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The bath gastroscopy toleration score: A validated comfort score for gastroscopy toleration

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Abstract

Objective: To develop a validated comfort score for gastroscopy

Design: The Bath Gastroscopy Toleration Score (GTS) was developed during routine a gastroscopy list. The score was used by the endoscopist and two nurses to grade the comfort of the patient. During the list the wording of the score was amended and subsequently a consensus between endoscopists and nurses produced the Bath GTS, a five-point scale from 0 – 4 which ascends in terms of patient discomfort. Following unsedated gastroscopies, the GTS was independently collected from the endoscopist and each endoscopy nurse for 47 cases, and for a further 46 cases from the patient as well. Data was analysed using Krippendorff's alpha (α) coefficient to assess inter-rater reliability.

Results: The GTS was found to be a reliable marker for patient comfort during gastroscopy, with significant agreement between both endoscopists and nurses, as well as between staff and unsedated patients. Analysis of the endoscopist-nurse matched scores from all 93 gastroscopies showed significant agreement ((Krippendorff's α= 0.858 (95% CI 0.81-0.91)). When the endoscopist, nurse and patient scores from all 93 gastroscopies were compared the Krippendorff's α= 0.745.

Conclusion: The Bath GTS is a simple tool to assess patient comfort during gastroscopy, which has been validated for inter-observer correlation between endoscopists, nurses and unsedated patients with statistically significant agreement. The Bath GTS is useful in clinical practice, and we suggest that it could be adopted as a validated comfort score for gastroscopy with further work to develop an auditable standard.

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Introduction

Gastroscopy is a common medical procedure for both diagnostic and therapeutic benefit. Although multiple factors can influence patients' willingness to undergo gastroscopy, concern and even fear of procedure-related discomfort is common. It has been demonstrated that pre-procedural apprehension is a strong predictor of poor tolerance, not to mention unwillingness to undergo a repeat procedure. Given the invasive nature of endoscopy, identifying ways to improve the subjective experience not only reduces the burden to patients, but also has the secondary benefit of increasing the likelihood that they will accept a repeat procedure if required in future [1-4]. In order to improve and monitor gastroscopy experience for patients it is important to objectively describe how well tolerated a procedure is.

Ensuring patient comfort is a fundamental component in achieving a patient-centred service. Comfort scoring during colonoscopy is an auditable outcome for endoscopy departments and is a well-established maker of quality as part of the 'Global Rating Scale' [5-6]. Currently comfort during gastroscopy and toleration of the procedure is neither an auditable outcome nor mentioned in the recent British Society of Gastroenterology (BSG) and Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland (AUGIS) position statement on quality in upper GI endoscopy [7]. The need for endoscopy services to "implement and monitor systems to achieve patient comfort" is however highlighted in the Joint Advisory Group on Gastrointestinal Endoscopy (JAG) accreditation standards [8].

Commonly the Modified Gloucester Comfort Scale is used to assess patient comfort during colonoscopy, though typically this score is based on objective interpretation rather than subjective patient feedback [9]. However, Rafferty et al have demonstrated that perception of procedure-related discomfort differs between the endoscopist, the patient and nursing staff when this scale is implemented, which potentially undermines its value as a quality indicator [10].

It is important to recognise that there is no universally accepted comfort score for gastroscopy, and comfort scores similar to those used for colonoscopy are commonly used as surrogates in gastroscopy as there is no validated score. Scores designed for colonoscopy rely on pain as a standard for comfort which is much less relevant for gastroscopy toleration[11]. In a study of 300 patients, Muson et al trialled the La Crosse (WI) intra-endoscopy sedation comfort score (L-WISC), the first intraprocedural gastrointestinal comfort score for routine use. This was validated with inter-observer agreement and demonstrated reproducibility between endoscopists and nurses, however it relied on patient-provided surveys with self-reporting of comfort two weeks post-procedure and in the second phase (using the revised score) there was poor agreement (weighted Krippendorff's α= 0.098; 95% CI [-0.0020, 0.20]) between nurses' and patients' scores [12]. The primary aim of this study was therefore to develop and implement a comfort score for gastroscopy and validate correlation of scoring between endoscopists, unsedated patients and nursing staff.

Methods

Score Design

The Bath Gastroscopy Toleration Score (GTS) was developed via consensus between consultant Gastroenterologists, Gastroenterology Specialty Registrars and endoscopy nursing staff. The Bath GTS was initially trialled during a routine elective gastroscopy list consisting of 4 cases, with scores collected from the endoscopist and two nurses in a double-blind method. Qualitative data was also collected and based on feedback regarding the ease of interpretation of the GTS minor amendments were made to the chosen terminology. The finalised GTS encompasses a five-point scale from 0-4 which ascends in terms of patient discomfort (i.e. a GTS of 4 reflects the least well tolerated procedure) (Figure 1). This ascending scale was chosen to reflect existing comfort scores to aid ease of use.

0 – Still throughout, may retch at intubation

1 – Minimal retching (<25% of procedure time)

2 – Frequent retching (>25% of procedure time)

3 – Attempts to handle and/or remove gastroscope

4 – Extubates themselves or withdraws consent

Figure 1: The Bath GTS

Data collection

Comfort data was prospectively collected during elective gastroscopy cases at the Royal United Hospital in Bath, Somerset. This district general hospital provides for an estimated catchment population of 500,000 residents of Bath and North East Somerset. On average, 11,000 endoscopic procedures are performed annually at this centre. Data was collected over a three-month period (November 2017 to February 2018).

Trial 1 involved double-blind comfort score data collection from the endoscopist and two nurses during 47 gastroscopy cases to determine inter-observer correlation between staff alone. Trial 2 similarly collected comfort score data from staff, but also included feedback from patients. Feedback forms were provided to patients who underwent gastroscopy immediately following the procedure, but only in cases where the patient had not received sedation to minimise confounding factors and improve the accuracy of the results. The data was collected in a double-blind method from the endoscopist, nurse and unsedated patient during 46 gastroscopy cases. We also analysed sub-group matches between endoscopist-nurse, endoscopist-patient and nurse-patient to determine if there were significant trends in correlation between certain groups. Finally, we then analysed the combined endoscopist-nurse data from Trial 1 and Trial 2 (i.e. 93 gastroscopy cases) to further assess the validity of the score when used by a larger sample size.

Statistical analysis

The data were analysed using SPSS V.23. For each trial, Krippendorff's alpha (α) coefficient was calculated to assess inter-rater reliability. The minimum acceptable alpha coefficient for appropriate inter-rater reliability was determined as $\alpha \geq 0.800$ as per general consensus in wider practice, with the caveat that tentative conclusions could be drawn from data with $\alpha \geq 0.667$.

Results

Trial 1 - Correlation between endoscopist and nursing staff

Trial 1 was used to assess the inter-rater correlation between the endoscopist and nursing staff. Of the 47 cases, there were

no matched scores in 1 case (2.13%), two matched scores in 12 cases (25.5%) and all three matched scores in 34 cases (72.3%). There were therefore at least two matched scores in 46 cases (97.9%). The inter-rater correlation between the endoscopist and two nurses was reliable (Krippendorff's α= 0.811 (95%CI 0.73-0.88)) (Table 1) (Figure 2).

Table 1: Bath GTS scores collected from the endoscopist and two nurses, and corresponding match data (Trial 1)

	STAFF SCORES			*TOTAL MATCHES*		
	Staff One	*Staff Two*	*Staff Three*	*0x Match*	*2x Match*	*3x Match*
	1	1	1	0	0	1
	1	1	1	0	0	1
	0	0	0	0	0	1
	2	2	2	0	0	1
	0	0	0	0	0	1
	1	0	1	0	1	0
	0	0	0	0	0	1
	0	0	1	0	1	0
	1	1	1	0	0	1
	1	1	1	0	0	1
	0	0	1	0	1	0
	0	0	0	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	1	2	2	0	1	0
	0	0	0	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	1	0	0	0	1	0
	0	0	0	0	0	1
	0	0	0	0	0	1
	0	1	0	0	1	0
	0	2	1	1	0	0
	4	4	4	0	0	1
	0	0	0	0	0	1
	1	1	1	0	0	1
	0	0	0	0	0	1
	1	1	1	0	0	1
	4	4	4	0	0	1
	2	2	2	0	0	1
	2	1	1	0	1	0
	0	0	0	0	0	1

	1	0	1	0	1	0
	1	1	1	0	0	1
	2	1	1	0	1	0
	1	1	0	0	1	0
	1	1	2	0	1	0
	0	1	1	0	1	0
	0	0	0	0	0	1
	3	3	3	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	2	2	2	0	0	1
	0	0	0	0	0	1
Total	34	34	36	1	12	34
Match Percentage				2.13%	25.53%	72.34%

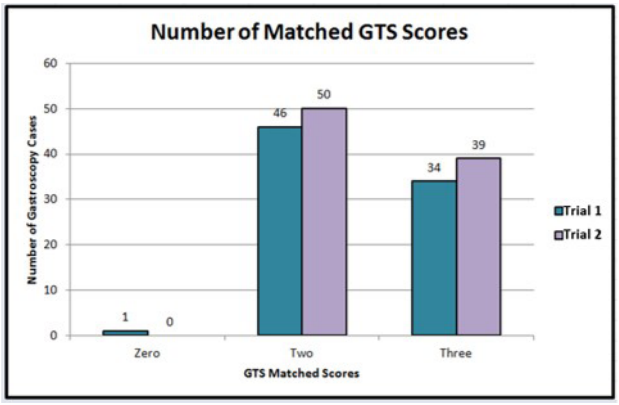

Figure 2: Graph depicting Bath GTS scores matches between endoscopist and two nurses (Trial 1)

Trial 2 - Correlation between staff and patients

Trial 2 was used to assess the inter-rater correlation between the endoscopist, nurse and patient. Of the 46 cases, there were two matched scores in 11 cases (23.9%) and all three scores matched in 35 cases (76.31%). There were therefore at least two matched scores in all 46 cases (100%). The inter-rater correlation between the endoscopist, nurse and unsedated patient was again reliable (Krippendorff's α= 0.833 (95%CI 0.75-0.90)) [Table 2].

Table 2: Bath GTS scores collected from the endoscopist, the nurse and the patient and corresponding match data (Trial 2)

	STAFF/PATIENT SCORES			*TOTAL MATCHES*		
	Endoscopist	*Nurse*	*Patient*	*0x Match*	*2x Match*	*3x Match*
	1	1	1	0	0	1
	1	1	1	0	0	1
	1	1	2	0	1	0
	2	2	2	0	0	1
	4	4	4	0	0	1
	1	1	1	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	1	1	0	0	1	0
	1	1	2	0	1	0
	0	0	0	0	0	1
	2	2	0	0	1	0
	0	1	1	0	1	0

	1	1	1	0	0	1
	0	0	0	0	0	1
	1	1	1	0	0	1
	2	2	1	0	1	0
	0	0	0	0	0	1
	1	1	1	0	0	1
	1	0	1	0	1	0
	0	1	0	0	1	0
	0	0	0	0	0	1
	2	2	1	0	1	0
	1	1	0	0	1	0
	1	1	1	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	1	1	1	0	0	1
	2	2	2	0	0	1
	2	2	2	0	0	1
	0	0	0	0	0	1
	1	1	1	0	0	1
	1	1	0	0	1	0
	1	1	1	0	0	1
	0	0	0	0	0	1
	2	2	2	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	2	2	2	0	0	1
	0	0	0	0	0	1
	0	0	0	0	0	1
	1	1	1	0	0	1
	0	0	0	0	0	1
Total	**37**	**38**	**33**	**0**	**11**	**35**
Match Percentage				**0.00%**	**23.91%**	**76.09%**

Trial 2 - Subgroup analysis

Subgroup analysis demonstrated that of the gastroscopies with only two matched scores, endoscopist-nurse matches totalled 8 cases (72.3%), endoscopist-patient matches totalled 2 cases (18.2%) and nurse-patient matches 1 case (9.10%). Krippendorff's α for these subgroups were 0.930 (95% CI 0.84-1.00), 0.800 (95%CI 0.63-0.93) and 0.774 (95%CI 0.60-0.92) respectively (Table 3) (Figure 3).

Table 3: Subgroup analysis of matched Bath GTS scores collected from the endoscopist, the nurse and the patient (Trial 2 – Subgroup Analysis)

	MATCH TYPE		
	Endoscopist/Nurse	***Endoscopist/Patient***	***Nurse/Patient***
	0	0	0
	0	0	0
	1	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	1	0	0
	1	0	0
	0	0	0
	1	0	0
	0	0	1
	0	0	0
	0	0	0
	0	0	0
	1	0	0
	0	0	0
	0	0	0
	0	1	0
	0	1	0
	0	0	0
	1	0	0
	1	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	1	0	0
	0	0	0
	0	0	0

	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
	0	0	0
Total	**8**	**2**	**1**
Match Percentage	**72.72%**	**18.18%**	**9.09%**

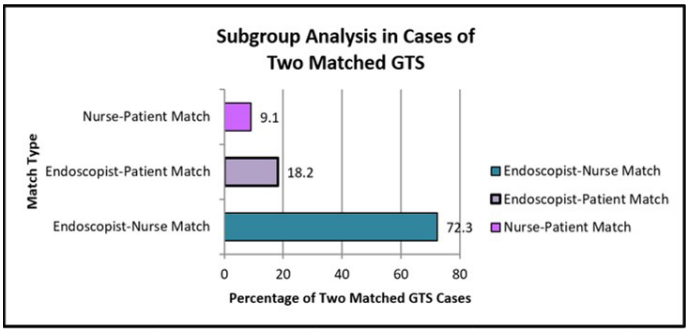

Figure 3: Graph depicting subgroup analysis of matched Bath GTS scores collected from the endoscopist, the nurse and the patient (Trial 2 – Subgroup Analysis)

Combined trial analysis

We then compared combined comfort scoring data from all 93 gastroscopy cases included in Trial 1 and Trial 2. Analysis of the endoscopist-nurse matched scores from all 93 gastroscopies also showed significant agreement ((Krippendorff's α= 0.858 (95%CI 0.81-0.91)). When the endoscopist, nurse and patient scores from all 93 gastroscopies were compared the Krippendorff's α= 0.745.

Discussion

In order to improve and monitor gastroscopy experience for patients we require a validated tolerability score. As patient experience is integral to service quality, it is imperative to recognise if there is variation in perceived comfort levels between staff and the patient themselves. The purpose of this study was to develop a valid and reliable tool to assess patient comfort during the gastroscopy procedure, and to ensure that there was adequate correlation of scoring between endoscopists, patients and nursing staff when implemented. Our study has demonstrated a gastroscopy toleration score that has been validated for inter-observer error between endoscopists, endoscopy nurses and patients. This score is more suited to gastroscopy than commonly used pain scores.

This is the first study of its kind to develop a bespoke comfort scoring system for gastroscopy, with previous studies utilising non-specific measures such as generic visual analogue scales (VAS) to assess pain levels. With such measures, it has been established that patients' discomfort during an unsedated procedure was greatly underestimated by the endoscopist. Thanvi et al. demonstrated a significant difference between patients' perception of the discomfort and the endoscopist's assessment of the patient's discomfort, as evidenced by the overall higher VAS scores for patients (median 4.9, SD 2.6) than those of the endoscopist (median 2.2, SD 1.2), giving a significant difference in median VAS score of 3.4 ($p<0.001$) [13]. Although beyond the scope of this study which only included an unsedated patient cohort, it could be hypothesised that if such scoring systems are not accurate in unsedated patients then they would be unlikely to be accurate in sedated patients either.

Other previously utilised comfort assessment measures include post-procedure questionnaires, though the main drawback of this method is that by its very nature it does not facilitate assessment of the patient discomfort during the procedure [12]. The detrimental repercussions of a poor patient experience have been widely studied, so determining that a patient has had a poor experience after the fact when the opportunity to improve it has passed is arguably less helpful [1-4,12].

One of the main strengths of this study is the patient cohort did not receive sedation, which ensures the reliability of their comfort scoring compared to patients whose judgment may have been influenced by sedative (and amnesic) medications. As we have demonstrated appropriate agreement between unsedated patients and staff regarding procedure toleration. On the premise that endoscpists and patients agree in unsedated patients, we propose that this scoring system is suitably reliable to be able to be applied to sedated patients in future. In our centre, the rates of unsedated versus sedated gastroscopies are equivocal, so it is vital that a comfort score can be appropriately applied to this cohort as well.

However, a possible threat to the validity of our results is that the patients were asked to provide a comfort score rating directly after the procedure, which might have influenced their perception. Several studies have shown that at follow-up appointments patients recall experiencing more pain than directly after the procedure [1,14]. A second limitation is the small sample size of 93 gastroscopy cases, which may impact on the power of this study to be able to extrapolate the statistical analysis results to the overall population.

In summary, we have shown that the Bath GTS is a simple yet effective method of assessing patient's comfort during gastroscopy, which has been validated for inter-observer correlation between endoscopists, nurses and unsedated patients with statistically significant agreement. The Bath GTS has the potential to be a useful tool in assessing patients in clinical practice, and we suggest that it should be adopted as a validated national auditable outcome for gastroscopy with further work in progress to determine the standard.

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