Development and validation of the Gastrointestinal Endoscopy Satisfaction Questionnaire (GESQ)

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ABSTRACT

Background and study aims

Patient satisfaction is a key indicator of the quality of gastrointestinal endoscopy. The aim of this study was to develop and validate a specific patient satisfaction questionnaire for patients undergoing gastrointestinal endoscopy-the Gastrointestinal Endoscopy Satisfaction Questionnaire (GESQ).

Patients and methods

We developed and validated the GESQ within the context of a national multi-institution nurse endoscopy trial based in secondary care, in three stages: 1) item generation with a panel of patients and professionals following a detailed literature review to identify the most relevant items from existing scales; 2) developing and piloting a draft questionnaire on a sample of patients referred for gastrointestinal endoscopy; and 3) testing the questionnaire within a large multi-centre pragmatic randomised trial. We undertook psychometric analysis of the questionnaire to identify the underlying dimensions, and assessed the questionnaire for reliability and validity.

Results

The final version of the GESQ contains 21 items. Principal components analysis revealed four subscales with high internal consistency: skills and hospital (7 items, Cronbach's alpha 0.83), pain and discomfort during and after endoscopy (4 items, Cronbach's alpha 0.84), information before endoscopy (5 items, Cronbach's alpha 0.80) and information after endoscopy (5 items, Cronbach's alpha 0.76).

Conclusions

The four identified subscales are clinically relevant and correspond to domains of patient satisfaction identified in previous studies. Our development and validation of the GESQ confirmed that it is a valid, reliable, interpretable and acceptable tool to measure satisfaction in patients who have undergone a gastrointestinal endoscopy.

(245)

Key words

endoscopy; gastrointestinal; patient satisfaction; validation studies as a topic

INTRODUCTION

Patient satisfaction is “the extent of an individual's experience compared with his or her expectations”[1] or “the extent to which health care meets general and condition-specific needs”[2]. Patient satisfaction increasingly contributes to assessing the quality of health care services and procedures and achieving excellence in health care[3]. It can also identify divergences between centres and regions and areas for improvement[4].

The movement to define and then measure aspects of quality for endoscopy first arose from increased reports of medical errors[5]. Patient satisfaction has since become a key indicator of gastrointestinal endoscopy quality across both the United States of America[6] and Europe[3]; both the American Society for Gastrointestinal Endoscopy (ASGE) and the European Society of Gastrointestinal Endoscopy recommend the routine collection of quality indicators, including satisfaction, for all patients undergoing gastrointestinal endoscopy[3 6]. All endoscopy units in the UK now have to measure patients’ satisfaction twice a year as part of the Global Rating Scale[7 8]. Yacavone et al, proposed assessment of satisfaction with endoscopy should cover: access; appointments; information; procedure; and discharge[9].

To date however, instruments used to measure patient satisfaction have failed to describe their development and validation[10]. Analysis of 195 studies reporting on patient satisfaction data in 1994 showed that, with few exceptions, most instruments demonstrated little evidence of reliability or validity[10]. Existing tools measure patient satisfaction with care other than endoscopy[11] or assess quality of

care in a specific gastrointestinal condition[4]. Even the modified Group Health Association of America (mGHAA-9) survey recommended for measuring patient satisfaction with endoscopy[12] by the ASGE did not include all factors necessary for patient satisfaction, especially pain control during and after endoscopy[9]. There is a therefore a need for a valid and reliable instrument to measure patients' cognitive and emotional response to their experience of endoscopy.

We therefore developed and validated the Gastrointestinal Endoscopy Satisfaction Questionnaire (GESQ) within a national multi-institution nurse endoscopy trial based in secondary care (MINuET)[13-15].

PATIENTS AND METHODS

We followed Streiner and Norman's general approach[16] and developed the questionnaire in three stages: (1) item generation; (2) initial validation at a local hospital; and (3) concurrent validation in a large multi-centre trial. We collected data for stages (2) and (3) between January and April 2002.

(1) Item generation

We generated potential items for the GESQ by first undertaking a systematic search of the literature. We searched seven databases: Medline, British Nursing index, CINAHL, EMBASE, evidence-based medicine reviews, health management information consortium and PsycINFO. We searched for: patient satisfaction AND [endoscopy OR gastrointestinal endoscopy OR upper gastrointestinal endoscopy OR colonoscopy OR flexible sigmoidoscopy OR endoscopic retrograde cholangio

pancreotography (ERCP) OR gastroscopy]. We also searched the websites of leading professional bodies: The British Society of Gastroenterology (BSG), The Joint Advisory Group for Gastrointestinal Endoscopy (JAG), The American Society for Gastrointestinal Endoscopy (ASGE), The European Society of Gastrointestinal Endoscopy (ESGE), the World Organisation for Digestive Endoscopy (Organisation Mondiale d'Endoscopie Digestive – OMED) and the American Gastroenterological Association (AGA). We also reviewed textbooks on gastrointestinal endoscopy [17-19]. Following the Cochrane guidelines (http://handbook.cochrane.org/), we reviewed and combined individual search results to narrow down articles specific to GI endoscopy. Our focus was on studies reporting on the validation of patient satisfaction questionnaires. We reviewed retrieved abstracts and obtained complete papers of studies which we judged relevant. We also reviewed reference lists to identify relevant articles. We collated a list of potential items for the GESQ from this literature and submitted it to a panel comprising patients and professionals with expertise in gastroenterology, outcome measurement or psychology. We asked them whether the draft questionnaire covered all relevant issues, and the wording of draft questions was suitable for patients who had undergone gastrointestinal endoscopy.

(2) Initial validation

We carried out initial validation of the GESQ version 0 (see Appendix 1) at all centres in the MINuET pilot[13 14] and a local community hospital (Neath Port Talbot Hospital – NPHT). We invited 125 patients who attended NPTH for an endoscopy and 157 patients from the MINuET trial to take part in this initial validation. We

asked patients who were attending hospital for a gastrointestinal endoscopy [oesophago-gastro-duodenoscopy (OGD), flexible sigmoidoscopy or colonoscopy] to complete a questionnaire comprising the GESQ and three open-ended questions:

- Were there any questions that were difficult to understand? If so, which ones?
- Were there any questions that you did not wish to answer? Is so, which ones?
- If you have any other comments about this questionnaire, please write them below.

Patients were asked to complete the questionnaire one day after their endoscopy and return it by post in a pre-paid envelope.

The purpose of these open ended questions was to assess whether there was any ambiguity in the questions and identify additional questions which patients thought relevant to assessing patient satisfaction with gastrointestinal endoscopy. We obtained informed consent from patients and asked them to complete questionnaires on their endoscopies and return them by post.

We undertook semi-structured interviews with a sub-sample of 20 patients from NPHT who had completed the questionnaire. We also asked endoscopy staff (physicians and nurses) from NPHT and a patient representative to comment on the questionnaire. Again the aim was to identify ambiguity and missing questions.

(3) Main study

We based the main study on MINuET, a 23-hospital randomised trial designed to compare flexble sigmoidoscopy or upper gastro-intestinal endoscopy performed by

doctors and nurses[13-15]. Following feedback from stage (1) we updated the GESQ to version 1 (see Table 1)[13], and undertook concurrent validation with new participants in MINuET. We consented 1782 patients in the main study and asked them to complete a questionnaire containing the GESQ one day after endoscopy and return it in a pre-paid envelope. We sent reminders to non-responders at 2 and 4 weeks.

The endoscopists who performed the procedures were not involved in the sampling. Randomisation was undertaken centrally. We used Zelen's randomisation technique before consent in order to minimise distortion of existing practice in the participating sites[13].

Hospitals in the UK with nurse endoscopists undertaking were invited to participate in the study, firstly via the British Society of Gastroenterology (BSG) and again when the application for funding was in preparation. Those hospitals which showed initial interest were contacted when the outline application for funding was successful, and a collaborators meeting was held to inform the preparation of the full bid. When funding was secured, the individual sites were individually contacted. Other centres that had not initially responded were contacted again.

The study was discussed face-to-face with each patient and we supplied a pre-paid envelope for the return of the questionnaire one day post-endoscopy. The combination of motivated sites, personal contact and pre-paid envelope helped to facilitate a high response rate.

No difference in compliance between patient groups between respondents and non-respondents (see Table 2)

Statistical Analysis

Face and content validity

We assessed the face and content validity of the GESQ in the first two stages – item generation and initial validation stage – with input from our panel of patients and professionals.

We carried out the following psychometric analyses on the completed questionnaires from the third stage – the main study:

Underlying dimensions and internal consistency

We examined whether each item suffered from 'floor' or 'ceiling' effects. We also considered items for rejection if more than 80% of participants gave the same response because such items could not discriminate between levels of satisfaction.

We applied principal component analysis to the questionnaire data applying an oblique rotation (direct oblim rotation), which assumes that there is some correlation between the factors[20 21]. We considered that a factor was important if its eigenvalue clearly exceeded 1 and it had face validity, that is it appeared to measure a recognisable aspect of patients' satisfaction. We considered that an item contributed to a factor if it had a loading of at least 0.4 on that factor[22]. We

considered items not contributing to any important factor in this way for rejection from the questionnaire.

We assessed the internal consistency of the GESQ by examining item-total correlations and Cronbach's alpha. We considered items for rejection if their item-total correlations were below 0.2 (hardly related) or above 0.8 (highly related and therefore providing little additional information). Finally we examined Cronbach's alpha for each of the resulting scales to ensure that they exceeded 0.7[16 23] .

The purpose of the questionnaire was to assess patient satisfaction with endoscopy and we therefore designed it to be used as a single administration instrument. It was not possible to assess the test-retest reliability of the GESQ in the study as test-retest reliability assumes that there will be no change in the quality and construct being measured. In order to assess this for the GESQ would require the patient to undergo an endoscopy twice by the same endoscopist under exactly the same conditions (time of procedure, drugs used for the procedure).

Final scoring

In analysing and validating the GESQ in the main study (see Table 1), we calculated component scores thus:

1. We reversed questions which originally gave higher scores to positive statements and lower scores to negative statements so that 1 consistently became the best score and 5 the worst.

2. We coded questions comprising three- or five-point Likert scales so that 1 was the best score and 5 the worst.
3. We coded binary questions so that Yes was 1 and No was 5.
4. We gave all questions equal weighting, based on the deductive argument that each domain is equally important to the individual responding[24 25].
5. We calculated component scores by summing the valid responses from the questions in that component and dividing by the number of valid responses.

We transformed the component scores to the range 0-100 using the formula: ((score-lowest possible/score range) x 100).

We calculated the GESQ scores only when the patient had responded to at least 50% of the questions for that component. If patients had completed fewer than 50% of the questions, we treated the GERQ score as missing.

A 3 point likert scale was used for some questions where it was deemed difficult to discriminate further than 3 points. These questions were about respondents beliefs (i.e whether they agreed or disagreed with a particular issue) rather than the intensity of these beliefs. A five point likert scale was used for questions where it was felt that more in-depth discrimination was possible and which illustrated the intensity of a respondents beliefs.

Ethical Considerations

The Multicentre Research Ethics Committee for Wales approved the study. We also obtained approval from R&D committees in all participating sites. All patients provided written informed consent to participate in the study.

RESULTS

(1) Item generation

The items we identified through our systematic literature searches as appropriate for inclusion in our draft GESQ were based on four main papers[9 11 12 26]. We identified items related to: access; appointments; information; procedures; and discharge which Yacovone, et al identified as essential issues to measure patient satisfaction with endoscopy[9]. After review we developed the 24-item GESQ version 0 (see Appendix 1) with most items on a five-point scale.

(2) Initial validation

Of those invited patients, we subsequently recruited and received completed questionnaires for 93 (74%) patients from the NPTH and 94 (59%) patients from the MINuET pilot. We invited 20 of the patients from the NPTH who completed questionnaires to interview.

All patients (n=187) reported that the GESQ included all relevant items, implying that GESQ had face and content validity. Patients also reported the instrument to be readable and acceptable.

During our initial validation, we found three items with 100% response on one category. We dropped two of these items – "Did more than one person give you an explanation of what would happen during your endoscopy?" and "If more than one person explained your endoscopy to you, did you find this confusing?" However we retained the third item "Did the person who performed the endoscopy give you the explanation?" as the purpose of the MINuET trial was to explore differences in outcome between endoscopies carried out by doctors or nurses.

Two of the patients we interviewed reported difficulty with the questions "How much pain or discomfort did you experience during endoscopy?" and "How much pain or discomfort did you experience after endoscopy?" They felt that some individuals would experience discomfort but not pain, and thought the two concepts should be separated. After discussion we split these two questions into four separate questions asking patients about pain *and* discomfort separately during and after endoscopy. Two other patients also reported difficulty in answering question 21 relating to facilities in the endoscopy suite. So we changed this to focus on one aspect of the suite, namely the comfort of the recovery area. Hence patient input enhanced the content validity of the resulting GESQ version 1 (see Table 1)[[13]].

(3) Main study

From the 1782 consented patients in the main study, we received 1536 completed questionnaires. The high response rate of 86.2% showed they found the GESQ acceptable. However we excluded three items before undertaking principal

component analysis due to high response on one category (> 80%) and low item-total correlation (<0.35):

- How much information was sent before your endoscopy? (Maximum response frequency 92%)
- Before you had your endoscopy, how much explanation did you receive about what would happen during your endoscopy? (Maximum response frequency 93%)
- Did the person who performed your endoscopy give you the explanation before endoscopy? (Maximum response frequency 81%)

We applied principal component analysis to the remaining 21 items of the GESQ version 1. Tables 1 and 3 show the resulting four components, all with high internal consistency: skills and hospital (7 items; $\alpha = 0.83$); pain or discomfort during and after endoscopy (4 items; $\alpha = 0.84$); information before endoscopy (5 items; $\alpha = 0.80$); and information after endoscopy (5 items; $\alpha = 0.76$). In summary GESQ version 2 (see Appendix 2) seems a valid, reliable, interpretable and acceptable tool to measure patients' satisfaction with gastro-intestinal endoscopy, upper or lower.

DISCUSSION

We systematically developed and validated the GESQ on patients with a variety of GI symptoms undergoing endoscopy from hospitals across United Kingdom. The final version of the GESQ contains 21 items with principal components analysis revealing four components (skills and hospital, pain and discomfort during and after endoscopy, information before endoscopy, and information after endoscopy) all of which demonstrated high internal consistency. These four components are clinically

relevant and they cover to the essential patient satisfaction domains identified by Yacavone[9].

The strength of our study was the development and validation of the GESQ within the context of a large, national multi-institution nurse endoscopy trial based in secondary care. Our analysis was thoroughly reviewed by psychometricians, statisticians and outcome specialists and patients. The meticulous development and rigorous validation enhanced the robustness of GESQ. A weakness of the study was that we did not test the construct or criterion validity of the GESQ. Although our initial data collection was in 2002, the GESQ has been successfully used in more recent studies[27], and is also being clinically applied in various hospital settings throughout the UK (Swansea, Neath, Lanarkshire) and therefore remains clinically relevant.

Further work is therefore needed to establish the construct and criterion validity of the GESQ. One way of assessing the construct validity of GESQ would be to examine the correlation between patient satisfaction data and reported complications of endoscopy. There is evidence that patients experiencing complications after endoscopy are less likely to return for a repeat endoscopy, being less satisfied with endoscopy[28]. As endoscopy complications are rare, this would require a sample much larger than the current study. Another possible scenario would be to correlate the GESQ patient satisfaction data with the change in SF-36 scores at *one day* after endoscopy and see whether patients reporting higher satisfaction levels have better general health. A substantial number of patients have sedation for endoscopy which might affect their satisfaction with the procedure (in terms of pain control) and their

perceived general health in different ways, which would need to be taken into account in any analysis. Patients' intent to return could be used as a criterion for validating the GESQ. We collected patients' preference data at one-year post endoscopy asking patients whether they would recommend endoscopy to a friend (using the same endoscopist, different endoscopist, or not at all) based on their experience with endoscopy. Further work is needed to explore whether this information can be used to assess construct validity and to determine whether more satisfied patients recommended further endoscopy to a friend. Comparison of the GESQ with a validated questionnaire such as the PDIS[29] may also be a consideration to assess the construct validity of the GESQ. We need to consider a number of practical considerations before we assess the construct and criterion validity of the GESQ.

Future work would also be to test the GESQ in a training setting. Using the GESQ could determine whether being endoscoped by a trainee has any effect on patient satisfaction, and whether there is a positive correlation with increasing experience. The GESQ could then be used in the endoscopy training and accreditation process. We think that it is unlikely that the GESQ would be any different when used following other endoscopic procedures like Endoscopic ultrasound (EUS) or Endoscopic retrograde cholangio pancreatography (ERCP), but would recommend testing of the GESQ within these different population groups.

The GESQ is ready for routine use in clinical practice. As the leading GI endoscopy societies now recommended that patient satisfaction should be routinely collected as one of the core quality indicators in GI endoscopy, the GESQ would be useful for

this purpose. As the GESQ scores are easy to calculate, with no complex weighting or computational analysis required, they can be readily incorporated into computerised endoscopy databases. Using the GESQ has potential for monitoring trainees' progress with endoscopy and managing accreditation. The four GESQ components can identify the particular domains where an individual is performing poorly. The Endoscopy Global Rating Scale[7], which has been developed and validated by the Endoscopy unit Modernising Agency has been designed to assess endoscopy units in UK. We recommend using the GESQ alongside this Global Rating Scale in accrediting endoscopy units to monitor patient satisfaction.

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Table 1 Selection of questions for GESQ and its components

No	Content	Maximum response frequency	Significant factor coefficients (after rotation)			
			F1	F2	F3	F4
1	Amount of information sent before endoscopy	92%				
2	Information sent before endoscopy easy to understand	46%			-0.819	
3	Information sent before endoscopy useful	50%			-0.747	
4	Opportunity to ask questions before endoscopy	68%	(0.363)		-0.324	
5	Amount of explanation about the procedure before endoscopy	93%				
6	Explanation about the procedure before endoscopy easy to understand	44%			-0.793	
7	Explanation about the procedure before endoscopy useful	50%			-0.739	
8	Endoscopist explained procedure	81%				
9	Communication skills of the endoscopist	71%	0.734			
10	Technical skills of the endoscopist	73%	0.795			
11	Communication skills of other staff	74%	0.777			
12	Discomfort during endoscopy	37%		0.757		
13	Pain during endoscopy	33%		0.828		
14	Discomfort after endoscopy	37%		0.831		
15	Pain after endoscopy	44%		0.832		
16	Opportunity to ask about findings	52%				0.543
17	Amount of explanation of findings received	74%				0.755
18	Endoscopist explained findings	72%				0.587
19	Explanation after endoscopy easy to understand	37%			(-0.415)	0.640
20	Explanation after endoscopy useful	37%				0.725
21	Comfort of recovery area	39%	0.572			
22	Overall satisfaction	46%	0.445			
23	Previous endoscopy by same person	67%	0.618			
24	Overall reputation of the hospital	39%	0.548			
Eigenvalue (power to explain variation between patients			6.62	2.26	1.70	1.42
% variance			31.52	10.80	8.07	6.75

Table 2 Comparison of demographic characteristics of those patients who did not take part in the trial compared with consented patients

Characteristic	**Refused consent/did not attend (n=2240)**	**Consented patients (n= 1782)**
Age (years)		
Mean (SD)	53.5 (17.01)	52.5 (15.13)
Sex		
Number of females (%)	1264 (56.4)	932 (52.3)
Degree of urgency (%)		
Very urgent	19 (0.85)	30 (1.7)
Urgent	239 (10.7)	137 (7.7)
Soon	680 (30.4)	551 (30.9)
Routine	1302 (58.1)	1064 (59.7)
Presenting symptoms (%)		
OGD patients:		
Dyspeptic symptoms	1006 (90.4)	807 (94.4)
Weight loss	75 (6.7)	43 (5.7)
Anaemia	138 (12.5)	68 (8)
Anorexia	31 (2.3)	20 (2.3)
FS patients:		
Bleeding per rectum	778 (68.8)	700 (73.5)
Change in bowel habit	488 (43.3)	390 (42.1)

* There was no significant difference between the consented and the non-consented patients for any characteristic

Table 3 Internal consistency of the GESQ components

Component	Question number*	Corrected item-component correlation	Cronbach's alpha
Skills and hospital	9	0.617	
	10	0.701	
	11	0.610	
	21	0.477	
	22	0.595	
	23	0.630	
	24	0.407	0.83
Pain or discomfort during or after endoscopy	12	0.648	
	13	0.718	
	14	0.690	
	15	0.670	0.84
Information before endoscopy	2	0.570	
	3	0.567	
	4	0.339	
	6	0.682	
	7	0.679	0.80
Information after endoscopy	16	0.501	
	17	0.520	
	18	0.272	
	19	0.588	
	20	0.690	0.76

*Question number relates to question number listed in Table 2

Appendix 1 Gastrointestinal Endoscopy Satisfaction Questionnaire (Version 0)

Appendix 2 Gastrointestinal Endoscopy Satisfaction Questionnaire (Version 2)