of the literature revealed no evidence from randomised controlled trials or other higher forms of evidence regarding faecal incontinence assessment. In fact, expert opinion and evidence from studies looking at the psychometric properties of tools that could be used in the assessment of faecal incontinence were the only forms of evidence available upon which to base assessment guidelines. This evidence, though, had not been systematically reviewed or synthesised to the point where clinical practice guidelines could be developed.

With this in mind, a protocol was developed to guide a systematic review of expert opinion on assessment issues in faecal incontinence and the psychometric properties of assessment tools used for faecal incontinence in older community-dwelling adults. The project from which this protocol was derived was a joint initiative of the Australian Centre for Rural and Remote Evidence Based Practice, based at the Toowoomba Health Service, and the Centre for Rural and Remote Area Health based at the University of Southern Queensland in Toowoomba. The project was funded by Home and Community Care, Queensland.

The project team consisted of:

- Primary reviewer
- Secondary reviewer
- Third reviewer

The review is primarily aimed at collecting and synthesis-ing information about faecal incontinence assessment for older community-dwelling adults prior to the development of practice guidelines for this population. It is targeted toward informing community nurses and continence advisors, but could be equally valuable to other healthcare professionals who are involved in the assessment of faecal incontinence, such as continence physiotherapists and general practitioners.

What is faecal incontinence?

There is some disagreement regarding the most appropriate definition of faecal incontinence among experts in the field. The point of disagreement generally revolves around the inclusion of control of flatus in the definition. For example, Kalantar *et al.*² define faecal incontinence as 'an involuntary loss of anal sphincteric control leading to unwanted release of liquid or solid faeces (not flatus) at an inappropriate time or in an inappropriate place within the past 12 months.' Other authors, such as Mavrontonis and Wexner,³ include the inability to control flatus in their definition of faecal incontinence. In collaboration with the expert panel and on the basis of the majority of opinion in the literature, we decided to utilise the broader definition of faecal incontinence in this review.

Prevalence of faecal incontinence

While overall prevalence of faecal incontinence is estimated at around 5.3-5.5%,⁴ the incidence of faecal incontinence in community-dwelling older persons has been estimated at somewhere between 11% and 17%.^{2,4-9}

Assessment of faecal incontinence

In the authors' experience, there is a wide variation in terms of guidelines for the community-based assessment of faecal incontinence in older adults. An initial review of the literature revealed a number of assessment guidelines provided by experts in the field of faecal incontinence.¹⁰⁻¹³ It quickly became clear, however, that guidelines varied considerably in terms of their depth, breadth and perspective.

Additionally, none of these guidelines had been empirically validated, instead relying upon logical argument based on the findings of other studies, clinical experience and anecdotal evidence. It was clear that there was a need to provide some basis upon which guidelines could be developed, informed by the systematic review of all expert opinion on the topic.

Assessment tools

Additionally, various assessment tools have been used to assess aspects of faecal incontinence such as symptom severity and quality of life in the community setting. Again, however, there appeared to be a lack of summarised accessible information as to the psychometric properties of these assessment tools for use with community-dwelling older people. In an initial review of the literature, a number of assessment tools were identified. Popular tools for the assessment of faecal incontinence symptom severity included the Faecal Incontinence Severity Index (FISI)¹⁴ and the Pescatori and Wexner measures of faecal incontinence.^{15,16} Similarly, measures of quality of life specific to faecal incontinence have been identified, including the Fecal Incontinence Quality of Life Scale (FIQLS)¹⁴ and the Gastrointestinal Quality of Life Index (GIQLI).¹⁷ More generalised measures of quality of life, such as the Medical Outcomes Survey Short Form-36 (SF-36)¹⁸ and the Manchester Health Questionnaire (MHQ)¹⁹ were also identified as having potential to be utilised in the assessment of faecal incontinence.

A number of psychometric properties have the potential to be associated with faecal incontinence assessment tools. The two main issues in psychometric validation are that the tool measures the same way each time it is used and that the tool measures what it is intended to measure. These concepts are known as reliability and validity,²⁰

Reliability

There are three main ways in which reliability of a tool can be measured. To examine *test-retest reliability*, the same tool is administered twice to the same sample on two separate occasions. The assumption is made that there is no change in the underlying condition between the two tests and thus any variability is due to issues with the reliability of the test. Evaluation of test-retest reliability normally uses either the Pearson's correlation coefficient or the intraclass correlation coefficient.²¹ A high intraclass correlation coefficient (>0.70) between the two test scores indicates good test-retest reliability.²² Another commonly used method to assess test-retest reliability is the kappa statistic. This statistic adjusts for the contribution of chance agreements and defines perfect agreement at a value of 1.0 and agreement no different to chance at a value of 0. Kappa values greater than 0.4 constitute good reliability.²³

Internal consistency estimates the reliability of a tool by various methods of grouping items within a tool together and observing if they measure the same attribute. Generally, this type of reliability is expressed in terms of Cronbach's alpha coefficient,²⁴ with values above 0.70 being considered sufficient. Kappa statistics have also been used to assess internal consistency.

Inter-rater reliability involves two or more raters administering the same test to the same people to establish the extent of consensus across raters. This type of reliability is generally measured using the intraclass correlation coefficient if there are more than two raters or the kappa statistic if there are just two raters.^{22,23}

Validity

In terms of validity of an assessment tool, there are four main types that need to be considered. *Face validity* refers to the test looking like it should be measuring what it is intended to measure.²⁵ A tool is likely to have little credibility if it does not possess this characteristic. *Content validity* involves the tool possessing sufficient breadth as to ensure all relevant aspects of the construct under investigation are included and that aspects irrelevant to the constructs are not included.²⁶

Construct validity refers to whether scales purported to measure the same attribute actually measure the same attribute.²⁶ Pearson's correlation coefficient is used to test for construct validity. Generally, a test will have good construct validity if it correlates well with other tools that also measure that construct (i.e. *convergent validity*) and correlates less well with tools that do not measure the same construct (i.e. *discriminant validity*). Construct validity is generally considered good if correlations related to convergent validity exceed those related to discriminant validity.²⁶ *Factor analysis* is also a statistical technique involved in the establishment of construct validity. A set of items in a tool usually combines to provide a measurement of a particular construct. Factor analysis is used to determine which items are associated with the measurement of a construct. Evidence for a construct being valid is provided if the same items are associated with the same construct across a number of different samples, conditions, etc. When this occurs, the tool is said to have a stable factor structure.²⁶

Finally, *criterion validity* discriminates between groups known to differ with respect to attributes being measured.²⁷ The tests generally used to assess criterion validity are tests of differences between groups such as analysis of variance and the Kruskal-Wallis test.²⁶

Sensitivity

Sensitivity refers to the ability of a test to measure changes as a result of intervention. This is particularly important for the clinician in terms of being able to determine if interventions have had a positive impact on the patient.²¹

Recently, Thomas *et al.*,²⁸ as part of the development of a suite of outcome measures for incontinence, conducted a review of incontinence outcome measures, including outcome measures for faecal incontinence symptom severity and faecal incontinence quality of life. After reviewing a number of outcome measures, the Wexner scale¹⁵ was recommended as the most appropriate outcome measure for symptom severity while no appropriate outcome measure was identified for quality of life. This review, while comprehensive in nature, was not conducted in the form of a systematic review (Thomas, pers. comm., 19 October 2005).

Additionally, a number of papers on psychometric properties of assessment tools have been published since the Thomas *et al.* review was conducted.

Objectives

What does assessment of older community-dwelling adults with symptoms of faecal incontinence need to include? What tools are most effective for the assessment of symptoms of faecal incontinence in older adults living in the community?

Expert panel

The project reviewers consulted with a multidisciplinary panel of experts throughout the course of the project. The panel members were selected in such a way that, when combined, the panel contained recognised medical and nursing expertise in terms of knowledge about current incontinence literature, possessed a considerable number of years of clinical experience in faecal incontinence practice and were in reasonably close geographical proximity to the site at which the study was conducted. The expert panel was consulted on such things as the content and scope of the review, the breadth of the literature consulted and confirmation that expert opinion included in the review was actually written by acknowledged experts in the field. This panel included:

- Mrs Audrey Burgin - Continence Advisor, Continence Education and Leadership Project, Brisbane
- Mrs Kaye Josephs - Clinical Nurse Consultant, Blue Care, Brisbane
- Dr Robyn Nagel, Gastroenterologist, Toowoomba
- Dr Nick Oliver, Gerontologist, Toowoomba

Inclusion criteria

Review of psychometric properties of tools

The inclusion criteria established for this aspect of the review limited the search to include studies that:

- Were primarily concerned with people living in the community
- In the agreed opinion of the primary and secondary reviewers, included a significant proportion of the sample aged 65 years or greater
- Examined the psychometric properties of the assessment tools or assessed sensitivity of the assessment tool to non-surgical interventions that would be available in the community setting

Review of expert opinion

The inclusion criteria for this part of the review limited the search to expert opinion and narrative that, in the opinion of the reviewers and expert panel:

- Constituted opinion or narrative provide by an expert in the field of assessment of faecal incontinence
- Related to the assessment of faecal incontinence in the community setting
- In both reviews, only articles published in English were eligible for inclusion, and no limits were placed on publication dates.

Exclusion criteria

Review of psychometric properties of tools

Exclusion criteria for studies in this part of the review were:

- Insufficient overlap between the age range of the sample and the population of interest (i.e. people aged 65 years and over)
- Studies specific to the residential aged care, palliative care or acute settings
- Studies of sensitivity of assessment tools where the treatment could only be provided in acute care settings
- Studies investigating assessment in relation to pre- and post-surgical intervention
- Studies relating to animals
- Studies specific to a particular condition or disease, such as spina bifida

Review of expert opinion

The exclusion criteria for this part of the review limited the search to expert opinion and narrative that, in the opinion of the reviewers and expert panel:

- Was not written by a person of standing in the field of expertise
- Was not specifically addressing assessment of faecal incontinence
- Related to the assessment of faecal incontinence in settings other than the community setting
- Included expert opinion specific to a particular condition or disease

Types of studies

Review of psychometric properties of tools

This review considered well-designed studies, including randomised controlled trials, quasi-experimental studies, other non-controlled trials and cohort studies that assessed the reliability, validity and sensitivity of tools used in the assessment of faecal incontinence where at least the majority of clients in the sample were community-dwelling adults over the age of 65 years. A paper was included in this part of the review if it reported any psychometric property or relevant data about performance of a measure applied to the defined population.

Review of expert opinion

This review considered opinion in publications and text from clinicians and academics considered experts in the assessment of faecal incontinence. Consideration was given to:

- The standing of the expert in the field
- Reference to the extant literature
- The relevance of the opinion to the assessment of faecal incontinence in older community-dwelling adults

- The focus of the text upon client interests

For both reviews, non-English language articles, abstracts and unpublished studies were excluded.

Types of participants

The review of psychometric properties considered clients over the age of 65 years who live in the community (i.e. they do not live in a residential aged care facility) and experience symptoms of faecal incontinence. The review of expert opinion only considered expert text and opinion relevant to older community-dwelling clients.

Types of interventions/phenomena of interest

Rather than focusing on intervention, the psychometric review was specifically focused on evidence related to psychometric properties of assessment tools. These types of studies do not generally incorporate an intervention. The only exception to this was in relation to the assessment of sensitivity. For sensitivity, only studies that measured the impact of interventions that were capable of being delivered in a community setting were considered. This excluded surgical interventions as well as the more invasive non-surgical interventions that would be difficult to implement in a community setting. For the review of expert opinion, the phenomena of interest were the opinion and text provided by incontinence experts on the assessment of faecal incontinence.

Types of outcome measures

For the psychometric review, outcome measures of interest included measures of reliability (e.g. inter-rater reliability, test-retest reliability, internal consistency), validity (face validity, content validity, discriminant and convergent validity, stability of factor structure) and sensitivity for tools used in the assessment of faecal incontinence.

For the review of expert opinion, opinion and text related to assessment of faecal incontinence formed the basis of the analysis. Opinion provided on areas such as assessment of medical history, assessment of bowel history, physical examination and criteria for expert referral was examined.

Search strategy

The initial search attempted to identify both published and unpublished studies in the English language. A three-step search strategy was used. An initial search of Medline and CINAHL databases identified terminology frequently used in the literature with regard to the assessment of faecal incontinence. This was primarily undertaken in an effort to identify optimal search terms. A second extensive search was then undertaken using all identified keywords and index terms. The third step involved a search of the reference lists and bibliographies of all relevant articles. The search strategy was adapted to suit the requirements of each database.

Terms/descriptors included:

Faecal or Fecal or Anal or Bowel

Incontinen* or Continen*

Assessment

Management

Treatment

Evaluation

Reliabil*

Valid*

Specific*

Sensitiv*

Tools or Guideline* or Scale* or Questionnaire* or Grading or Diar* or Chart*

SF-36

SF-12

Sickness Impact Profile

Cleveland or Wexner

St Marks or Vaisey

Pescatori
American Medical Systems
Faecal Incontinence Severity Index
Faecal Incontinence Quality of Life Scale
Gastrointestinal Quality of Life Scale
Symptom and Severity
Quality of Life
Mini-Mental State Examination
Barthel Index
Functional Independence Measure

Databases searched included:

- CINAHL
- Australian Medical Index Embase
- The Cochrane Library Pubmed/Medline Current Contents
- Psychlit
- Database of Abstracts of Reviews of Effectiveness (DARE) Dissertation Abstracts

Google scholar

All studies identified during the database search were assessed for relevance to the review based on the information provided in the title, abstract and descriptor/MeSH terms. A full report was retrieved for all studies that appeared to meet the inclusion criteria. Studies identified from reference lists were assessed for relevance based on study title. When the full report was retrieved, two independent reviewers compared studies with the inclusion and exclusion criteria to determine their relevance to the systematic review.

Critical appraisal

All identified studies that met the inclusion criteria were critically appraised for methodological validity, in the case of studies considered for inclusion in the psychometric review, and validity of expert text for inclusion in the review of expert opinion, prior to inclusion in the review.

Grading systems for judging the quality of evidence typically identify randomised, controlled trials as the 'gold standard', followed by controlled observational studies, descriptive epidemiology studies and case reports. Such grading systems are not useful in evaluating studies of the psychometric validity of measurement tools, as randomised controlled trials are not necessarily the best setting for evaluating the psychometric performance of a tool. Therefore, for the evaluation of psychometric validity, reviewers relied upon narrative descriptions of studies quality rather than rating schemes. The quality of individual studies was judged using specific criteria for evaluating reliability, internal and external validity and sensitivity. Criteria for judging internal validity included the following: sample size, sample characteristics, setting, selection bias, attrition bias, definition of interventions and outcomes and confounding variables. Criteria for judging external validity related to how well the results could be generalised to patients and conditions outside the study settings. Studies were rejected if they had multiple methodological errors, poor or inadequate reporting and/or unwarranted claims of cause and effect. The critical appraisal tool developed for this review was based upon the critical appraisal and data extraction form for diagnostic tests from the Critical Appraisal Skills Program²⁹ and the quantitative critical appraisal form from the JBI MASTARI program.³⁰ The critical appraisal form developed for the psychometric review is presented in Appendix I.

For the review of expert opinion, The JBI-NOTARI module was utilised. Expert opinion was critically appraised using the NOTARI critical appraisal tool³¹ to assist the reviewers in excluding opinions that were:

- Provided by commentators not deemed to be experts
- Irrelevant to the topic under consideration
- Of questionable validity The NOTARI critical appraisal tool is presented in Appendix II.

Based on the standard approach promoted by the Cochrane Collaboration and adopted by the Joanna Briggs Institute, two reviewers conducted the critical appraisals independently. Following this, the primary and secondary reviewers conferred to reach agreement as to whether studies and expert opinion were to be included or excluded from the review. If agreement was not reached between the two reviewers, contingency was made for a third reviewer to make the final decision as to the inclusion or exclusion of the study or expert opinion. The third reviewer, however, was not required to deliberate during the critical appraisal process as the primary and secondary reviewers were able to reach a consensus on all occasions.

Data extraction

Review of psychometric tools

A data extraction tool, based upon the critical appraisal and data extraction form for diagnostic tests from the Critical Appraisal Skills Program²⁹ and the quantitative data extraction form from the JBI MASTARI program,³⁰ was developed for the review of psychometric assessment tools. Data were extracted on:

- The details of the manuscript
- The setting in which the data were collected
- The name of the assessment tools for which psychometric evidence was provided
- The purpose of the assessment tools
- The method by which psychometric data were collected
- Characteristics of the participants
- Recruitment procedures
- Inclusion and exclusion criteria
- Results in relation to psychometric validity of the targeted assessment tools (i.e. reliability, validity, sensitivity, specificity)
- A summary of author conclusions

In addition to these details, there was space on the data extraction form for the reviewer to make comments about the reviewed study. The data extraction form is presented in Appendix III.

Each conclusion was assigned a level of credibility, according to the methodological quality of the paper (e.g. sampling procedures, sample size, correct use of statistical methods). Assignment was made to the levels *unequivocal*, *credible* or *unsupported*, on the basis of the descriptions provided in Table 1.

Review of expert opinion

Data from the review of expert opinion were extracted using the NOTARI data extraction process.

Generally, each paper containing expert opinion included opinion on a number of different topics relating to assessment of faecal incontinence. The reviewer read each paper in detail. Individual conclusions from each paper were extracted. Each conclusion was entered into NOTARI, along with details of the paper from which the conclusion was derived, and carefully selected illustrations from the text to support the allocated level of evidence.

Each conclusion was assigned a level of credibility, according to the strength of the conclusion. Assignment was made to the levels *unequivocal*, *credible* or *unsupported*, using the descriptions provided in Table 1.

Data synthesis

Review of psychometric tools

Evidence in relation to the psychometric properties of assessment tools was categorised according to the assessment tool and, when appropriate to the particular psychometric properties being tested (i.e. reliability, validity, sensitivity). Narrative summaries of the evidence and tables summarising the evidence within each study were then provided.

Review of expert opinion

Conclusions derived from the data extraction process were categorised for synthesis. The focus of a particular conclusion was examined and each conclusion was then coded into a particular category and, where applicable, subcategories. Categories were developed on the premise of providing a basis for clinical guidance in assessment. Each conclusion was assigned to a particular category using NOTARI. Underlying themes were then developed, categories were assigned to those themes and a synthesis was conducted on each of the identified themes. The structure of categories and themes was agreed upon by the reviewers and reviewed by the expert panel prior to synthesis taking place. Narrative summaries of the expert opinion within particular themes and subthemes, where applicable, were then developed.

Results

Description of studies

The final search strategy identified approximately 7000 references. Appraisal of abstracts by the reviewers resulted in the exclusion of over 6800 of these original references. Full-text versions of 144 references were critically appraised for inclusion in the review. Of these, the reviewers considered appropriate for inclusion 25 sources of information for the review of expert opinion and 16 sources for the review of psychometric properties. A summary of the included studies for the review of expert opinion and the review of psychometric properties are included in Appendices IV and V, respectively. A further 103 sources were excluded for a number of reasons, including:

- Poor methodological quality, inappropriate study type and insufficient overlap of the sample to the target population for the review of psychometric properties
- Questionable expertise in the field, limited information, lack of reference to extant literature and focus on management rather than assessment for the review of expert opinion
- The studies excluded, and the reasons for their exclusion, are provided in Appendix VI for the review of expert opinion and Appendix VII for the review of psychometric properties.

Table 1 Level of credibility for the reviews of psychometric properties and expert opinion

Levels of credibility	Unequivocal	Credible	Unsupported
Psychometric Review	Evidence from a study that is of excellent methodological quality, directly relevant to the population of interest and appropriate use of psychometric tests.	Evidence from a study that has good methodological quality but contains potential flaws in issues such as small sample size, partial divergence from the population of interest, or questionable use of psychometric tests.	Evidence from a study with poor methodological quality, little direct relevance to the population of interest, and/or inappropriate use of psychometric tests.
Review of expert opinion	Relates to evidence beyond reasonable doubt, which may include conclusions that are matter-of-fact, directly reported, observed and not open to challenge.	Those that are plausible in light of an argument and theoretical framework.	When 1 nor 2 apply and when most notably conclusions are not supported by sound argument.

Review of expert opinion

Data were extracted from the 25 included sources for the review of expert opinion. From these sources, 254 conclusions relating to the assessment of faecal incontinence were extracted for synthesis.

Thematic analysis of conclusions resulted in 31 thematic categories, which were then organised into five syntheses:

- History-taking - details of medical, surgical, gastro-colorectal, obstetrical, urological, cognitive, drugs and medications, nutrition and sexual histories
- Bowel assessment - use of specific assessment tools (pictorial stool charts, bladder bowel diaries, grading of symptom severity), assessment questions, factors or events associated with onset, current management, history of bowel pattern, and symptom severity
- Psychosocial aspects - development of rapport, tools that measure quality of life, environmental assessment, and assessment of functional and cognitive ability
- Physical examination - visual inspection, abdominal palpation, and digital rectal examination
- Specialist referral - identification of risk factors, referral for pathology, diagnostic evaluation

- The results derived from the syntheses are described in the following section.

History-taking

Of the 25 sources of expert opinion, six (1 unsupported, 5 credible) specifically recommended the taking of client histories during the assessment process for faecal incontinence.^{11,32-36} Specific areas in which it was recommended that data be collected included neurological and neurogenic factors, medical history, obstetric and gynaecological history, cognitive factors, surgical history, medication and drug history, dietary history, gastrointestinal history, functional/environmental issues, congenital issues, sexual history and activity. Additionally, four sources provided credible recommendations regarding the need to ask about the events surrounding the onset of faecal incontinence or changes in bowel habits.^{3,11,12,37} Related to this was a credible recommendation to ask questions ascertaining the client's premorbid bowel functioning.¹⁰

Medical history

Of the 25 sources of expert opinion, four made general recommendations about the need to take a medical history of the client during the assessment of faecal incontinence.^{3,13,38,39} A number of sources made specific recommendations, however. Twelve sources (11 credible, one unequivocal) recommended questions regarding history of diabetes mellitus.^{3,11-13,34,37-43} Additionally, 10 sources made 15 recommendations (one unsupported, 13 credible, one unequivocal) that specific questions be asked about spinal cord trauma or injury.^{3,12,13,34,35,38,39,41,43,44} A few sources recommended ascertaining whether the client had a history of constipation, stroke and chronic diarrhoea - the great majority of these recommendations were either credible or unequivocal.^{10-12,33,35,42,43} There were also credible recommendations regarding the need to take history on faecal urgency,^{11,12} urinary tract infections,¹² menopause,¹¹ thyroid issues,¹¹ prostate cancer^{11,12} and collagen insufficiencies.⁴⁴

Surgical history

Ten sources of expert opinion made credible recommendations for the inclusion of surgical history.^{3,11-13,34,35,38,44-46} The most common specific recommendations related to the need to gain information on specific anorectal issues and whether the client experiences or experienced double incontinence.^{11,13,28,39,43} A number of sources also recommended asking whether the client had undergone radiation treatment in the pelvic area.^{11,12,35,39,43,45} The remaining recommendations were all credible and included the need to gain information on history of abdominal surgery,^{11,39,45} back surgery,^{38,47} sphincterotomy,¹¹ fistulectomy,¹² prostatectomy,¹² colon resection¹² and gastrointestinal surgery.⁴¹

Obstetric and gynaecological history

Fourteen of the 25 sources of expert opinion (one unsupported, 13 credible) recommended asking questions about the obstetric history of female clients.^{3, 11,12,32, 34-36, 38,39,41,43,45,46,48} Additionally, two sources made credible recommendations to take a gynaecological history.^{3,45} Again, at least half these sources were not specific about obstetric and gynaecological information to be collected. The most common specific recommendations regarding obstetric history-taking, however, related to: (i) the need to ascertain whether the client had experienced prolonged labour, a difficult vaginal birth or vaginal tears;^{12, 38, 42-44, 49} (ii) the type of delivery;^{11, 38,41,48} and (iii) the number of births experienced.^{11,38,41,48} There was also credible expert opinion recommending women be asked about the weight of their babies at birth and what their bowel function was like following delivery.^{11,38,41,48} There were also unsupported recommendations regarding the need to ask about past episiotomies and post-partum infection.^{11,38} In terms of gynaecological history-taking, there was unequivocal expert opinion regarding the need to ask about whether the woman had previously undergone radical hysterectomy³⁹ and credible expert opinion recommending questioning regarding experience of perineal pain.^{34,40,41}

Cognitive factors

Taking a history of cognitive factors was recommended by nine of the 25 sources (all credible).^{10, 12, 35, 38,40,41, 44, 49, 50} Primarily, recommendations revolved around the need to gain information on present and past psychological and cognitive functioning and history of dementia. While the majority of expert opinion stayed at this more general level, some sources made specific recommendations regarding

issues for which a history would be important. The need to obtain history of cognitive impairment or decline, organic brain syndrome and poor functional status were emphasised by Madoff *et al.*⁴⁹ and Harari *et al.*¹⁰ with Tariq *et al.*² recommending that additional information regarding the client's history be gained from family members if the client has dementia. History-taking specific to psychological issues such as depression, anorexia, alcoholism, mental retardation and wilful soiling was also recommended in credible expert opinion.^{11,35,42,43} Finally, knowledge of perceptual difficulties such as visual impairment was regarded as important to client assessment.⁴⁴

Medication and drug history

Of the 25 sources of expert opinion, 10 (one unsupported, nine credible) recommended acquiring history pertaining to medication and drug use.^{3,11,12,34,36,40,43,44,46,51} Again, most of the recommendations were made at this broad level, though a diverse range of specific recommendations regarding history-taking in this area were made. Over half the sources recommended obtaining history of laxative use and abuse. Credible recommendations were also made regarding the need to ascertain history of:

- Prescription medication use,^{12,41,43,44} with specific recommendations made regarding history of the use of antidepressants,⁴³ antibiotics,¹² anticholinergics,⁴³ anti-parkinsonians,⁴³ phenothiazines,⁴³ calcium channel blockers,⁴³ alpha blockers,⁴³ non-steroidal anti-inflammatories⁴³ and antihypertensives⁴³
- Over-the-counter and herbal preparations,¹² with specific reference being made to iron formulations,⁴³ magnesium salts,^{12,43} and bulking agents⁴³
- Smoking¹¹
- Narcotic use⁴³

Finally, one source provided a credible recommendation that the client should be asked if there have been any recent changes in medication.⁴⁶

Gastrointestinal history

Three sources provided credible recommendations that a gastrointestinal history be included in history-taking during the assessment of faecal incontinence.^{38,40,43} The most commonly recommended specific issue in this area was history of inflammatory bowel disease.^{3,38,39,43} There were also unequivocal recommendations for the need to ask about bowel cancer^{12,33,39} and ischaemia, heart disease and circulatory problems.^{12,39,43} A number of sources also provided credible recommendations regarding the need to ask about:

- Signs and symptoms such as passage of blood,^{12,43} abdominal cramping,^{10,43} weight loss,⁴³ small hard pellets,⁴³ blood in the faeces,⁴³ ribbon-like stools,⁴³ tenesmus,⁴³ steatorrhea,³ proctitis,¹² dragging sensation¹¹ and a sensation that the rectum is protruding through the anus¹¹
- Associated diseases such as viral gastroenteritis,³⁸ diverticular disease⁴³ and irritable bowel disease^{38,43}
- Conditions such as rectal prolapse³⁵

Dietary history

Eight sources (one unsupported, seven credible) recommended the need to take a dietary history as part of the assessment of faecal incontinence, though most sources were not specific as to questions to ask.^{3,11,12,35,39,40,43,52} There were, however, credible recommendations for history-taking on specific dietary issues, such as:

- Intake of fibre, fats, beer, curries, fluids and caffeine^{11,43}
- Recent changes in diet¹²
- Body weight⁴²

Neurological and neurogenic factors

Thirteen of the 25 sources (one unsupported, 11 credible, one unequivocal) recommended the inclusion of questions regarding history of neurological/neurogenic issues.^{3, 11-13, 33, 34, 38-41, 43, 44, 48} While most of these sources were not specific as to questions to ask when gaining information on these factors, a third of the sources did suggest asking questions about past or present neuromuscular disease and multiple

sclerosis.^{3,12,38,42,44,48} There was also unequivocal expert opinion on the need to ask the client about amyloidosis and muscular dystrophy⁴² and credible opinion on the need to ask about history of cauda equina syndrome.³⁸

Functional/environmental issues

Four sources (one unsupported; three credible) made general recommendations for the assessment of functional abilities and environmental issues.^{11,12,44,49} Specific recommendations were made to gain information on the impact of mobility,^{12,35,40,43,44,49} impaired dexterity^{35,40} and the ability to access the toilet.^{11,12,44,49} Additionally, credible recommendations were made for history-taking to include information on privacy,⁴⁴ clothing issues⁴⁴ and the ability to access carers or other assistance.⁴⁴

Congenital issues

Two sources provided credible recommendations for the inclusion of questions asking about congenital issues.^{11,48} The only specific recommendation, which was unsupported, was for the inclusion of a question asking about spina bifida.³⁸

Sexual history

Two sources also provided credible recommendations regarding the need to ask about sexual history of the client.^{35,38} A credible recommendation was also made regarding the need to specifically ask about anal intercourse.³⁸

Activity

One source provided a credible recommendation regarding the need to ask about activity levels and exercise and any changes in activity.⁴⁰

Bowel assessment

Of the 25 sources of expert opinion, seven (six credible, one unequivocal) recommended that assessment of faecal incontinence should include a comprehensive approach.^{3,10,35,38,43,45,46} Related to this was a recommendation from one credible source that an assessment guideline be included.⁴⁸ Additionally, two credible sources recommended asking questions related to clients' current bowel management^{13,40} and five sources (four credible and one unequivocal) recommended that the client provide information on their bowel history.^{10,35,37,42,43}

Symptoms and symptom severity

In addition to the overall recommendations, nine expert sources made a total of 18 recommendations (two unsupported, 13 credible and three unequivocal) that information pertaining to symptoms and symptom severity be contained within the questions.^{3, 12, 13, 33,41, 42, 44-46}

A number of specific recommendations emerged from the text including recommendations to specifically prompt the client about their faecal incontinence.^{11,40,48,49} Fourteen of the 25 sources recommended asking questions that identified the duration and frequency of the problem.^{3,12,34,35,38-41,43-46,48,49} A further source also recommended noting any fluctuations in the client's experience of the condition. Additionally, four sources recommended that the client should note the timing of incontinent episodes and timing of leaked stool,^{11,40,48} and the timing of pain associated with defecation.^{11,48}

Related to this were a small number of credible sources and one unequivocal source which made reference to the importance of a stool diary and the ability of the client to differentiate between flatus and stool leakage, and between bladder and bowel leakage.^{11,13,35,48} Additionally, a recommendation was made that the client be questioned as to whether the risk of soiling is a perceived risk or actually occurring, as well as whether they have the ability to control their flatus.¹¹

Six sources of expert opinion (five credible, one unequivocal) recommended asking questions about urgency.^{11,35,38,40,46,48} Five provided credible recommendations and one unequivocal recommendation for the client to be asked questions about the nature of the need to rush to the toilet to defecate.^{11,46,48} A

small number of sources recommended questions also be related to the frequency of the urge,¹¹ and the ability to defer the need to defecate.⁴⁸

A small number of credible sources also recommended questions be asked about the nature of faecal incontinence,³⁹ and pad usage.^{11,33,39,48} Experts also recommended questions that had ratings with importance weightings attached to them;⁵¹ measured aspects of quality of life;^{3,42} and provided a basis on which the clinician could compare client outcomes.⁴² Finally, one credible source recommended questionnaires form the basis for future client and clinician interaction.⁴⁸

Assessment tools for assessing symptom severity Sources also made a total of 27 recommendations regarding the inclusion or exclusion of tools to assess symptom severity. A number of tools were discussed in the literature including:

- The Wexner (Cleveland) scale^{13,19,28,32,33,39}
- The Vaisey (St Mark's) scale^{19, 33}
- The Kelly index⁴⁶
- The Luniss index⁴⁶
- The FIS^{19,33,49}
- The Pescatori index⁴⁶
- The Miller rating scale⁴⁶
- Pictorial stool scales^{11,32,48}

A number of sources recommended the Wexner scale be included in the assessment of the client.^{13,19,28,32,33,39} However, there was also a credible recommendation against the Wexner as a suitable tool for this purpose.⁴⁶ One source suggested that further studies to validate the use of the tool were required.¹⁹ One source made credible recommendations against the use of the assessment tools developed by Kelly *et al.*⁴⁶ One credible and one unequivocal recommendation were made for the use of the Vaisey scale as a tool in the assessment of faecal incontinence.^{19,33} A further three credible sources recommended the use of the FIS.^{19,33,49} Baxter *et al.*¹⁹ recommended that this tool was applicable when incontinence was experienced on a frequent basis by the client, though they also observed that the tool was limited in its ability to assess the limits of urgency.

Five sources recommended that tools for the assessment of faecal incontinence required further validation,^{3,19,28,46,50} and one unequivocal source provided a recommendation for the need for short form tools and minimum datasets.²⁸

Clothing issues

Of the 25 sources of expert opinion, eight recommendations were identified that included assessing the client for issues related to their personal care. These recommendations included asking questions that enquired about the use of containment aids or devices,^{3,11,13,39,48} the number of changes of clothing or underwear during a day,^{11,48} and the frequency that underwear changes occurred.¹¹

Stool form

Thirteen sources of expert opinion specifically recommended the assessment include some information on stool form.^{3,10-13,34,35,38-40,44,48,49} Seven of the 24 sources recommended determining the nature of the incontinence.^{10,11,35,39,42,43,48} A number of specific recommendations included assessing the client's awareness of stool form^{11,35,42,48} and consistency of stool form.^{32,37,48} Additional to these recommendations were two credible sources that identified the need to use a pictorial stool scale (e.g. Bristol stool form scale) to identify stool form.^{11,32,48} Related to this was the need to assess client incontinence in terms of amount of regular stool, amount of leaked stool and form of leaked stool.^{10,32,35,40}

Stool diary

Of the 25 sources, five credible sources and one unequivocal source recommended the use of a stool diary.^{10,11,13,19,33,45} Recommendations included:

- A stool diary should be simple to use⁴⁵
- An explanation should be given to the client why the diary is to be completed⁴⁵
- The diary should be used to determine usual bowel habits^{10,50}

- The diary should include information on frequency^{10,44}
- It should also include information on the degree of incontinence³³

A small number of experts recommended the use of a bowel diary for 1 week^{10,11} while one credible source recommended the use of a diary for 2 weeks.⁴⁰

Bladder diaries

Bladder diaries were also recommended as a necessary component of bowel assessment.²⁸ Thomas *et al.* also made the following specific recommendations about data the bladder diary would need to collect:

- Timing of micturition
- Recording frequency
- Measurement of volume
- Undertake a 24 h pad test
- Noting stress urinary incontinence
- Urge urinary incontinence²⁸

Evacuation difficulties

Four sources of expert opinion recommended assessing the client for signs and symptoms of evacuation difficulties.^{10,11,46,48} Specific recommendations were made to determine if the client was straining on defecation.^{10,42,46,48,53} Two credible sources recommended asking questions about whether clients experienced difficulty opening their bow-els.^{10,11} Related to this were recommendations to ask about any history or presence of rectal bleeding^{10,48} and pain associated with defecation.^{11,48} A small number of unequivocal expert opinion also recommended assessing the client for incomplete evacuation and ascertaining if digital assistance was required to initiate defecation.^{11,46}

Psychosocial aspects

Of the 25 sources of expert opinion, seven (two unsupported, four credible and one unequivocal) recommended that a general quality of life assessment should be included in the evaluation of the client with faecal incontinence.^{3,11,38,40,46,48,49} One credible source also recommended the need for a psychosocial assessment.³⁶

Tools for assessing quality of life

Mavrontonis and Wexner² and Norton *et al.*⁴² recommended that assessment tools should be used to assess health and quality of life. One source recommended clients receive an assessment for quality of life, but did not provide details of a specific tool to include in the assessment.⁴² The European Quality of Life Tool was the only tool that received a recommendation (unequivocal) for use in the community.²⁸ Norton *et al.*⁴² recommended the need to include a disease-specific quality of life assessment tool.

Expert opinion was unable to provide conclusive recommendations for a disease-specific quality of life assessment tool. Information was provided, though, on tools that showed promise for the future. These included:

- The FIQLS^{19,42}
- The Fecal Incontinence Questionnaire⁴²
- The SF-36^{19,28,37}
- The MHQ¹⁹

Some general recommendations regarding the use of utility tools such as the Health Utilities 13 during a psycho-social assessment were also made by Thomas *et al.*^{2&} A small number of sources also recommended that all quality of life assessment tools and utility tools required further validation.^{3,28,42} Finally, one unequivocal source determined that no disease-specific quality of life tool associated with faecal incontinence could be recommended for the assessment of quality of life.²⁸

Psychosocial impact

Sources made recommendations that included asking questions identifying the effect of faecal incontinence on the person. Three credible sources recommended that assessment be undertaken to measure the psychosocial impact on the individual.^{36,46,48} A small number of recommendations were made within expert opinion regarding the inclusion of questions enquiring about the effects faecal

incontinence had on relationships, feelings of embarrassment, feelings about the problem and depression.^{11,36,46}

Lifestyle changes

A number of experts made reference to lifestyle changes that occur when a person suffers with faecal incontinence. The main recommendations included asking questions about the effect the faecal incontinence is having on the person's lifestyle,^{11,36,46,48} or lifestyle changes that have occurred to deal with the faecal incontinence.^{11,38} Additionally, three credible sources recommended that specific questions be asked about the clients' experienced lifestyle changes including: staying in close proximity to toilets,⁴⁶ avoiding eating when socialising outside the home environment,^{36,46} isolating themselves from the community¹¹ or incorporating a prophylactic enema into their regime to assist them to be continent.⁴⁶

Rapport building

A number of expert sources (three credible, one unequivocal) recommended that building a rapport with the client was important when undertaking an assessment for faecal incontinence.^{13,32,39,42}

Physical examination

Of the 25 sources of expert opinion, 15 (13 credible, two unequivocal) recommended that a physical examination be included in the assessment of faecal incontinence.^{3,10-13,33,34,36,38,39,41,43,46,49,50} The most common specific recommendations for what should be included in the physical examination were digital rectal examination, visual examination of the perineum, testing of sacral reflexes and abdominal palpation.

Digital rectal examination

Of the 25 sources, 17 (16 credible; one unequivocal) recommended that a digital rectal examination be performed as part of the assessment process for faecal incontinence.^{3,10-13,32,33,36,39,41-46,48,49} Within this, there were a number of specific recommendations in relation to:

- Guidance of clinical practice
- Sphincter assessment
- Stool assessment

Within the sources, there was some guidance as to the appropriate ways to conduct a digital rectal examination. This guidance was rated as being credible or unequivocal. It was recommended that:

- The room in which the examination was conducted requires good illumination^{13,39}
- The clinician position the client in the left lateral position prior to assessment^{13,39}
- The clinician should ensure the hand used for the digital rectal examination is gloved and the finger lubricated³⁹

A small number of recommendations were made within the expert opinion about the quality and reliability of the examination. Specifically, Tuteja and Rao¹³ and Rao³⁹ highlight the need for clinical expertise and the need for a cooperative patient. Additionally, Rao³⁹ reminded clinicians that results of a digital rectal examination may vary according to the size of the clinician's finger.

Sphincter assessment

A few sources provided credible opinion regarding the need for assessment of the pelvic floor musculature and specifically anal sphincter function. Of the 25 sources, eight recommended the need for assessment of resting pressure of the sphincter.^{3,10,13,34,37,38,42,43} Additionally, a number of sources recommended assessment of tone and the amount of perineal descent with straining,⁴⁴ with excessive movement of the pelvic floor upon bearing down or attempting defecation in a lateral position indicating pelvic floor dys-function.^{39,54} Harari *et al.*,¹⁰ Norton *et al.*⁴² and Tuteja and Rao¹³ also provided credible evidence recommending the need for the assessment of squeeze pressure. One source also noted that the clinician's inserted finger should be pushed anteriorly when the client is requested to squeeze their anal muscles.⁴²

Within sphincter assessment, two sources recommended assessment of the sphincter for asymmetry of the sphincter muscles.^{12,46} A few sources also recommended that measurement of the length of the anal canal and the anorectal angle be made,^{13,39,42} along with assessment of the integrity of the puborectalis sling,^{13,39} and examination of the anovaginal septum with the thumb and forefinger.⁴³ The need to include in the assessment the examination for other physical anomalies, such as detection of tumours or rectal masses in the lower bowel, the presence of a rectocele, or presence of an anal stricture, was also expressed by some experts.^{33,34,38-40,43,45,49} Finally, Shelton⁴⁶ made the observation that the digital rectal examination is not by itself accurate for diagnosis of sphincter dysfunction.

Stool information

Fourteen (12 credible, two unequivocal) sources recommended the need to assess the amount of stool found in the rectum as part of the digital rectal examination.^{10-12,33,34,36-39,41-43,48,49} There were also credible recommendations made regarding the need to assess for faecal impaction,^{33,43} the presence or absence of faecal matter,³⁸ the nature of the stool in the rectum (e.g. presence of blood, nematodes³³) and any abnormalities in stool colour.³³

Visual/perineal inspection

Many sources spoke about the need to visually examine the perineal area.^{3,10-13,33,36,38,39,41,42,44-46} The most common recommendation related to the inspection of underclothing.^{38,46,49,50} A few sources also suggested that the presence of a protective device worn by the client was noteworthy.⁴⁶ Conducting the examination in an upright position was recommended by four sources.^{3,10,38,44} A number of sources recommended the identification of issues related to the skin surrounding the rectum, such as the presence of pus,⁴² inflammation,^{13,45} dermatitis,¹³ mucus,⁴² scars^{13,33,42,45} or evidence of poor hygiene,⁴² and the presence of congenital abnormalities such as keyhole defects in the visual inspection.⁴⁵ More detailed visual inspection of the anal area was also recommended by a number of sources, and included the need to identify the presence of haemorrhoids,^{13,33,45} a gaping or patulous anus,^{13,42,45} fistulas^{42,45} and skin tags.³³ Abnormalities on the anal verge, ballooning of the anus, anal fissures and sighting of a rectal prolapse were less commonly recommended, though still present, within the expert opinion.^{3,13}

Sensation and reflex

A number of recommendations were made within the expert opinion regarding the testing of neurological function as part of the physical examination. A few sources recommended the testing of perineal sensation.^{39,40,45} Most of the focus of expert opinion, however, was on the need to test the anal wink reflex for pudendal nerve function, with seven credible recommendations being made.^{12,13,34,40,42,44,45} Of the sources that provided detail as to how to undertake the assessment of the anal wink reflex, there was some disagreement, with Rao¹³ recommending stroking the perianal area with a cotton bud on all four quadrants and Madoff *et al.*⁴¹ recommending gentle stroking with a pin.

Abdominal palpation

Six of the 25 sources identified the need to include abdominal palpation in the physical examination.^{33,35,38,40,43,44} Of these, a few sources went into greater detail, recommending as part of this process the identification of tenderness,^{10,43,44} the presence of palpable masses^{35,43,44} and abdominal distension.^{10,43,44}

Miscellaneous

A small number of experts provided recommendations regarding physical examination that do not fit into the categories presented above. A few sources recommended the need to assess back and lower limb sensation and motor function and gait.^{39,43} Mavrontonis and Wexner³ recommended palpation of the perineum as part of the physical examination. Read *et al.*⁴³ also recommended that the clinician be vigilant for signs of dehydration during the physical examination.

Specialist referral

The amount of space devoted to issues surrounding specialist referral in the expert opinion was relatively small compared with that devoted to other aspects of assessment of faecal incontinence.

Additionally, while many issues surrounding specialist referrals were mentioned, normally only one or two sources provided recommendations on any individual issue.

Within the expert opinion, there were a few high-risk indicators identified. There were also some general recommendations made pertaining to diagnosis. Additionally, many recommendations related to specific specialist investigations and procedures were made.

High-risk indicators

Romero *et al.*⁴⁴ and Norton and Chelvanayagam¹¹ identified a number of high-risk indicators for specialist referral, including:

- Acute onset of faecal incontinence
- Sudden weight loss
- The presence of blood in the rectum
- A recent episode of anaemia

Considerations for diagnostic testing

Not all patients with faecal incontinence require referral to a specialist.³⁸ There was unsupported expert opinion provided by De Lillo and Rose³⁴ that investigations beyond sigmoido-scopy and anoscopy be limited to the well functional patient. There is also some caution expressed in the literature regarding the usefulness and practicality of undertaking anorectal neurophysiological evaluations.³

Given these cautions, however, Madoff *et al.*⁴⁹ and Buchanan *et al.*³³ provided credible expert opinion recommending that referral for diagnostic testing be made when the results of the physical examination are normal but the patient still suffers from faecal incontinence, when conservative management of symptoms has failed, when surgery is being contemplated, when there is a palpable mass, or when there is a suspicion of rectal prolapse but it is not present during physical examination. Novi and Mulvihill³⁸ and Andrews and Bharucha³² recommended that the need for diagnostic testing should be dependent on individual client circumstances. Factors to consider include the patient's age, probable causative factors, presenting symptoms, the impact of the problem on the client's quality of life, their response to conservative management and the availability of diagnostic tests in the community.

Neurologist referral

Mavrontonis and Wexner³ provide some credible recommendations as to when referral to a neurologist should occur. Specifically, neurological referral should be made if: there are neurological problems in the client's history; there is failure of the external anal sphincter to respond to stimuli; there is impaired rectal sensation or evidence of pudendal nerve damage; or there is suspicion of anal sphincter dysfunction.

Pathology

Referral for pathology tests is recommended if there is likelihood of microscopic inflammation or the presence of a systemic disorder (e.g. lupus, multiple sclerosis).⁴⁵ Referral for blood tests was recommended by Harari *et al.*¹⁰ once faecal impaction has been excluded, if the client has diarrhoea for more than 2 days or if there is recent onset of constipation or faecal incontinence without illness or a change in medication. Blood tests should include tests for thyroid function, thyroid hormones, electrolytes, diabetes, urea, metabolic disorders, calcium and full blood count.^{10,39,43,44}

Romero *et al.*⁴⁴ and Harari *et al.*¹⁰ recommend referral for stool analysis when there has been recent antibiotic use, when infection is suspected, or if diarrhoea has been present for more than 2 days. Romero *et al.*⁴⁴ suggest that referral for stool analysis occurs only after faecal impaction has been excluded. Referral for urine analysis is also recommended to exclude diabetes mellitus.^{3,39} Rao³⁹ and Novi and Mulvihill³⁸ recommend referral for breath tests to test for sugar intolerances and the presence of bacterial growth.

Sigmoidoscopy

There was some disagreement among experts as to when referral for sigmoidoscopy should be undertaken. Tuteja and Rao,¹³ Rao,³⁹ DeLillo and Rose³⁴ and Tariq *et al.*² recommend that most clients with faecal incontinence should be referred for this procedure to exclude mucosal disease or colitis, cancer, colonic ischaemia, laxative abuse, a recent unexplained change in bowel habits, or other structural abnormalities. Tuteja and Rao¹³ recommend that this procedure is not necessary for patients with a lengthy history of faecal incontinence. There is at least one inconsistency in the opinion provided, however, in that Rao,³⁹ later in this paper, suggests that a client should only be referred for a sigmoidoscopy if the patient has coexisting diarrhoea.

Proctosigmoidoscopy

Proctosigmoidoscopy is rarely mentioned in the expert opinion. Novi and Mulvihill³⁸ suggested that every patient should be referred for this procedure to exclude inflammation. Later in the paper, they provided clarification to this comment, recommending referral only if the client is experiencing faecal urgency, a change in bowel habits, rectal bleeding, or if there is the presence of occult blood.

Colonoscopy

Tariq *et al.*² and Tuteja and Rao¹³ recommend that clients be referred for colonoscopy when:

- There is a history of cancer or a family history of cancer
- The client exhibits symptoms of iron-deficiency anaemia
- There is a recent unexplained change in bowel habits
- There is a suspected abnormality in the bowel
- The client has coexisting diarrhoea

Anorectal manometry

Read⁴³ provided credible opinion that anorectal manometry can be used to assist the investigation of causes of faecal obstruction. Additionally, this procedure was identified as being useful in confirming defecation disturbances caused by lesions in the central nervous or peripheral nervous systems. Norton *et al.*⁴² recommend referral for anorectal manometry in situations when the conservative management of a client has failed. Rao³⁹ recommended clients be referred for anal manometry, pudendal nerve terminal motor latency, balloon expulsion test and endosonography to define the underlying mechanisms of faecal incontinence.

Miscellaneous procedures

In addition to the procedures mentioned above, a few sources made mention of other specialist investigations for which clients could be referred. Tariq *et al.*¹² and Harari *et al.*⁰ recommend referral for plain abdominal X-rays if there is still suspicion of constipation after rectal examination identifies that the rectum is empty. Referral for endoanal ultrasound was recommended for clients with suspected sphincter dysfunction or those for whom conservative management of symptoms has failed.^{33,35} Read⁴³ and Hinning-hofen⁴⁵ regard endoscopic examination as an essential aspect of assessment but offer no guidelines for referral. Mavrontonis and Wexner³ and DeLillo and Rose³⁴ suggest referral for anoscopy, to exclude haemorrhoids, fissures, and fistula and to eliminate the possibility of inflammation. Referral for a barium enema was recommended if a client had a recent unexplained change in bowel habits.⁴⁸ Finally, it was recommended that a suspected abnormality in the bowel required referral for a barium enema or a barium meal.⁴¹

Review of psychometric properties

It quickly became evident that there was limited, if any, analysis of the psychometric properties of the majority of the assessment tools reported in the literature. Indeed, many of the studies suffered from inadequate sample sizes given the tests conducted, an over-representation of women in study samples and limited overlap between characteristics of study samples and the population of interest in this review.

Sixteen sources, however, survived the critical appraisal process for the review of psychometric properties and their results are summarised below. From these sources, 52 conclusions relating to the

psychometric properties of assessment tools were derived. These conclusions are organised in the results below according to the assessment tools to which they are relevant.

Symptom severity scales

Wexner (Cleveland) scale

The Wexner scale,¹⁵ also known as the Cleveland scale, is a five-item scale of symptom severity. Ratings are made as to the frequency of incontinence of solids, liquid, flatus, wearing of pads and alteration to lifestyle on a scale of 0 (never) to 4 (always). Overall, scores range between 0 (no incontinence) and 20 (complete incontinence).

Information regarding the psychometric validity of this tool was limited. Three sources, however, provided credible data regarding the psychometric properties of the Wexner scale.⁵⁵⁻⁵⁷

Vaisey *et al.*⁵⁷ recruited 23 consecutive patients with faecal incontinence referred to their clinic for anorectal physiological testing. Over 90% of the sample was female and their median age was 57 years. The study compared psychometric properties of the Wexner with the properties of three other symptom severity scales. They determined that the scale had acceptable levels of *test-retest reliability* ($r = 0.75$). Additionally, good *convergent validity* was demonstrated, with the Wexner scale correlating well with a physician's clinical impressions of the severity of participants' faecal incontinence ($r = 0.78$). These data must be treated with caution, however, because of small sample size, over-representation of women in the sample and questions about representativeness of the sample.

Evidence for the *convergent validity* of the Wexner scale was also provided by Rothbarth *et al.*⁵⁶ Thirty-two patients with a mean age of 55 years, who had anterior sphincter repair as a result of obstetric injury, were recruited to participate. The relationship between clients' Wexner scores and their scores on the GIGLI¹⁷ and the SF-20⁵⁸ was examined. The relationship between the GIQLI and Wexner scores was strong ($r = 0.62$). Correlations between Wexner scores and the six dimensions of the SF-20 were all significant; no information, however, was provided on the strength of these correlations. Again, this study suffered from a low sample size. Additionally, all participants were female. The only information about the *sensitivity* of the Wexner scale was provided by Pucciani *et al.*⁵⁵ This well-constructed cohort study examined the data from 149 participants (85 women, 64 men) with a mean age of 60 years who attended an outpatient unit in Italy between 1997 and 2001. Changes to Wexner scores following a conservative treatment model known as the multimodal treatment rehabilitation model were examined. The Wexner score was sufficiently sensitive to detect significant differences between before and after scores of most patients who underwent rehabilitation.

Vaizey (St Mark's) scale

The Vaizey scale,⁵⁷ also known as the St Mark's scale, represented a modification of the Wexner scale,¹⁵ incorporating assessment of the ability to defer and the taking of constipating medications while reducing the importance in scoring of the need to wear a pad or plug. Incontinence for solid stool, liquid stool and flatus is assessed on a scale of 1, being never, to 4, being daily, as is a rating of the patient's perception of changes in lifestyle. Additionally, if the patient responds 'yes' to needing to wear a plug or pad or to taking constipating medication, two points are added to the incontinence score. A further four points are added to the continence score if the patient responds in the affirmative to lacking the ability to defer defecation for 15 min. Total scores range from 0 to 24, with 0 indicating perfect continence and 24 indicating total incontinence.

Only two studies provided credible information regarding the psychometric properties of the Vaizey scale.^{57,59} The study conducted by Vaizey *et al.*⁵⁷ described earlier, determined that the scale had good *test-retest reliability* ($r = 0.87$) and good *convergent validity*, with scale scores showing the highest correlation with the physician's clinical impressions of symptom severity ($r = 0.79$).

Deutekom *et al.*⁵⁹ also provided data regarding the sensitivity of the Vaizey scale. They investigated the significance of changes in this measure following pelvic floor rehabilitation in a cohort of primarily female patients with a mean age of 62 years who attended one of 16 Dutch hospitals participating in the study. They determined that, after treatment, Vaizey scores decreased from 18 to 15, with a good relationship between patient perceptions of improvement in symptoms and changes in the Vaizey score.

FISI

The FISI, developed by Rockwood *et al.*⁴ is a four-item scale. Patients are asked to rate the frequency of incontinence episodes for flatus, mucus, liquid stool and solid stool in the past month, using a six-item scale that ranges between 'never' and 'two or more times a day'. This creates a 4 x 6 type by frequency matrix, where values are assigned according to what patients considered the relative severity of different incontinence conditions. Scores derived from the scale range between 0 and 64, with higher scores indicating more severe incontinence.

Very little psychometric evidence exists that supports the use of this assessment tool. The only evidence relates to the *convergent validity* of the FISI. Rockwood *et al.*¹⁴ recruited 118 clients with faecal incontinence; no other information on characteristics of the sample was provided. FISI scores were compared with scores on the FIQLS,⁶⁰ a disease-specific quality of life tool that will be discussed in more detail below. Scores on the FISI were correlated, as expected, with scores on three of the four subscales of the FIQLS (Lifestyle, $r = 0.45$; Coping/Behaviour, $r = 0.29$; and Embarrassment, $r = 0.38$). The Depression/Self-perception scale did not correlate significantly with severity scores.

American Medical Systems scale and the Pescatori index Two other symptom severity scales from the literature are the American Medical Systems (AMS) scale⁶¹ and the Pescatori index¹⁶. The AMS scale is a five-item scale (gas, minor soiling or seepage, significant leakage of liquid stool, significant leakage of solid stool, effect on lifestyle), with frequencies ranging from once monthly to at least twice a day, and total scores ranging between 0 and 120. The Pescatori index is a three-item scale (flatus, liquid stool, solid stool) with frequencies ranging from less than once a week to every day and total scores ranging between 0 and 6.

Not much information is available on the psychometric properties of these scales, other than the study conducted by Vaizey *et al.*⁵⁷ In this study, *test-retest reliability* of the AMS and Pescatori scales were found to be $r = 0.84$ and $r = 0.58$, respectively. Reasonable *convergent validity* was observed for the Pescatori index, which correlated well with physician's clinical impressions ($r = 0.72$). The corresponding result for the AMS scale was not as convincing ($r = 0.58$).

Miller scale of continence severity

The Miller scale⁶² appeared to be the precursor to a number of the other scales evident in the literature, in particular the Wexner and Vaizey scales. The scale measures incontinence for flatus, liquid stools and solid stools on a three-item scale ranging between less than once a month and more than once a week. Incontinence for solid stools is weighted three times, and incontinence for liquid stool two times, more important in scoring than incontinence for flatus. Scores range between 1 and 18, with higher scores indicating greater severity.

Miller *et al.*⁶² provided the only credible psychometric evidence for their scale. Specifically, they gathered information on the *sensitivity* of the scale in terms of whether conservative management of faecal incontinence would produce changes in scale scores. The results indicated that the scale was indeed sensitive enough to detect changes in symptom severity as a result of this conservative treatment, with 40% of cases demonstrating a significant improvement in scores.

Combined symptom severity and quality of life scales

Two scales have been developed by the International Consultation on Incontinence that attempt to combine assessment of symptom severity and quality of life in a single scale; the International Consultation on Incontinence Questionnaire - Bowel Incontinence (ICIQ-BI)⁶³ and the International Consultation on Incontinence Questionnaire - Bowel Symptoms (ICIQ-BS).⁶⁴ The ICIQ-BI is a 56-item

scale in which 16 items measure aspects of symptom severity and the remainder of items measure the impact of bowel symptoms on quality of life. Little further information is available on scale content or the factor structure of the scale. Less information is available on the scale content of the ICIQ-BS as it only early in its early stages of development.

Avery *et al.*⁶³ conducted a pilot psychometric evaluation of the ICIQ-BI, incorporating various studies that examined the *test-retest reliability* and *internal consistency* of the tool, as well its *content validity*, *criterion-related validity* and *convergent validity*. Information provided on sample characteristics of the studies were limited, though the baseline sample contained 48 participants (33 women, 15 men) with an average age of 50.8 years and the study examining test retest reliability had a small sample of 27 participants (15 women, 12 men) with an average age of 56 years. Additionally, content validity was established with a sample of 14 consecutive patients with faecal incontinence (seven men, seven women) and an average age of 63 years.

The ICIQ-BI was observed to have good *test-retest reliability*, with a kappa value of 0.89. In terms of individual items, 34 of 37 items had good stability (kappa values between 0.56 and 0.97), with the remaining three items having moderate stability (kappa values between 0.20 and 0.60). For domains assessing symptom severity and condition-specific quality of life, *internal consistency* of the ICIQ-BI was good, with Cronbach alphas of 0.97 and 0.96, respectively.⁶³

Content validity of the ICIQ-BI was assessed by the systematic reviewing of previous questionnaires, a review by clinical and social science experts and interviews with patients who had faecal incontinence. Expert review and patient interviews indicated that items were easy to interpret and covered all necessary domains. Additionally, postal response rates were acceptable (56%), and there were low levels of missing data within returned surveys (4.6%).⁶³

Avery *et al.*⁶³ also compared scores on the ICIQ-BI with corresponding scores on the Wexner scale¹⁵ to assess *convergent validity*. Agreement with the total Wexner score was good ($r = 0.74$), and correlation to the Wexner items ranged from moderate to strong ($r = 0.48-0.89$). Additionally, *criterion-related validity* was assessed by determining if the ICIQ-BI could detect a difference in the level and impact of faecal incontinence between men and women. Scores clearly differentiated between the two groups, with higher mean scores for women than men.¹⁵

The ICIQ-BS would appear to be at a very early stage in its development. In fact, the only credible psychometric information on this scale came from Gardiner,⁶⁴ who examined various aspects of its *content validity*. In this study, expert opinion was gained from clinical experts regarding the most appropriate content to be included in the scale. Additionally, 420 patients with faecal incontinence were asked to complete a symptom questionnaire at baseline and following biofeedback treatment. Patients were asked to describe how their life was restricted because of the issues with faecal incontinence. Pooled responses were then compared with items on existing faecal incontinence questionnaires to determine overlap and inconsistencies.

Feedback from clinical experts suggested that items to assess type, amount and frequency of episodes were essential, along with questions regarding the passive nature of soiling, the ability to delay, urgency, the length of time symptoms had persisted, straining and incomplete evacuation. There were also recommendations to individualise definitions of normal bowel habit to each patient. Consistent with items included on questionnaires were patient responses regarding the effect of faecal incontinence on working life, hygiene/odour and relationships. Restrictions rarely found on questionnaires were those related to toilet location, fear, preventative measures, embarrassment and unpredictability of the bowel.⁶⁴

Disease-specific quality of life scales

FIQLS

The FIQLS⁶⁰ contains 29 items scored on a 5-point Likert-type rating system and grouped into four subscales (Embarrassment, Lifestyle, Coping and Depression). This scale would appear to the most

well-researched in terms of its psychometric properties, with three studies providing credible information, albeit with each study conducted on the same scale presented in different languages.^{60,65,66} All three of these studies attempted to examine the *test-retest reliability* of the FIQLS. Rockwood *et al.*⁶⁰ used repeated measures *t*-tests on a sample of 47 participants attending five colon and rectal surgery clinics. They observed that none of the scales shows significant differences between test and retest. This would appear, however, to be an unusual if not ineffective method of assessing test-retest reliability.

Minguez *et al.*⁶⁵ assessed test-retest reliability via the more conventional method of intraclass correlation coefficients, using a sample of 111 patients (92 women; 19 men) with faecal incontinence and an average age of 60 years. They found good test-retest reliability for all domains of the FIQLS (0.92 for Lifestyle, 0.90 for Behaviour, 0.85 for Depression) except for Embarrassment ($r = 0.74$). Rullier *et al.*⁶⁶ also used intraclass coefficients on 48 of their 100-patient sample who were considered to be clinically stable between test and retest. Intraclass coefficients for this group ranged between 0.80 and 0.93, indicating good test-retest reliability.

All three studies used Cronbach alphas to determine the *internal consistency* of the subscales of the FIQLS. All three studies demonstrated good to excellent internal consistency for the Lifestyle, Behaviour and Depression/Self-Perception subscales (Cronbach α -values between 0.80 and 0.96). Values for the Embarrassment subscale were also good in the Rockwood *et al.*⁶⁰ and Minguez *et al.*⁶⁵ studies, but less impressive in the Rullier *et al.* study.⁶⁶

Both Rockwood *et al.*⁶⁰ and Rullier *et al.*⁶⁶ examined *context* and *face validity* of the FIQLS. Rockwood convened a panel of colon and rectal surgeons and health service researchers to identify quality of life domains negatively affected by faecal incontinence. Areas such as altering dietary habits, behavioural adaptations and embarrassment were identified as primary domains influenced by faecal incontinence. On the basis of this, a 41-item questionnaire was pretested on 50 patients who experienced faecal incontinence to assess for clarity, readability and patient acceptance. All identified issues were resolved before the final version of the questionnaire was developed. Rullier *et al.* conducted a series of translations and retrotranslations to ensure that the French version of the questionnaire contained appropriate content. Ten patients were presented with a draft version of the questionnaire, who observed that the questionnaire was clear, understandable and acceptable. Literal translation of certain items, however, produced unfamiliar terms that were replaced by ordinary words used by patients. Completion rate was very good with low levels of missing data reported.

All three studies provided evidence regarding the *construct validity* of the FIQLS. In the Rockwood *et al.*⁶⁰ study, participants received both the FIQLS and the SF-36,⁶⁷ a well-known generic measure of general health status, to assess *convergent validity*. All correlations were observed to be significant, ranging between 0.28 (FIQLS Embarrassment with SF-36 Role Physical) and 0.65 (FIQL Depression with SF-36 Mental Health).

Minguez *et al.*⁶⁵ conducted a similar analysis, correlating the four domains of the FIQLS with domains of the SF-36 that were expected to possess relationships with FIQLS domains. The Lifestyle subscale correlated with the SF-36 Physical Role, Social Functioning and Emotional Health sub-scales (0.38-0.54); the Behaviour subscale correlated with the SF-36 Mental Health subscale (0.47); the Depression/ Self-perception correlated with the SF-36 General Health, Vitality and Mental Health subscales (0.62-0.64); and the Embarrassment subscale correlated with the SF-36 Physical Role, Social Functioning and Mental Health subscales (0.23-0.37). Minguez *et al.* also extended their construct validation by correlating subscale scores with Wexner scores¹⁵ with and without the question on lifestyle (which, it could be argued, is the only item on the Wexner scale measuring aspects of quality of life). They observed that the four domains of the FIQLS had better correlations with the Wexner scale with the lifestyle item than the Wexner scale without the lifestyle item (0.62 vs. 0.49 for the Lifestyle subscale; 0.82 vs. 0.50 for the Behaviour subscale; 0.89 vs. 0.47 for the Depression subscale; and 0.58 vs. 0.49 for the Embarrassment subscale), thus providing good evidence for *discriminant validity* of the FIQLS. Some concern could be expressed about the discriminant validity of this scale, though, given

that a number of the correlations between FIQLS subscales and the Wexner scale, a symptom severity scale, are greater than the corresponding correlations between FIQLS subscales and subscales of the SF-36, a generic tool to assess aspects of quality of life.

Rullier *et al.*⁶⁶ also provided evidence for the *convergent validity* of the FIQLS by comparing subscale scores with the Wexner score. All subscales were observed to correlate with the Wexner score (Lifestyle, $r = 0.39$; Behaviour, $r = 0.31$; Depression, $r = 0.41$; Embarrassment, $r = 0.46$). They also observed that FIQLS scores declined significantly with increasing severity of faecal incontinence as assessed by clinicians.

There was also evidence provided in these studies for the *validity of the factor structure* of the FIQLS. Rockwood *et al.*⁵¹ during the development of the FIQLS, conducted a confirmatory factor analysis to determine if the proposed factor structure of the proposed scale was accurate. They observed that two of the six original scales were composed of multiple factors and were therefore eliminated from the questionnaire. This also resulted in a decrease of the number of items in the scale from 41 to 29. Additionally, Rullier *et al.*⁶⁶ used the multitrait-multimethod approach⁶⁸ to determine whether scale items correlated better with the subscale to which they were attached than other subscales. In this technique, valid convergence of an item to a subscale is achieved if a correlation greater than $r = 0.40$ is present. Valid discrimination is achieved if items correlate better with their own subscale than with other subscales. Rullier *et al.* observed very good correlations for Lifestyle (0.50-0.79) and Depression (0.44-0.74) subscale items, good correlations for Behaviour subscale items (0.31-0.70) and weak correlations for Embarrassment subscale items (0.30-0.40). Twenty-four of the 29 items correlated better with their own subscale than with other subscales. Of the five offending items, two came from the Behaviour subscale and three from the Embarrassment subscale.⁶⁶

Again, all three studies provided information relevant to the *criterion-related validity* of the FIQLS. Rockwood *et al.*⁶⁰ compared responses of patients with faecal incontinence to a control group with known gastrointestinal problems. Analysis of variance revealed that the faecal incontinence sample had significantly lower FIQLS scores than the controls on each of the four subscales. Similarly, Rullier *et al.*⁶⁶ compared FIQLS scores for patients whose status had changed after being treated for faecal incontinence. Differences were significant for each subscale except the Behaviour subscale. Finally, Mínguez *et al.*⁶⁵ compared scores for those who reported wearing pads with those who reported not wearing pads. They also compared those reporting severe incontinence with those reporting less severe incontinence, and those with and without complete incontinence. All subscales were capable of discriminating those who wore pads from those not wearing pads, and those with severe incontinence from those with less severe incontinence. Those with complete incontinence had lower scores than those without complete incontinence on the Behaviour and Embarrassment subscales, but not on Lifestyle and Depression subscales.

GIQLI

The GIQLI¹⁷ is a disease-specific quality of life scale containing 36 Likert-type items. Responses to questions are summed to give a total numerical score. There is limited psychometric evidence for the GIQLI in the literature, though two studies do provide credible evidence.^{56,69}

Damon *et al.*⁶⁹ had consecutive patients referred to a clinic for anorectal manometry complete the GIQLI. Seventy-nine of these patients (69 women, 10 men) had faecal incontinence; their mean age was 57 years. *Convergent validity* was examined correlating GIQLI scores with scores from the Wexner scale.¹⁵ A significant correlation was observed. However, when the relationship between subscale scores and Wexner scores were examined, correlations were poor, with higher correlations with the Emotions ($r = 0.17$) and Social Integration ($r = 0.16$) subscales than those with the Symptoms ($r = 0.12$) and Physical Condition ($r = 0.10$) subscales. This might bring into question the *discriminant validity* of the GIQLI.

Both Damon *et al.*⁶⁹ and Rothbarth *et al.*⁵⁶ provide data on the *criterion-related validity* of the GIQLI. Both studies compared GIQLI scores of their sample with those of normal participants gained in

another study. GIQLI total scores and subscale scores were found to be lower for those with faecal incontinence than control participants.

Direct questioning of objectives and the HAQL Two other disease-specific quality of life assessment tools are mentioned in the literature - the Direct Questioning of Objectives⁷⁰ and the Hirschsprung's Disease Anorectal Malformation Quality of Life Questionnaire (HAQL).⁵⁹ The Direct Questioning of Objectives is as much a methodology as it is a questionnaire. Essentially, clients are asked to list objectives important to them, such as shopping or working. The client then rates the importance of topics on a scale of 0-10 and how well they can perform those activities, also on a scale of 0-10. The product of importance and ability is divided by 10 and then by the total importance of objectives and used to create an index score between 0 and 1. The HAQL is a Dutch questionnaire containing 42 items, with responses on each item having four options ranging from 'never' to 'very often'. Questionnaire items form three subscales: Constipation, faecal incontinence and disease-specific psychosocial functioning.

Byrne *et al.*⁷⁰ examined the *convergent validity* and *sensitivity* of the Direct Questioning of Objectives in a sample of 103 patients (mean age = 63 years) with neuropathic faecal incontinence. Convergent validity was examined by comparing scores on their index with those from the Vaizey⁵⁷ and Pescatori¹⁶ scales as well as a visual analogue completed by physicians. They found that decreased scores on the Vaizey and Pescatori scales correlated with increased scores on the Direct Questioning of Objectives scale. Additionally, increased scores on the Direct Questioning of Objectives corresponded with improvements on the visual analogue. The Direct Questioning of Objectives was also observed to be sufficiently sensitive to detect changes due to treatment.

Sensitivity of the Faecal Incontinence and Disease-specific Psychosocial Functioning subscales of the HAQL as a result of pelvic floor rehabilitation was examined by Deutekom *et al.*⁵⁹ in a sample of 66 participants of whom most were female and whose mean age was 62 years. Scores on these subscales were better for those who perceived themselves as having improved as a result of treatment than those who perceived their situation to be equal or worse as a result of treatment.

Generic health-related quality of life scales

There were very few studies that examined the psychometric properties of generic quality of life scales in relation to clients with faecal incontinence. While a single study has provided considerable psychometric evidence for the MHQ,⁷¹ far less evidence is available for other scales and nonexistent for some of the well-known generic scales, such as the SF-36.⁶⁷

Manchester health questionnaire

The MHQ⁷¹ has domains assessing general perception of health, general impact of incontinence, role, physical function, social function, personal relationships, emotion, sleep/energy and severity/coping measures, with a separate scale for the measurement of the severity of symptoms. It uses a five-point scoring system. Scores in each domain range between 0 and 100, with a higher score indicating a greater impairment of health-related quality of life.

Bugg *et al.*⁷¹ examined a number of psychometric properties of the MHQ in a cohort of 154 women with a mean age of 61 years. *Test-retest correlations* were acceptable, ranging between 0.81 and 0.92. All subscales reached the requirements for adequate *internal consistency*, with Cronbach alphas between 0.73 and 0.91.

In terms of *content validity*, items were initially reviewed by the authors. Fifteen women were sent questionnaires on three occasions, each time returning comments. Additionally, 10 physiotherapy tutors and 15 patients were interviewed about the representativeness of items and appropriateness of questions. Following this, the questionnaire was examined for ambiguities and ease of comprehension by 15 women with faecal incontinence and 20 midwives. During pretesting it was observed that women had difficulties understanding terms such as faecal and stool and so these words were replaced with the term 'bowel leakage' - this was more easily understood.

Bugg *et al.*⁷¹ also tested the *convergent validity* of the scale by measuring its relationship with scores on the SF-36. Modest to strong correlations of 0.35-0.77 were observed. Bugg *et al.* also hypothesised that the more severe the symptoms of incontinence, the lower the scores would be in the subscales measuring quality of life. Two questions from the symptom subscale, asking how often a patient's bowels leak when coughing or sneezing and when walking, were scored together to produce a symptom severity score out of 100. Correlations between this score and scores on the subscale related to quality of life were then conducted. The observed correlations were modest to strong (0.30-0.65).

Other scales

A number of other scales were observed in the literature to have limited but credible information regarding their psychometric properties. The Medical Outcomes Survey (MOS)⁷² is a large survey and the precursor to the SF-36.⁶⁷ It contains 149 items measuring a total of 35 dimensions of quality of life, including physical functioning, role limitations due to physical and emotional health and cognitive functioning. O'Keefe *et al.*⁷³ used multiple logistic regression to assess whether the MOS could discriminate participants with faecal incontinence from participants with other colonic symptoms and control participants with no symptoms in a sample of 478 randomly selected people over the age of 65, of whom 37 reported having faecal incontinence. Participants with faecal incontinence were observed to have similar MOS scores to participants with other colonic symptoms but had lower overall scores compared with the asymptomatic controls.

The EuroQol 5-D⁷⁴ is a utility measure designed for use in cross-cultural comparisons. The measure has five items, each with three response levels, and measures mobility, self-care, usual activities, pain/discomfort and anxiety/depression. The only psychometric data relevant to clients with faecal incontinence was gathered by Deutekom *et al.*⁵⁹ who investigated changes in EuroQol 5-D scores after pelvic floor rehabilitation. No changes were observed.

Stool classification scales

Stool classification scales assign stool form to categories in an attempt to quantify and standardise stool form descriptions and improve communication about stool form between clients and clinicians. The scale most commonly cited in the literature is the Bristol Stool Form Chart.⁷⁵ This tool contains seven categories of stool consistency, ranging from 1 (separate hard lumps-like nuts (difficult to pass)) to 7 (watery, no solid pieces (entirely liquid)). There was, however, no psychometric data available on this scale. Psychometric data have been provided, though, on another classification scale developed by Bliss *et al.*,⁷⁶ which had four classifications (hard and formed, soft and formed, loose and unformed, and liquid). In an investigation of the *criterion-related validity* of this scale, analysis of variance was used to determine differences in percentage of water among stools in each consistency category, collected from 39 participants, the majority of whom were women, over a 16-day period. The mean percentage of water from stools in each category was indeed found to be significantly different, with hard and formed stools containing the smallest percentage of water and liquid stools containing the greatest percentage of water. Additionally, a moderate relationship between participants' classifications of stools and the mean percentage of stool water was observed ($r = 0.50$).

Discussion

The original objectives of the systematic review were to determine what needs to be included in the assessment of faecal incontinence in older community-dwelling adults. Associated to this question was the need to gather the best available evidence regarding the tools used in this type of assessment. A review of expert opinion was used to provide information related to the first of these aims while a review of psychometric properties of assessment tools was used to provide information about the second aim.

Approaches to the review

The two approaches to reviewing the literature appeared largely successful in achieving their aims. This is the first time, to our knowledge, that a systematic review of expert opinion has been conducted. It has

been successful in gathering the opinions of those with considerable expertise in the field of assessment of faecal incontinence and synthesising that opinion in a way that is reasonably accessible when compared with accessing each of the articles that were critically appraised. It is also worth noting, too, that a great majority of the expert opinion extracted for synthesis and rated as credible or unequivocal was based upon the expert's reference to extant literature related to that recommendation and logical argument. The Joanna Briggs Institute acknowledge that well-designed research studies provide more credible evidence than expert opinion.⁷⁷ Caution must therefore be attached to the conclusions drawn from the use of expert opinion in this review. However, in the absence of well-designed research or where it is difficult to investigate a research question using empirical methods, expert opinion is regarded as the best available evidence. Expert opinion draws on the collective experience of practitioners and evidence arising from expert opinion is often sought and utilised by practitioners.⁷⁸ The systematic process by which opinion was evaluated would suggest that there is good reason to regard the results of this review as credible.

A systematic review of psychometric properties for the assessment of community-dwelling older adults, too, is reasonably novel in the available literature. At the time this review was being undertaken, to our knowledge there was no other systematic review of psychometric properties in the literature, though Thomas *et al.*²⁸ have conducted a more general review of incontinence tools. Since then, however, a systematic review of the psychometric properties of behaviour scales used in late-stage dementia has been published.⁷⁹ The current systematic review has been successful in synthesising the psychometric evidence and summarising this in accessible form for those who wish to obtain information about the best scales to use in assessment of faecal incontinence. Additionally, it has identified gaps in the psychometric information available on these scales.

Review of expert opinion

A large volume of information has been successfully synthesised in the review of expert opinion. It is apparent that considerable overlap exists in assessment recommendations, particularly in the areas of history-taking and physical examination. There is less overlap in other themes, in particular specialist referral.

Comprehensive assessment

It is reasonably clear from expert opinion that assessment for issues in relation to faecal incontinence should be comprehensive in nature and involve the gathering of history in a number of different areas as well as a comprehensive physical examination which includes visual inspection, abdominal palpation and digital rectal examination. Within this comprehensive assessment, the importance of rapport development between the health professional and the client is very important. Adequate time and support is required to establish effective communication with clients.⁸⁰

Diabetes mellitus and neurogenic conditions such as multiple sclerosis are considered by most experts to be important predisposing conditions to faecal incontinence. Anecdotal evidence from our expert panel suggests that questions regarding these issues are not often asked in the context of a faecal incontinence assessment. Some conditions, indeed, are regularly regarded by experts as being important in terms of making appropriate diagnosis in relation to faecal incontinence. In developing guidelines for the assessment of faecal incontinence, it may be wise to highlight asking questions about these important diagnostic conditions to ensure that information regarding these conditions is collected. Risk indicators for specialist referral should also be highlighted and a flowchart included for when to refer to specialists as well as the pathology tests that need to be conducted for particular presentations.

The importance of recent changes to health, habits and lifestyle is a common theme across the expert opinion and is mentioned in relation to many things, including diet, medication and illness. Nurses need to be aware of the need to ask about recent events and explore how they may contribute to the onset of faecal incontinence or decline in faecal control. Recommendations for bowel, food and bladder diaries may mean multiple diaries being completed during the assessment phase by the client. This could cause the client confusion and lead to reduced compliance. Combining these aspects into a single diary might

be an appropriate means of getting around this problem. Nurses also need to be mindful that questions relating to sexual activity need to be asked during an assessment. In asking these questions, nurses also need to be aware of the sensitive nature of this questioning, the potential for past issues such as sexual abuse to arise and to have appropriate referral mechanisms in place.

Limitation and gaps

The expert opinion that formed the basis for the review does have a number of limitations. Primary among these is that there are lots of general recommendations as to what should be included in an assessment (e.g. obstetric history), with relatively little detail as to what sort of questions might be included in gaining that information from the client. For example, a number of experts recommend the assessment of pudendal nerve damage, but few provide specific information about how this should be done. This limits the specificity of the recommendations made in this review.

There are also a number of gaps in the expert opinion reviewed. There is limited information about what to do in a situation where the client is assessed as experiencing cognitive decline. There was also not much information available in the expert opinion regarding referral to specialists. This is not to downplay some of the important information that is provided about specialist referral in the expert opinion, such as recommendations as to when procedures such as anorectal manometry might be appropriate. Often, though, expert opinion was generally in favour of having certain specialist procedures done upon most, if not all, individuals presenting with faecal incontinence. Perhaps this is because the majority of experts providing opinion on this topic were indeed specialists themselves. Clearly such a situation would result in considerable costs to health services and to clients. Recommendations therefore need to be tempered against the typical time and economic constraints present within the care situation as well as the issues of access and availability of specialist services in rural and remote communities.

Financial considerations and the impact of this upon a client's ability to cope with faecal incontinence were not addressed in the expert opinion. As an example, consider the financial costs of in-home care, home modifications, and medications to manage incontinence in the home environment. Financial resources in this situation would appear to play a large part in the ability of a community-dwelling client to deal effectively with managing their symptoms and maintaining an acceptable quality of life. The authors feel that this reflects a gap in expert opinion, possibly brought about by the focus on primary health interests to the detriment of a more holistic consideration of impacts upon faecal incontinence. Also, it is somewhat surprising that expert opinion did not contain recommendations in relation to obtaining information on client weight, particularly given the relationship between client weight and functional mobility.⁸¹

The potential impact of herbal remedies upon clients with faecal incontinence was another issue not addressed in the expert opinion. The interactions between prescribed and over-the-counter medications and herbal medicines are well recognised in other areas as contributing to health issues. For example, cranberry tablets should be avoided when taking warfarin as the interaction between these preparations produces changes in clotting times.⁸² It is quite possible that such interactions may be present that contribute to exacerbation of faecal incontinence. Further research is required in this area. Additionally, anecdotal evidence suggests that many nurses are not aware of the neurogenic influences of smoking upon the gut and therefore faecal incontinence.⁸³ Asking clients about smoking habits and its relationship to toileting habits should be part of questioning in a comprehensive assessment. Similarly, few nurses would appear to possess knowledge of the number of narcotic substances that may impact upon the gastrointestinal tract.⁸⁴ A list of these substances and their potential actions upon the GI tract could be developed to assist nurses in making appropriate diagnoses.

Finally, the effect of motivation of the client upon compliance and willingness to undertake a comprehensive assessment was not discussed. For example, a client may come to a continence clinic purely to access government subsidy schemes that reduce the cost of continence aids. This may reduce the readiness of the client to participate in comprehensive assessment or make improvements to their continence status.

Appropriate training

The continence advisor needs to be appropriately trained to provide a comprehensive assessment. For example, in Queensland, while nurses are trained in the use of some measures like the MMSE⁸⁵ during their undergraduate years, few continence advisors are trained to interpret many of the tests used in assessment of faecal incontinence, such as tools to assess quality of life and cognitive functioning. There need to be procedures and appropriate protocols developed for such elements of the comprehensive assessment as physical examinations. In fact, a set of competency standards for continence nurse advisors has been developed by Australian Nurses for Continence.⁸⁶ However, the recent report by AITEC⁸⁷ to the National Continence Management Strategy raised the issue that, at the time of their report, there was only one qualified continence nurse practitioner operating in Australia. Additionally, they report that nurses are often placed by their employer in the role of continence nurse advisor without appropriate skills and qualifications.

In Queensland, there is minimal physical assessment of the patient by continence advisors and few continence advisors are trained in procedures such as digital rectal examinations. Additionally, continence advisors do not have physical access to the appropriate facilities in which to conduct procedures of this kind, or they lack other infrastructure, such as lack of personnel to conduct the examinations in an appropriate manner or procedures and/or protocols to enable these assessments to be conducted safely. These issues become even more apparent in rural and remote communities, where continence advisors often conduct assessments in the home of the client. This also leads to other issues such as safety of the advisor, often in areas where mobile phone coverage is non-existent, and a lack of facilities such as adequate lighting. Comparison between current practice and knowledge and the knowledge required to conduct a comprehensive assessment is needed to identify gaps. Appropriate training needs should be met to fill those gaps. Adoption of core competency standards for the comprehensive assessment for faecal incontinence and regular peer review of practice are possible means to ensure that care provided is consistent.

Viability of comprehensive assessment

In the economic reality of today's health system in most countries, it would be difficult to provide a comprehensive assessment in an initial interview by a primary care nurse trained in assessment of faecal incontinence. Perhaps developers of guidelines should consider the possibility of staggering the assessment, such that a primary care nurse, during the initial assessment, could provide questions to identify risk factors that warrant further investigation. The client would then be referred to a specialist continence advisor for a more comprehensive assessment. The continence advisor would then have initial information about the client from the initial interview, which should target the types of more detailed assessment that would be undertaken during the next stage of assessment. Efforts need to be made to ensure that there is no duplication in the questions being asked at each stage of the assessment process. Also, in rural areas, primary care nurses might not have access to continence advisory services and may therefore be required to conduct more advanced assessments themselves. Greater training for nurses in this situation might be required and there is also the potential for greater utilisation of mentoring via telehealth options.

Psychometric review of assessment tools

In terms of assessment tools, there is some credible information regarding the psychometric properties of symptom severity tools and tools assessing generic and disease-specific quality of life. Of the symptom severity tools, the Vaizey and Wexner scales would appear to be the tools of choice, though more work still needs to be done on demonstrating the validity of these tools. This is consistent with the recommendations from the Thomas *et al.*'s report.²⁸ There is little evidence for the psychometric properties of the FISII. It is comforting, perhaps, that the Wexner and Vaizey scales were those most often mentioned and recommended as being suitable for use with older adults in the expert opinion. Some concern, however, must be expressed over the recommendations by a few experts that the FISII is an appropriate tool for measuring symptom severity.^{19,33,49}

The conclusions of the review differ from those of Thomas *et al.*²⁸ in relation to recommendations for quality of life tools. The FIQLS is the clear standout in terms of the amount of psychometric data available. The results are favourable, though there do appear to be potential problems with the stability of the Embarrassment subscale and some potential issues with discriminant validity. While Thomas *et al.* did not recommend a disease-specific quality of life tool, more research on this tool has been completed since the time of that review^{65,66} that has provided corroborating evidence for the psychometric properties of the scale developed by Rock-wood *et al.*⁶⁰ With this evidence, and despite some of its psychometric limitations, we feel the FIQLS can be considered an appropriate tool for the measurement of disease-specific quality of life.

Another variation between our conclusions and those reached by Thomas *et al.*²⁸ relate to the appropriateness of the SF-36.⁶⁷ Specifically, Thomas *et al.* recommended the use of the SF-36 as a generic quality of life measure for people with faecal incontinence. However, this conclusion was based on psychometric properties gained from studies using other populations. In fact, when the literature is examined, not a single study examining the psychometric properties of the SF-36 has been conducted on older community-dwelling people with faecal incontinence. Clearly, there is a gap in research on this tool which must be addressed. The same can be said for most other faecal incontinence assessment tools.

Limitations

In general, research on the psychometric properties of faecal incontinence assessment tools suffers from small sample sizes. These result in large confidence intervals around statistical values, rendering findings less meaningful than values gained from studies where sample sizes are larger. Charter⁸⁸ suggests that a sample size of at least 200 participants needs to be obtained for many tests of reliability and validity. The majority of studies reported in this systematic review, even those regarded as providing credible information, have sample sizes much lower than this recommendation. Additionally, more work is required on determining the psychometric properties of tools such as the MMSE,⁸⁵ the Bristol Stool Form Chart⁷⁵ and the Functional Independence Measure⁸⁹ relevant to the population of interest in this review. Many of these tools are potentially useful in the assessment situation. For example, the Bristol Stool Form Chart would be useful in stool classification and improving communications between client and clinician. Without appropriate validation, however, there is no guarantee that the tool is providing reliable measurements or measuring what it is intended to measure.

Clinician knowledge of assessment tools

Most of the tools in use and their psychometric properties are not well understood by clinicians and often by the people who recommend that certain assessment tools be utilised in the clinical situation. A lack of understanding of the importance of psychometric properties may lead to inappropriate use of tools and interpretation of results.⁹⁰ For example, an incontinence score on a symptom severity tool may indicate an improvement in client symptoms, but if it is unreliable, the change in scores may reflect error in measurement rather than any real improvement. Similarly, if a rehabilitation program uses a tool that measures changes as a result of that treatment, a real change in client symptoms may be masked by the measurement tool being insensitive to such changes. Without the knowledge of the psychometric properties of the tool, there is no way to determine if the lack of change is due to the treatment being ineffective or to the insensitivity of the tool to detect changes as a result of treatment.

Conclusion

In conclusion, this review has successfully provided a synthesis of the best available evidence for the assessment of faecal incontinence for community-dwelling older persons. This process of evidence translation, however, is only the first step in making changes to ensure that the evidence presented here is utilised in clinical practice. The development of clinical guidelines based upon the findings of the review must now be a priority. Once a pilot version of the guidelines is developed, their effectiveness needs to be tested against usual care in a randomised controlled trial. Additionally, the feasibility and meaningfulness of these guidelines for clinical practice should be assessed.

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Review of expert opinion

Data were extracted from the 25 included sources for the review of expert opinion. From these sources, 254 conclusions relating to the assessment of faecal incontinence were extracted for synthesis.

Thematic analysis of conclusions resulted in 31 thematic categories, which were then organised into five syntheses:

- History-taking - details of medical, surgical, gastro-colorectal, obstetrical, urological, cognitive, drugs and medications, nutrition and sexual histories
- Bowel assessment - use of specific assessment tools (pictorial stool charts, bladder bowel diaries, grading of symptom severity), assessment questions, factors or events associated with onset, current management, history of bowel pattern, and symptom severity
- Psychosocial aspects - development of rapport, tools that measure quality of life, environmental assessment, and assessment of functional and cognitive ability
- Physical examination - visual inspection, abdominal palpation, and digital rectal examination
- Specialist referral - identification of risk factors, referral for pathology, diagnostic evaluation

The results derived from the syntheses are described in the following sections

Appendix I

Critical Appraisal Form for Psychometric Review

Appendix 1 - Critical Appraisal Form

Reviewer:

Date:

Author:

Year:

Record No:

	Yes	No	Unclear	N/A
1. Is the study well-designed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there an appropriate sample size?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Is the sample randomly selected?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If not, provide details of how the sample was selected:				
4. Does the sample accurately reflect the population of interest?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Is the assessment tool clearly described?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Are the methods associated with the data collection clearly described?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Are the methods associated with the data collection appropriate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Do the outcomes presented relate to any of the following:				
a. Reliability?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Validity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Sensitivity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Specificity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Overall Appraisal Include Exclude Seek further info.

10. Comments (including reasons for exclusion)

Appendix II

NOTARI Tool for Critical Appraisal of Expert Opinion

Publication Details

Author:

Title:

Journal:

Year:

Volume:

Issue:

Page No:

Status:

	Criteria	Yes	No	Unclear
1)	Is the source of the opinion clearly identified?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
2)	Does the source of the opinion have standing in the field of expertise?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
3)	Are the interests of patients/clients the central focus of the opinion?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
4)	Is the opinion's basis in logic/experience clearly argued?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
5)	Is the argument developed analytical?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
6)	Is there reference to the extant literature/evidence and any incongruence	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
7)	Is the opinion supported by peers?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Include

Reason

Appendix III

Data Extraction Form for Psychometric Review

Author: _____ Record No: _____

Journal: _____

Year: _____

Reviewer: _____

Method _____

Setting _____

Participants _____

Number of Participants _____

Recruitment Procedures _____

Inclusion Criteria _____

Exclusion Criteria _____

Data Collection Procedures _____

Results

Reliability _____

Validity _____

Specificity _____

Sensitivity _____

Author's Conclusions _____

Reviewer's Comments _____

Appendix IV

Included studies for review of expert opinion

Source of opinion	Nature of source document	Setting	Conclusion topics	Levels of evidence
Andrews & Bharucha ³²	Literature review in peer-reviewed journal	General	Rapport development; use of pictorial stool scales; digital rectal examination; symptom severity scales; history-taking	Unsupported (1) Credible (4)
Baxter <i>et al.</i> ¹⁹	Literature review in peer-reviewed journal	General	Severity scales; reliability and validity of tools; generic and disease-specific quality of life measures; utility measures	Credible (6)
Buchanan <i>et al.</i> ³³	Literature review in peer-reviewed journal	General; community	History-taking; measurement of symptom severity and quality of life; use of diaries; general and abdominal examination; indications for further anorectal testing; digital rectal examinations; perineal inspection.	Unsupported (1) Credible (3) Unequivocal (3)
Chelvanayagam & Norton ⁴⁸	Literature review and assessment guidelines in peer-reviewed journal	Written for community nurses and midwives	Need for assessment guidelines; use of stool form charts; digital rectal examination; indicators for further investigation; assessment (bladder control, obstetric history, pad use, flatus, passive soiling; evacuation difficulties; urge incontinence; pain, presence of blood/mucous); quality of life; neurological disease	Unsupported (1) Credible (18)
De Lillo & Rose ³⁴	Literature review in peer-reviewed journal	Geriatric	Physical examination; history-taking; digital rectal examination; indicators for further testing	Unsupported (2) Credible (4)
Drossman <i>et al.</i> ³⁵	Edited book – diagnostic criteria	General	Physical examination; use of diaries; bowel history; indicators for further testing; obstetric history; sexual history; surgical history; cognitive and behavioural history	Credible (12) Unequivocal (1)
Harari ⁵⁴	Literature review – chapter in edited book	Elderly patients – community and hospital	Stool charts; bowel assessment; indicators for further testing; need for comprehensive assessment; evaluation of functional ability; diagnostic tests; abdominal and perineal inspection; constipation; cognitive impairment	Unsupported (1) Credible (9)
Harari <i>et al.</i> ¹⁰	Literature review and recommendations in study of prevalence and risk factors – peer-reviewed journal	Stroke patients in the community; new onset faecal incontinence after stroke	Functionality tools; need to assess after stroke; constipation	Credible (2) Unequivocal (2)
Hinninghofen & Enck ⁴⁵	Literature review in peer-reviewed journal	General	Symptom diary; symptom severity scales; obstetric history; physical examination; pathology; digital rectal examination; endoscopy; surgical history	Credible (8)
Jensen ⁴⁰	Literature review – chapter in edited book	General	Bowel history; assessment of quality of life; bowel diary; current bowel management; factors affecting current bowel function; medical and surgical history; lifestyle changes; physical examination; digital rectal examination; perineal inspection	Credible (10)
Kouraklis & Andromonakos ³⁶	Literature review in peer-reviewed journal	General	Diet history; history-taking; included requirements for assessment; digital rectal examination; social impact; physical examination; further testing; medication history	Unsupported (2) Credible (6)

Source of opinion	Nature of source document	Setting	Conclusion topics	Levels of evidence
Madoff <i>et al.</i> ⁴⁹	Literature review in peer-reviewed journal	Community-dwelling adults	Cognitive assessment; bowel history; physical impairment; symptom severity scales; environmental factors; assessment of quality of life; digital rectal examination; further testing; physical examination	Credible (9)
Madoff <i>et al.</i> ⁴¹	Literature review in peer-reviewed journal	General	Symptom severity; medical assessment; obstetric history; anorectal history; anorectal examination; indicators for further testing; neurological conditions; digital rectal examination	Credible (8)
Mavrontonis & Wexner ²	Literature review in peer-reviewed journal	General	Digital rectal examination; comprehensive assessment; stool consistency; symptom severity scales; visual inspection; referral to specialists; pathology	Credible (9)
Norton & Chelvanayagam ¹¹	Assessment guidelines and literature review in peer-reviewed journal	Independent community-dwelling adults	Use of probing questions; bowel diary; stool form guide; symptom severity; passive soiling; nature of incontinence; pain; blood or mucous; constipation; rectal prolapse; incontinence aids; medication history; medical history; functional abilities; obstetric history; caffeine intake; smoking; double incontinence; perineal inspection; quality of life assessment; digital rectal examination; dietary factors	Unsupported (1) Credible (22)
Norton <i>et al.</i> ⁴²	Literature review in chapter of edited book	General	Symptom severity scales; further work on scale validity; quality of life assessment; history-taking; physical examination; digital rectal examination; indicators for further testing; obstetric history; defecation history; dietary and cognitive factors	Credible (15) Unequivocal (4)
Novi & Mulvihill ²⁸	Literature review in peer-reviewed journal	Women	History-taking; symptom severity; quality of life; medical and surgical history; obstetric and gynaecological history; sexual history; physical examination; neurological examination; indicators for specialist referral; pathology; digital rectal examination; gastrointestinal history	Credible (12) Unequivocal (3)
Rao ³⁹	Literature review and practice guidelines in peer-reviewed journal	General	Development of rapport; stool diary; history-taking; symptom severity scales; physical and neurological examination; perineal inspection; digital rectal examination; further testing; pathology; elements of assessment; disease states associated with faecal incontinence	Credible (9) Unequivocal (3)
Read <i>et al.</i> ⁴³	Literature review in peer-reviewed journal	Older people	Events surrounding onset; gastrointestinal history; obstetric history; neurological history; medical history; dietary history; cognitive functioning; mobility; physical examination; digital rectal examination; endoscopy; stool examination; pathology; further testing	Credible (13)
Rockwood ⁵¹	Literature review in peer-reviewed journal	General	Symptom severity scales; weighting issues	Credible (1) Unequivocal (1)
Romero <i>et al.</i> ⁴⁴	Literature review in peer-reviewed journal	General	Comprehensive evaluation; environmental factors; abdominal and perineal inspection; digital rectal examination; functional assessment; pathology; further testing; stool diaries; history-taking	Credible (9)
Shelton & Madoff ⁴⁶	Literature review in peer-reviewed journal	General	Physical examination; perianal inspection; digital rectal examination; symptom severity scales; history-taking; medication history; social impact	Credible (11) Unequivocal (2)

Source of opinion	Nature of source document	Setting	Conclusion topics	Levels of evidence
Tariq <i>et al.</i> ¹²	Literature review in peer-reviewed journal	Elderly	Specific questioning; symptom severity; environmental factors; surgical history; history-taking; obstetric history; neurological conditions; medical history; medication use; physical examination; digital rectal examination; further testing	Unsupported (4) Credible (8)
Thomas <i>et al.</i> ²⁸	Literature review and recommendations – unpublished report for government department	General – targeted towards primary care and non-specialist practitioners	Symptom severity scales; quality of life scales; functional independence scales; pad tests; bladder diaries; health utility scales; need for further psychometric scale validation	Credible (3) Unequivocal (8)
Tuteja & Rao ¹³	Literature review in peer-reviewed journal	General	Rapport development; stool form; use of aids; history-taking; symptom severity scales; neurological examination; digital rectal examination; conditions for diagnostic testing; further testing; physical examination; stool diary	Unsupported (2) Credible (9)

Appendix V Included studies for review of psychometric properties

Source of opinion	Design	Tool(s) validated	Participants	Outcomes	Levels of evidence
Avery <i>et al.</i> ⁶³	Psychometric validation; interviews	International Consultation on Incontinence Questionnaire – Bowel Incontinence (ICIQ-BI)	Adults of all ages, with or without different symptoms and levels of urinary and bowel incontinence.	<p>Test–retest reliability – 34 of the 37 symptom items had kappa values of 0.56–0.97. The stability of the remaining three items was moderate, with kappa values of 0.20–0.60. Agreements between test and retest scores were very good, with kappa value of 0.89.</p> <p>Internal consistency- Cronbach's alphas were 0.97 and 0.96 respectively.</p> <p>Content validity – interviews and review by clinical and social science experts indicated items were well-interpreted and covered all important domains. Postal response rates acceptable; low missing data for most items.</p> <p>Criterion-related validity – clearly differentiated between males and females, with significantly higher mean scores for women than men.</p> <p>Convergent validity – agreement with Wexner items ranged from moderate to strong. The total score also correlated well with the Wexner score.</p>	Credible (5)
Bliss <i>et al.</i> ⁷⁶	Descriptive	Bliss Classification of Stool Consistency	Community-living adults with faecal incontinence who volunteered to participate in a study to determine the effectiveness of dietary fibre for treating faecal incontinence.	<p>Mean percentage of water significantly different among the four categories of stool consistency. Hard and formed stools contained the smallest percentage of water, whereas liquid stools contained the greatest percentage of water. Significant moderate relationship between subjects' stool consistency categorisations and mean percentage of stool water.</p>	Credible (1)
Bugg <i>et al.</i> ⁷¹	Psychometric validation; interviews	Manchester Health Questionnaire	Women with known anal incontinence	<p>Test–retest reliability – correlations ranged between 0.81 and 0.92. Mean differences ranged between –0.70 and 2.7.</p> <p>Internal consistency – Cronbach's alpha exceeded minimum requirements for reliability in all domains.</p> <p>Content validity – No sample items were removed and no additions were made after content was reviewed by women with faecal incontinence and health professionals with experience in the field. During pretesting, it was found that women had difficulty understanding key words such as faecal and stool. These words had to be replaced with the term 'bowel leakage' which was more easily understood.</p> <p>Convergent validity – Modest to strong correlations of the domains to the SF-36. The correlations between questions relating to frank incontinence and health status domains were modest to strong depending on the domain.</p>	Credible (5)

Source of opinion	Design	Tool(s) validated	Participants	Outcomes	Levels of evidence
Byrne <i>et al.</i> ⁷⁰	Randomised controlled trial	Direct Questioning of Objectives	Patients with neuropathic faecal incontinence	Convergent validity – increased scores on the Direct Questioning of Objectives correlated with decreased scores on the St Mark's and Pescatori scales and corresponded with improvement on the visual analogue completed by physicians Sensitivity – changes in the St Mark's and Pescatori scores correlated consistently above a Pearson coefficient of 0.30 for changes in ability in five of the eight categories. Major categories correlated significantly with changes in St Mark's scores	Credible (2)
Damon <i>et al.</i> ⁶⁹	Prospective cohort	Gastrointestinal Quality of Life Index (GIQLI)	Consecutive patients referred to a clinic for anorectal manometry	Convergent validity – Significant correlation between GIQLI scores and Wexner score. Discriminant validity – correlation between Wexner and subscale scores were all weak, were more for the Symptoms subscale (0.12) than the Physical condition subscale (0.096), but higher correlations were also observed between the Wexner score and Emotions (0.165) and Social Integration (0.155). Criterion validity – GIQLI total score and subscores were lower for those with faecal incontinence than controls	Credible (3)
Deutekom <i>et al.</i> ⁵⁹	Clinical cohort; psychometric validation	Vaisey scale; Hirschsprung's Disease Anorectal Malformation Quality of Life Questionnaire (HAQL); EuroQol – 5 Dimensions (EQ-5D)	Consenting eligible participants with faecal incontinence visiting one of 16 participating hospitals	Sensitivity – Average severity scores (Vaisey and Wexner) were 1 point lower for patients who rated their situation as worse or equal (62%), 4 points lower for patients who reported their situation to be better, and 9 points lower in patients who rated their situation as much better. After treatment, the average Vaisey score decreased from 18 to 15. The differences in impact scores for HAQL faecal incontinence and disease specific psychosocial functioning reached significance between the much better group (+9 and +13 points respectively) and the group that perceived their situation equal or worse (-2 and -1 points respectively). No changes in EQ-5D measure after pelvic floor rehabilitation treatment.	Credible (3)
Gardiner ⁶⁴	Descriptive	International Consultation on Incontinence Questionnaire – Bowel Symptoms (ICIQ-BS)	420 participants. Mean age 53.96 years. No other information available	Content validity – a questionnaire to assess lower bowel habits would not need to address upper gastrointestinal symptoms. Items to assess type, amount and frequency of incontinent episodes were deemed essential with additional evaluation of passive and urgency type incontinence. Ability to delay, urgency and the duration that symptoms had been experienced were also reported to be central to the assessment of bowel symptoms. An attempt to define bowel habit according to individual patients was recommended to provide a complete review of the condition. Straining and incomplete evacuation were considered other important symptoms. Greatest areas of consistency between free text responses and existing questionnaire assessment items were in working life, hygiene/odour, and relationships. The greatest areas of disparity were toilet location, fear, preventative measures, embarrassment and bowel unpredictability.	Credible (2)
Miller <i>et al.</i> ⁶²	Prospective cohort with control group	Miller Scale of Continence Severity	Patients referred with incontinence over the study period from 1983 to 1986. A group of healthy patients with no anorectal complaints served as controls. Patients were selected for conservative or operative treatment on the basis of both clinical and physiological information.	Sensitivity- The tool was sensitive enough to detect changes in symptom severity as a result of conservative treatment, with 40% of conservative cases demonstrating a significant improvement in scores	Credible (1)
Minguez <i>et al.</i> ⁶⁵	Psychometric evaluation	Faecal Incontinence Quality of Life Index (FIQLS – Spanish version)	Patients with active faecal incontinence from 11 Spanish hospitals	Test-retest reliability – intraclass correlation coefficients good for all domains except for embarrassment subscale Internal consistency – Cronbach's alpha good to excellent for all domains Convergent validity – the four domains on the FIQLS significantly correlated with expected domains in the SF-36. Lifestyle correlated with Physical Role, Social Functioning, and Emotional Health; Behaviour correlated with Mental Health; Depression/Self-Perception correlated with General Health, Vitality and Mental Health; and Embarrassment correlated with Physical Role, Social Functioning and Mental Health Discriminant validity – the four domains on the FIQLS significantly correlated with the Wexner scale score. Correlations were higher with the lifestyle question included than with that question excluded. Correlations between subscales and the Wexner scale appeared better than correlations between subscales and corresponding subscales of the SF-36. Criterion-related validity – wearing pads was associated with poorer quality of life on all subscales. Participants with severe incontinence had poorer scores on all subscales than those with Wexner scores less than 9. Those with complete incontinence had lower scores on the Behaviour and Embarrassment subscales but not on Lifestyle and Depression subscales.	Credible (5)

Source of opinion	Design	Tool(s) validated	Participants	Outcomes	Levels of evidence
O'Keefe <i>et al.</i> ⁷³	Longitudinal cohort study	Medical Outcomes Survey (MOS)	Stratified random sample of older people for the years 1987 through 1990	Criterion-related validity – subjects with faecal incontinence were similar on all MOS scores to subjects with other colonic symptoms, but had lower overall scores in comparison to asymptomatic subjects	Credible (1)
Pucciani <i>et al.</i> ⁵⁵	Uncontrolled before and after	Wexner scale	Consecutive patients with faecal incontinence attending an outpatient unit in Italy between 1997 and 2001.	Sensitivity – the Wexner scale was sufficiently sensitive to detect a significant difference between the before and after scores of most patient groups who underwent rehabilitation. This was consistent with the before and after results of the manometric studies	Credible (1)
Rockwood <i>et al.</i> ¹⁴	Development and psychometric evaluation	Fecal Incontinence Severity Index (FISI)	Patients with faecal incontinence. No other information	Convergent validity – Pearson's correlations used. Three scales on the FIQLS demonstrated significant correlations with both the surgeon and patient severity scores: Lifestyle, Coping/Behaviour, and Embarrassment. The Depression/Self-Perception scale, although correlated in the expected direction, did not demonstrate correlations with the severity scores	Credible (1)
Rockwood <i>et al.</i> ⁶⁰	Content and face validation; psychometric validation	FIQLS	Patients diagnosed with faecal incontinence; sequentially recruited from five colon and rectal surgeries in the US	Test-retest reliability – none of the scales showed significant differences between test and retest administrations Internal consistency – Cronbach's alpha. All four scales demonstrate acceptable internal reliability Face and content validity – out of this process, fundamental areas such as altering dietary habits and behavioural adaptations and embarrassment were identified as being the primary domains relevant to assessing QOL on the FI population. All issues identified regarding clarity, readability and patient acceptance of items were resolved Convergent validity – Pearson's correlation coefficients. Ten a priori comparisons between the FIQLS and SF-36 subscales were significant Construct validity – two of six scales were eliminated because they were composed of multiple factors. Of the 41 original items, 29 were retained Criterion-related validity – analysis of variance. The FI population had a significantly lower QOL score than the controls for each of the four scales	Unsupported (1) Credible (4)
Rothbarth <i>et al.</i> ⁵⁶	Longitudinal cohort	Wexner scale; GIQLI	Patients who had anterior sphincter repair for faecal incontinence as a result of obstetric injury	Convergent validity – the Wexner scale was correlated with both the GIQLI and the six dimensions of the SF-20. Linear relationship between GIQLI and Wexner. The correlation between the Wexner score and the SF-20 was significant for all six dimensions The mean GIQLI score was significantly lower than the mean GIQLI score of a reference group of normal individuals	Credible (2)
Rullier <i>et al.</i> ⁶⁶	Longitudinal multicentric cohort; psychometric validation	FIQLS – French version	Patients with faecal incontinence for more than six months from 10 colon and rectal centres in France	Test-retest reliability – intraclass coefficients ranged from 0.80 to 0.93, demonstrating the reproducibility of the FI-specific scale Internal consistency – Cronbach's alpha. Very satisfactory internal reliability for each scale except the Embarrassment scale. Nevertheless, after extrapolation to a 10-item scale, Cronbach's alpha remained above 0.70 for all scales Face and content validity – considered understandable and acceptable by the 10 patients who tested it. Patients completed the questionnaire in 12 minutes. Literal translation of certain items produced unfamiliar terms that were replaced by ordinary words used by patients. The original version in English has a column entitled 'concern for you for reasons other than accidental bowel leakage. The corresponding column in French was not retained in the French version to avoid confusion. The equation used to calculate the score for the Coping/Behaviour scale was corrected, eliminating a typographical error in the original version. Finally, the scoring scale was inverted to avoid risk of calculation error since the scales are presented in inverse order in the American version. Completion rate was good. The mean number of items with missing data were 0.93 and 0.76 respectively Convergent validity – scores on each subscale correlated significantly with the Wexner score. The quality of life score decreased with increasing continence score. Quality of life declined significantly with increasing clinician-assessed FI severity Construct validity – very good correlation between items and the corresponding scale for Lifestyle and Depression/Self-Perception, good correlation for Coping/Behaviour and weak correlation for Embarrassment. The correlation with the corresponding scale was <0.40 for 4 of the 29 items. Evaluation of discriminant validity showed that the majority of the items correlated better with their own scale than with other scales. Could not be confirmed for two items in the Coping/Behaviour scale and three items in the Embarrassment scale. The first two items correlated better with the Depression/Self-Perception scale and the last three items with the Depression/Self-Perception scale (n = 2) and the Coping/Behaviour scale (n = 1), but the differences did not reach statistical significance Criterion-related validity – the FIQLS scale enabled significant discrimination of FI severity for each scale except Coping/Behaviour	Credible (6)

Appendix VI Studies excluded from the review of expert opinion

Abrams P, Billington A, Booth F *et al.* *Good Practice in Continence Services*. London: Department of Health, 1998; 1-44. **Reason for exclusion:** No reference to extant literature. Recommendations not backed up by evidence or consistent with the literature. Little detail on assessment.

Addison R. Faecal incontinence. *Nurse Prescriber* 1996; **1**: 29.
Reason for exclusion: No backing up of opinion with literature

Barnes PRH. The investigation and treatment of faecal incontinence. *Mod MedAus* 1994; **37**: 66-73. **Reason for exclusion:** No reference to extant literature.

Barrett JA. Clinical assessment of the faecally incontinent elderly patient. In: Barrett JA, ed. *Faecal Incontinence and Related Problems in the Older Adult*. Seveoaks. Kent: Edward Arnold, 1993; **16**: 129-32. **Reason for exclusion:** No reference to extant literature.

Basch A. Assessment and treatment of fecal incontinence. *WCET J* 1998; **18**: 18-19. **Reason for exclusion:** Not much information, reference to literature or content of assessment

Berger MM. Caring for patients with faecal incontinence. *WCET J* 1998; **18**: 13-15. **Reason for exclusion:** Not relevant to review topic

Bliss DZ, Norton CA, Miller J, Krissovich M. Directions for future nursing research on fecal incontinence. *Nurs Res* 2004; **53**: S15-21. **Reason for exclusion:** Not about care of patients

Brandis S, Penrose P, Hill R *et al*. *First Step in the Management of Urinary Incontinence in Community-dwelling Older People: a Clinical Practice Guideline*. Brisbane: Queensland Health, 2005. **Reason for exclusion:** Much more about UI and constipation than FI

Chiarelli P, Bower W, Wilson A, Attia J, Sibbritt D. Estimating the prevalence of urinary and faecal incontinence in Australia: systematic review. *Australas J Ageing* 2005; **24**: 19-27. **Reason for exclusion:** Prevalence article only

Clayman C, Thompson V, Forth H. Development of a continence assessment pathway in acute care. *Nurs Times* 2005; **101**:46-8. **Reason for exclusion:** Relevant to the acute care environment

Demata EU. Faecal incontinence - Part 2: assessment and medical and surgical management. *WCET J* 2000; **20**: 12-16. **Reason for exclusion:** Not a person of standing - no reference to extant literature

Demata EU. Faecal incontinence - Part 3: nursing Management. *WCET J* 2000; **20**: 12-16. **Reason for exclusion:** Not high standing in the field, little reference to literature

Dennison C, Prasad M, Lloyd A, Bhattacharyya SK, Dhawan R, Coyne K. The health-related quality of life and economic burden of constipation. *Pharmacoeconomics* 2005; **23**: 461-76. **Reason for exclusion:** Article is constipation-related

Doughty D. A physiological approach to bowel training. *J WOCN* 1996; **23**: 46-56. **Reason for exclusion:** Minimal reference to literature to back up why things need to be asked in the assessment tool.

Finlayson TL, Moyer CA, Sonnad SS. Assessing symptoms, disease severity, and quality of life in the clinical context: a theoretical framework. *Am J Manag Care* 2004; **10**: 336-44. **Reason for exclusion:** More a theoretical article. Not related to assessment of faecal incontinence

Gurland BH, Weiss EG. Fecal incontinence and associated diseases: diabetes, inflammatory bowel disease and multiple sclerosis. *Semin Colon Rectal Surg* 2001; **12**: 98-102. **Reason for exclusion:** Concentrates on anatomy and physiology, little reference to literature

Hanauer SB. Fecal incontinence in the elderly. *Hosp Pract* 1988; **23**: 105-22. **Reason for exclusion:** No reference to literature, primarily anatomy and physiology

Henry M. Faecal incontinence. *Nurs Times* 1983; **79**: 61-2.

Reason for exclusion: Does not contain information on assessment. Author not of standing in the field. Paper is over twenty years old.

Herbert J. Faecal incontinence: the last taboo. *Br J Ther Rehab* 1999; **6**: 453-8.

Reason for exclusion: No reference to literature

Hirsh T, Lembo T. Diagnosis and management of fecal incontinence in elderly patients. *Am Fam Physician* 1996; **54**: 1559-64.

Reason for exclusion: No reference to literature. Talk about mobility, but do not mention mobility in the assessment even though it is touted as a major issue earlier in the article.

Irwin K. Managing adult fecal incontinence. *J Community Nurs* 2001; **15**: 25-9.

Reason for exclusion: Insufficient reference to extant literature

Jensen LL. Assessing and treating patients with complex fecal incontinence. *Ostomy Wound Manage* 2000; **46**: 56-61. **Reason for exclusion:** Not much information on assessment or relating back to literature

Jensen LL. Fecal incontinence: evaluation and treatment. *J WOCN* 1997; **24**: 277-82.

Reason for exclusion: No reference to extant literature

Johnston CB, Goldstein MK, Triadafilopoulos G. Constipation, diarrhea and fecal incontinence. In: Beck J, Osterweil D, Alon R, Franzi C, Frank J, Brummel-Smith K, eds. *Comprehensive Geriatric Assessment*. New York: McGraw-Hill, 2000; 421-41.

Reason for exclusion: Minimal reference to literature

Jorge JCN, Wexner SD. Etiology and management of fecal incontinence. *Dis Colon Rectum* 1993; **36**: 77-96.

Reason for exclusion: Lack of reference to back-up literature, primarily anatomy and physiology

Kamm MA. Faecal incontinence. *BMJ* 1998; **316**: 528-32.

Reason for exclusion: Not relevant to assessment

Kapoor DS, Thakar R, Sultan AH. Combined urinary and faecal incontinence. *Int Urogynecol J* 2005; **16**: 321-8.

Reason for exclusion: Not relevant to assessment

Lam R, Jones-Roberts A. A care model for faecal incontinence management in the community. *Aust Nurs J* 2002; **48**: 1-4.

Reason for exclusion: Clinical flowchart - one step above assessment

Royal District Nursing Service. *A Care Model for Management of Faecal Incontinence for Clients Receiving Care in Their Home*. St Kilda: Royal District Nursing Service, 2001.

Reason for exclusion: Little information on assessment - no reference to extant literature

Leslie LR. Training for functional independence. In: Kottke FJ, Lehmann JF, eds. *Krusen's Handbook of Physical Medicine and Rehabilitation*. Philadelphia, PA: W.B. Saunders, 1990; 564-70.

Reason for exclusion: Short section. No reference to literature

Mathers S, Swash M. Faecal incontinence. *Int Disabil Stud* 1988; **10**: 164-8.

Reason for exclusion: Small section, no reference to literature

Maunder RG, Cohen Z, McLeod RS, Greenberg GR. Effect of intervention in inflammatory bowel disease on health-related quality of life: a critical review. *Dis Colon Rectum* 1995; **38**: 1147-61.

Reason for exclusion: Related to inflammatory bowel disease than faecal incontinence.

Miner PB. Economic and personal impact of fecal and urinary incontinence. *Gastroenterology* 2004; **126**: S8-13.

Reason for exclusion: No expert opinion provided regarding assessment

Brady C. Constipation and fecal incontinence. In: Munsat TL, ed. *Neurologic Bladder, Bowel and Sexual Dysfunction*. Amsterdam: Elsevier, 2002; 27-37.

Reason for exclusion: No reference to extant literature

Naliboff BD. Choosing outcome variables: global assessment and diaries. *Gastroenterology* 2004; **126**: S129-34.

Reason for exclusion: Focuses generically on tool development

Norton C. Faecal incontinence in adults 1: prevalence and causes. *Br J Nurs* 1996; **5**: 1366-74.

Reason for exclusion: Only a small section, lack of assessment details

Norton C. Assessing incontinence. *Geriatr Nurs Home Care* 1987; **7**: 24-6.

Reason for exclusion: Relates primarily to assessment of incontinence in general with very little reference to fecal incontinence. No reference back to extant literature

Norton C, Fader M. Continence management. *Elder Care* 1994; **6**: 23-7.

Reason for exclusion: Only a brief overview of assessment issues.

Norton N. Research priorities for fecal incontinence: the patient's perspective. *IFFGD Symp* 2002: November 3-5. **Reason for exclusion:** No real expert opinion provided in relation to assessment. Talks about scales and areas for future research.

Powell M, Rigby D. Management of bowel dysfunction: evacuation difficulties. *Nurs Stand* 2000; **14**: 47-51.

Reason for exclusion: About management rather than assessment

Rauen KK, Biefeld T, Balcom AH. New continence assessment tool: development, validity, reliability. *Digit Urol J* 1998; April (online).

Reason for exclusion: Deals with continence overall and only specific to spina bifida

Regensberg D. Understanding continence. *Nurs RSA Verpleg* 1994; **9**: 23-6.

Reason for exclusion: Concentrates on pathophysiology, no reference to extant literature

Roe B. Effective and ineffective management of incontinence: issues around illness trajectory and health care. *Qual Health Res* 2000; **10**: 677-90.

Reason for exclusion: Qualitative research - not relevant to review

Roe B, May C. Incontinence and sexuality: findings from a qualitative perspective. *J Adv Nurs* 1999; **30**: 573-9.

Reason for exclusion: Qualitative study - combined urinary and fecal incontinence

Runciman P. Health assessment of the elderly at home: the case for shared learning. *J Adv Nur* 1989; **14**: 111-19.

Reason for exclusion: Very little information specific to faecal incontinence.

Stevens TK, Soffer EE, Palmer RM. Fecal incontinence in elderly patients: common, treatable, yet often undiagnosed. *Cleve Clin JMed* 2003; **70**: 441-8.

Reason for exclusion: Tables had limited information to support their use in practice

Tariq SH. Geriatric fecal incontinence. *Clin Geriatr Med* 2004; **20**: 571-87.

Reason for exclusion: Virtually identical to previous article published by Tariq in 2003.

Thomas S. Continence: an update on policy priorities and practice implications in primary care. *Nurs Older People* 2001; **13**: 21-5.

Reason for exclusion: Not specific to faecal incontinence, little reference to literature

Tobin GW. Incontinence in the elderly. *Practitioner* 1987; **231**: 843-7.

Reason for exclusion: Little relevant information. No reference to literature

Wald A. Constipation and fecal incontinence in the elderly. *Semin Gastrointest Dis* 1994; **5**: 179-88.

Reason for exclusion: Very small section - against what most peers recommend and not back up by reference to extant literature

Waldrop J, Doughty DB. Pathophysiology of bowel dysfunction and fecal incontinence. In: Doughty DB, ed. *Urinary & Fecal Incontinence: Nursing Management*. St Louis: Mosby, 2000; **13**: 325-52. **Reason for**

exclusion: Not relevant to assessment

Yacavone RF, Locke GR, Provenzale DT, Eisen GM. Quality of life measurement in gastroenterology: what is available? *Am J Gastroenterol* 2001; **96**: 285-97.

Reason for exclusion: Not specific to FI

Appendix VII

Studies excluded from the psychometric review

Abbas SM, Bissett IP, Neill ME, Parry BR. Long-term outcome of postanal repair in the treatment of faecal incontinence. *ANZ J Surg* 2005; **75**: 783-6.

Reason for exclusion: Poorly designed retrospective study. Test-retest the only reliability statistic reported - reported upon comparison between pre-operative and post-operative measurements.

Alcala MJ, Casellas F, Fontanet G, Prieto L, Malagelada JR. Shortened questionnaire on quality of life for inflammatory bowel disease. *Inflamm Bowel Dis* 2004; **10**: 383-91.

Reason for exclusion: Related to inflammatory bowel disease. Not relevant to current review.

Bakx R, Sprangers MA, Oort FJ *et al.* Development and validation of a colorectal functional outcome questionnaire. *Int J Colorectal Dis* 2005; **20**: 126-36.

Reason for exclusion: Not enough overlap in sample in terms of age. Not clear whether these are people living in the community or not. Tool designed to measure functional outcome after surgery.

Barber MD, Kuchibhatla MN, Pieper CF, Bump RC. Psychometric evaluation of 2 comprehensive condition-specific quality of life instruments for women with pelvic floor disorders. *Am J Obstet Gynecol* 2001; **185**: 1388-95.

Reason for exclusion: Only 13 percent of the sample have faecal incontinence. Insufficient age overlap with sample.

Barber MD, Walters MD, Bump RC. Short forms of two condition-specific quality-of-life questionnaires for women with pelvic floor disorders (PFDI-20 and PFIQ-7). *Am J Obstet Gynecol* 2005; **193**: 103-13.

Reason for exclusion: Sample only included a quarter of women only who experienced FI.

Beddy P, Neary P, Eguare EI *et al.* Electromyographic biofeedback can improve subjective and objective measures of fecal incontinence in the short term. *J Gastrointest Surg* 2004; **8**: 64-72.

Reason for exclusion: Cohort study with no control. Age range of sample does not have sufficient overlap with population of interest.

Bharucha AE, Zinsmeister AR, Locke GR *et al.* Prevalence and burden of fecal incontinence: a population-based study in women. *Gastroenterology* 2005; **129**: 42-9.

Reason for exclusion: Prevalence study - not relevant to review.

Borgaonkar MR, Irvine EJ. Quality of life measurement in gastrointestinal and liver disorders. *Gut* 2000; **47**: 444-54.

Reason for exclusion: Review article of quality of life instruments. Reference to other studies, but otherwise irrelevant.

Bradley CS, Rovner ES, Morgan MA *et al.* A new questionnaire for urinary incontinence diagnosis in women: development and testing. *Am J Obstet Gynecol* 2005; **192**: 66-73.

Reason for exclusion: Not specific to faecal incontinence. More of a prevalence study. No reliability or validity information re the questionnaire provided.

Crowell MD, Lacy BE, Schettler VA, Dineen TN, Olden KW, Talley NJ. Subtypes of anal incontinence associated with bowel dysfunction: clinical, physiologic, and psychosocial characterization. *Dis Colon Rectum* 2004; **47**: 1627-35.

Reason for exclusion: No information on psychometric properties of tool. Not enough detail about tool itself.

Deutekom M, Terra MP, Dobben AC *et al.* Selecting an outcome measure for evaluating treatment in fecal incontinence. *Dis Colon Rectum* 2005; **48**: 2294-301.

Reason for exclusion: Compares scores on the Vaisey scale to scores on the EuroQOL. No real information regarding reliability or validity of either instrument.

Drossman DA. The functional gastrointestinal disorders and the Rome III process. *Gastroenterology* 2006; **130**: 1377-90.

Reason for exclusion: While the tool is described well in its various forms, there is no evidence for psychometric properties of the tool. Additionally, only a small part of the tool is dedicated to faecal incontinence.

Efron JE. The SECCA procedure: a new therapy for treatment of fecal incontinence. *Surg Technol Int* 2004; **13**: 107-10.

Reason for exclusion: Procedure investigated is invasive in nature.

Eypasch E, Williams JI, Wood-Dauphinee S *et al.* Gastrointestinal Quality of Life Index: development, validation and application of a new instrument. *BrJSurg* 1995; **82**: 216-22.

Reason for exclusion: Good validation, but none of the samples have any more than partial crossover in terms of age range and no participants have faecal incontinence as the primary symptom.

Fialkow MF, Melville JL, Lentz GM, Miller EA, Miller J, Fenner DE. The functional and psychosocial impact of fecal incontinence on women with urinary incontinence. *Am J Obstet Gynecol* 2003; **189**: 127-9.

Reason for exclusion: Only a small proportion of participants with faecal incontinence. No information on psychometric properties of the tool.

Frizelle FA, Geary RB, Johnston M *et al.* Penile and clitoral stimulation for faecal incontinence: external application of a bipolar electrode for patients with faecal incontinence. *Colorectal Dis* 2004; **6**: 54-7.

Reason for exclusion: Poorly designed retrospective study with no control group. Evidence derived from study for the validity of the Jorge-Wexner scale is questionable.

Gwee KA, Wee S, Wong ML, Png DJ. The prevalence, symptom characteristics, and impact of irritable bowel syndrome in an asian urban community. *Am J Gastroenterol* 2004; **99**: 924-31.

Reason for exclusion: Prevalence study looking at irritable bowel syndrome.

Harari D, Norton C, Lockwood L, Swift C. Treatment of constipation and fecal incontinence in stroke patients: randomized controlled trial. *Stroke* 2004; **35**: 2549-55.

Reason for exclusion: Randomised controlled trial of an intervention. No information relevant to the review.

Hill J, Corson RJ, Brandon H, Redford J, Faragher EB, Kiff ES. History and examination in the assessment of patients with idiopathic fecal incontinence. *Dis Colon Rectum* 1994; **37**: 473-7.

Reason for exclusion: Manometry would appear to be an invasive procedure not conducted in community settings. Study therefore irrelevant to review.

Hiller L, Radley S, Mann CH *et al.* Development and validation of a questionnaire for the assessment of bowel and lower urinary tract symptoms in women. *BJOG* 2002; **109**: 413-23.

Reason for exclusion: Sample not close enough to population of interest to warrant inclusion

Jackson SL, Weber AM, Hull TL, Mitchinson AR, Walters MD. Fecal incontinence in women with urinary incontinence and pelvic organ prolapse. *Obstet Gynecol* 1997; **89**: 423-7.

Reason for exclusion: No information in relation to the standardised tool mentioned

Jagger C, Clarke M, Davies RA. The elderly at home: indices of disability. *J Epidemiol Community Health* 1986; **40**: 139-42.

Reason for exclusion: The scale that has been developed does not distinguish between fecal and urinary incontinence.

Kalantar JS, Howell S, Talley NJ. Prevalence of faecal incontinence and associated risk factors; an underdiagnosed problem in the Australian community? *Med J Aust* 2002 21; **176**: 54-7.

Reason for exclusion: Prevalence study, No information on psychometric properties of tools used

Kwon S, Visco AG, Fitzgerald MP, Ye W, Whitehead WE; Pelvic Floor Disorders Network (PFDN). Validity and reliability of the Modified Manchester Health Questionnaire in assessing patients with fecal incontinence. *Dis Colon Rectum* 2005; **48**: 323-31.

Reason for exclusion: Sample too small and too young.

Lam TCF, Kennedy ML, Talley NJ, Lubowski DZ. Faecal and urinary incontinence - a population based study. *AustNZJSurg* 1997; **67**: A14.

Reason for exclusion: Not enough overlap in relation to the population of interest

Lam TCF, Kennedy ML, Chen FC, Lubowski DZ, Talley NJ. Prevalence of faecal incontinence: obstetric and constipation risk factors: a population based study. *Colorectal Dis* 1999; **1**: 197-203. **Reason for exclusion:** Prevalence article.

Leibbrand R, Cuntz U, Hiller W. Assessment of functional gastrointestinal disorders using the Gastro-Questionnaire. *Int J Behav Med* 2002; **9**: 155-72.

Reason for exclusion: Questionnaire is too broad for the purposes of the review. Sample does not reflect population of interest.

Lewis SJ, Heaton KW. Stool form scale as a useful guide to intestinal transit time. *Scand J Gastroenterol* 1997; **32**: 920-4.

Reason for exclusion: Sample outside of the scope of the review (all under 65 years)

Maunder RG, Cohen Z, McLeod RS, Greenberg GR. Effect of intervention in inflammatory bowel disease on health-related quality of life: a critical review. *Dis Colon Rectum* 1995; **38**: 1147-61.

Reason for exclusion: Not related to faecal incontinence

Nelson R, Norton N, Cautley E, Furner S. Community-based prevalence of anal incontinence. *JAMA* 1995 16; **274**: 559-61.

Reason for exclusion: Prevalence study - no information on psychometric properties of tools used

Ng C, Prott G, Rutkowski S *et al.* Gastrointestinal symptoms in spinal cord injury: relationships with level of injury and psychologic factors. *Dis Colon Rectum* 2005; **48**: 1562-8.

Reason for exclusion: Prevalence study - no information on psychometric properties of tools used Norton C, Chelvanayagam S. Methodology of biofeedback for adults with fecal incontinence: a program of care. *J Wound Ostomy Continence Nurs* 2001; **28**: 156-68.

Reason for exclusion: The Bowel Symptom Questionnaire is presented but no psychometric information on the tool is provided

Norton C, Chelvanayagam S. A nursing assessment tool for adults with fecal incontinence. *J Wound Ostomy Continence Nurs* 2000; **27**: 279-91.

Reason for exclusion: This is a paper outlining a nursing assessment tool for use with patients suffering from faecal incontinence. There is a lot of evidence presented as to why certain items should be included in this tool and some expert opinion provided as to why certain things should be included. Data was therefore included in the review of expert opinion.

Norton C, Chelvanayagam S, Wilson-Barnett J, Redfern S, Kamm MA. Randomized controlled trial of biofeedback for fecal incontinence. *Gastroenterology* 2003; **125**: 1320-9.

Reason for exclusion: Sample is too varied - not representative of population we are trying to access.

Nyein K, McMichael L, Turner-Stokes L. Can a Barthel score be derived from the FIM? *Clin Rehabil* 1999; **13**: 56-63.

Reason for exclusion: Sample is not specific to FI. Small sample size. No real relationship to FI.

O'Keefe EA, Talley NJ, Tangalos EG, Zinsmeister AR. A bowel symptom questionnaire for the elderly. *J Gerontol* 1992; **47**: M116-21.

Reason for exclusion: Related to inflammatory bowel disease and gastrointestinal disorders overall. Not relevant to current review.

Olopade FA, Norman A, Blake P *et al.* A modified Inflammatory Bowel Disease questionnaire and the Vaizey Incontinence questionnaire are simple ways to identify patients with significant gastrointestinal symptoms after pelvic radiotherapy. *Br J Cancer* 2005 9; **92**: 1663-70.

Reason for exclusion: While some of sample were in the population of interest, goal of study was specific to radiotherapy patients.

Ortiz H, Marzo J, Armendariz P, De Miguel M. Quality of life assessment in patients with chronic anal fissure after lateral internal sphincterotomy. *BrJSurg*2005; **92**: 881-5.

Reason for exclusion: Sample not reflective of population (age and anal fissure only).

Ostbye T, Seim A, Krause KM *et al.* A 10-year follow-up of urinary and fecal incontinence among the oldest old in the community: the Canadian Study of Health and Aging. *Can J Aging* 2004; **23**: 319-31.

Reason for exclusion: Prevalence study - no psychometric properties reported - single-item measure

Osterberg A, Graf W, Edebol Eeg-Olofsson K, Hynninen P, Pahlman L. Results of neurophysiologic evaluation in fecal incontinence. *Dis Colon Rectum* 2000; **43**: 1256-61.

Reason for exclusion: Sample too varied. Insufficient description of questionnaire. Small sample size.

Pescatori M, Anastasio G, Bottini C, Mentasti A. New grading and scoring for anal incontinence. Evaluation of 335 patients. *Dis Colon Rectum* 1992; **35**: 482-7.

Reason for exclusion: No mention of who did the scoring. Some retrospective scoring - no details of how this was done.

Prosser S, Dobbs F. Case-finding incontinence in the over-75s. *Br J General Pract* 1997; **47**: 498-500.

Reason for exclusion: No reliability available in relation to the single-item measure used in the study.

Quander CR, Morris MC, Melson J, Bienias JL, Evans DA. Prevalence of and factors associated with fecal incontinence in a large community study of older individuals. *Am J Gastroenterol* 2005; **100**: 905-9.

Reason for exclusion: Prevalence study. No information on psychometric properties of single item measure of faecal incontinence.

Reilly WT, Talley NJ, Pemberton JH, Zinsmeister AR. Validation of a questionnaire to assess fecal incontinence and associated risk factors: Fecal Incontinence Questionnaire. *Dis Colon Rectum* 2000; **43**: 146-53.

Reason for exclusion: Small sample sizes for reliability and validity assessment. Not enough information about the sample to determine if it relates to target population.

Ross DG. Altered bowel elimination patterns among hospitalized elderly and middle-aged persons. *Orthop Nurs* 1995; **14**: 25-31.

Reason for exclusion: Irrelevant to review. Small sample.

Ross FM, Bower P. Standardized Assessment for Elderly People (SAFE) - a feasibility study in district nursing. *J Clin Nurs* 1995; **4**: 303-10.

Reason for exclusion: Article on feasibility. Not specific to faecal incontinence.

Sailer M, Bussen D, Debus ES, Fuchs KH, Thiede A. Quality of life in patients with benign anorectal disorders. *BrJSurg* 1998; **85**: 1716-19.

Reason for exclusion: Sample size is small and does not appear to include sufficient proportion of those aged 65 and over.

Sampselle CM, Harlow SD, Skurnick J, Brubaker L, Bondarenko I Urinary incontinence predictors and life impact in ethnically diverse perimenopausal women. *Obstet Gynecol* 2002; **100**: 1230-8.

Reason for exclusion: Prevalence study - no psychometric information on tools used. Urinary incontinence only.

Stenzelius K, Mattiasson A, Hallberg IR, Westergren A. Symptoms of urinary and faecal incontinence among men and women 75+ in relations to health complaints and quality of life. *Neurourol Urodyn* 2004; **23**: 211-22.

Reason for exclusion: Prevalence study. Single item measure of FI with no information on psychometric properties

Temple LK, Bacik J, Savatta SG *et al.* The development of a validated instrument to evaluate bowel function after sphincter-preserving surgery for rectal cancer. *Dis Colon Rectum* 2005; **48**: 1353-65.

Reason for exclusion: Relates to sphincter-related surgery in patients undergoing rectal cancer therapy. Not appropriate to current review

Teunissen TA, van den Bosch WJ, van den Hoogen HJ, Lagro-Janssen AL. Prevalence of urinary, fecal and double incontinence in the elderly living at home. *Int Urogynecol J Pelvic Floor Dysfunct* 2004; **15**: 10-13.

Reason for exclusion: Prevalence study. No mention of reliability or validity of tool.

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