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Research Article

Development and Validation of a Satisfaction Questionnaire for Pediatric Digestive Endoscopy to Improve Quality of Care

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Abstract

Background: Patient satisfaction is an important criterion when analyzing quality improvement in healthcare interventions. In order to enhance patient-centered care, this study was planned to develop and validate a patient satisfaction questionnaire for pediatric patients undergoing digestive endoscopy.

Methods: This prospective study took place in the digestive endoscopy unit of the CHU Sainte-Justine in Montreal. A 26-item questionnaire was developed and organized in two parts (pre-procedure and post-procedure). It was administered to patients on the day of their endoscopy. Five domains were included: knowledge about the disease and the procedure, wait time, bowel preparation, professional conduct, anxiety and pain. The reliability of the questionnaire was evaluated with test-retest analysis as well as Cronbach's alpha coefficient.

Results: A total of 296 outpatients (mean age: 14.5 years old, range: 8.1 to 18.4 years) undergoing upper or lower digestive endoscopies completed the questionnaire. The mean completion time was less than 5 minutes for each part of the questionnaire. The Cronbach's alpha coefficient was: 0.64 for colonoscopy patients, 0.67 for gastroscopy patients, and 0.66 for all patients. The Cohen's kappa coefficient showed slight to perfect agreement (κ: 0.16 to 1.00) in test-retest.

Conclusion: The pediatric endoscopy satisfaction questionnaire (PESQ) is a valuable tool to assess the patients' experience and is part of the implementation of a quality improvement process in pediatric digestive endoscopy. The PESQ demonstrates adequate reliability and evidence of face and content validity. Consideration should be taken in the interpretation of satisfaction in the immediate post procedure due to the effect of sedation drugs.

Keywords: *Patient Satisfaction; Surveys and Questionnaires; Quality of Health Care; Endoscopy; Digestive System; Pediatrics*

Introduction

Patient satisfaction is an important component in the assessment of the quality of health care services, particularly in the gastrointestinal endoscopy unit [20]. Evaluation of patient satisfaction can be used to institute performance standards and to improve the quality and outcome of the procedure [3,8,9,24,33]. Ongoing patient feedback can also enhance the early detection of potential problems and promote equitable care across all patient populations [20].

Many studies have established validated questionnaires for adult patients undergoing digestive endoscopy, including the Gastrointestinal Endoscopy Satisfaction Questionnaire (GESQ) which contained 4 domains [13]. Moreover, the mGHAA-9 questionnaire by the American Society for Gastrointestinal Endoscopy was used in many adult studies [9,11,18]. Yacavone., *et al*. found that the mGHAA-9 did not have adequate content validity as it did not include a pain control domain [33]. Other studies also found that pre-procedure anxiety was closely linked with a higher level of pain: both factors influenced patient satisfaction [21,29]. The most important factors that contributed to lower satisfaction scores in adults were found to be wait time, pre-procedure explanations and discomfort during the procedure [3,9]. The Canadian Association of Gastroenterology identified quality and safety indicators for adult digestive endoscopy [2].

To date there is very little literature about pediatric questionnaires regarding patient endoscopy satisfaction. In our health center, Khour., *et al*. collected data on pediatric patient satisfaction with items derived from adult satisfaction studies [17]. In the UK, the Pediatric Endoscopy Global Rating Scale (P-GRS) quality improvement tool was developed; a patient questionnaire was created, but no reliability testing was discussed [25,32].

As part of a quality improvement process established in our department since 2013, we aimed to assess the patients' perspective on endoscopic practices in a large pediatric center [12]. The primary aim of this study was to elaborate and validate a pediatric patient satisfaction questionnaire for endoscopic procedures. The secondary aim was to evaluate the level of patients' satisfaction.

Methods

Settings

This prospective study was conducted in the endoscopy unit of the CHU Sainte-Justine, Montreal, Canada. We perform more than 1400 digestive endoscopic procedures each year.

Population

Outpatients aged 8 to 18 years old scheduled to undergo an upper or lower digestive endoscopy were invited to answer a satisfaction questionnaire before and after the procedure.

Data collection

We collected data during four time points between 2013 and 2018. On the day of the endoscopy, the research assistant met the participant and their parents once the patient had finished their pre-procedure evaluation by the nurse: After informed consent, participants filled the pre-procedure questionnaire before the endoscopy. The post-procedure questionnaire was completed after the endoscopy and before discharge. Two weeks after the procedure, a subset of participants in cohort 4 (n = 28) were asked to fill the same questionnaire online.

Procedural pain was evaluated by an independent research assistant during the procedures with endoscopist-led sedation using the validated Nurse-Assessed Patient Comfort Score (NAPCOMS), a 9-point scale tool for pain assessment during endoscopy [27]. A post-procedure self-evaluation of pain by the patient was done using an 11-point visual scale.

The study's was approved by the Research Ethics Committee of CHU Sainte-Justine (2013-502, 3643).

The questionnaire

The pediatric endoscopy satisfaction questionnaire (PESQ) contains 13 questions in the pre-procedure section and 13 questions in the post-procedure section, consisting of single-choice questions with two open-ended questions (Supplemental Questionnaire). It contains five domains identified during the literature review (number of questions): knowledge about the disease and the procedure (n = 5); wait time for the appointment (n = 2); satisfaction regarding the bowel preparation (n = 1); satisfaction regarding professional conduct (n = 7); anxiety, pain and comfort (n = 7). The last two questions were about overall satisfaction and willingness to do the procedure in the same conditions.

The PESQ was created by a multidisciplinary team including pediatric endoscopists, patients, endoscopy nurses and an expert in designing satisfaction surveys. The conception was done in five phases: (1) a literature review; (2) generation of the questions and organization of the questionnaire in two parts; (3) question relevance revised by a group of nurses and gastroenterologists; (4) a pilot phase among a group of 17 adolescents; (5) questionnaire adjustment after each cohort. The PESQ was created both in French and English. Starting from the third cohort, the questionnaire was converted from paper to digital.

Face and content validity

As there is no gold standard to validate a patient satisfaction questionnaire, we used qualitative methods to collect evidence of validity of the questionnaire during its creation [1,5]. We followed similar steps to the validation process in the GESQ [13]. Content validity was assessed by comparing the generated questions with adult questionnaires found during the literature review. A panel of pediatric endoscopists and endoscopy nurses were asked to comment on the questionnaire and identify ambiguity and any missing questions. In addition, in the pilot phase, 17 adolescents having undergone an endoscopy evaluated the understanding of each question and any missing domains. This resulted in the adjustment of the questionnaire, including the removal of certain questions and modification of the wording, in order to reach an acceptable face and content validity. Furthermore, by analyzing the open-ended questions between the different cohorts, we confirmed that there were no other domains pertinent to patient satisfaction that were not included in the questionnaire.

Reliability

Test-retest reliability

Test-retest assesses the intra-rater reliability of the questionnaire by determining if the patient's answers remain the same over time. An online follow-up questionnaire was sent two weeks after their procedure. Many studies stated that a 2 week timeframe was adequate, as it is long enough to prevent recall and short enough to avoid confounding from differences that system changes bring about [5,26,28]. It contained 17 questions from the pre- and the post-procedure questionnaires that were still relevant in the post-procedure context as well as an open-ended question for comments. The questions that could not be included would necessitate that the patient undergo a second endoscopy in the same context [13].

Internal consistency

The Cronbach α test was used to assess the reliability across the items within each domain and for the whole questionnaire, with the standard acceptable range being 0.70 and above.

Inter-rater reliability

Inter-rater reliability was evaluated between the self-evaluation of pain during the procedure and the research assistant's hetero-evaluation using the NAPCOMS scale. This scale had been validated for pediatric use, demonstrating high inter-rater agreement between two investigators [7].

Data analysis

The data was recorded in FileMaker Pro software (FileMaker, Inc., Santa Clara, CA 95054, USA) and analyzed using the SAS statistical software, version 9.4 (SAS Institute, Cary, NC).

For continuous variables, the median and interquartile range (IQR) were calculated. For categorical variables, the frequency and percentage were calculated.

Cohen's kappa coefficient (κ) with 95% confidence interval was calculated to assess the intra-rater reliability between the baseline and retest responses. It was also used to assess the inter-rater reliability between the hetero-evaluation and self-evaluation of pain during the procedure. Kappa performance was analyzed using standard nomenclature: < 0 poor agreement; 0 to 0.2 slight; 0.21 to 0.4 fair; 0.41 to 0.6 moderate; 0.61 to 0.8 substantial; 0.81 to 1 almost perfect.

Results

In total, 296 patients who completed both the pre-procedure and post-procedure questionnaires are included in the current analysis. The mean completion time was less than 5 minutes for each questionnaire. The median (IQR) age was 15 (4.0) and 46.0% of the patients were males. Most procedures (69.6%) were done under endoscopist driven conscious sedation using a combination of intravenous (IV) midazolam and fentanyl. For colonoscopies, ketamine was added to this regimen. The remaining procedures were under general anesthesia (Table 1).

Variable	Total (N = 296)
Age	
Median, (Interquartile range)	14.5 (4.0)
Min-max	8.1-18.4
Sex, n (%)	
Male	136 (46.0)
Female	160 (54.0)
Prior endoscopic experience, n (%)	
None	149 (50.3)
One or more	147 (49.7)
Type of endoscopy, n (%)	
Gastroscopy	171 (57.8)
Colonoscopy	60 (20.2)
Gastroscopy + Colonoscopy	65 (22.0)
Type of sedation, n (%)	
Sedation	206 (69.6)
General anaesthesia	90 (30.4)

Table 1: *Patient population characteristics.*

Knowledge about the disease and about the procedure

Most patients felt very well informed about the indication of the procedure (64.5%) about the different steps of the procedure (54.1%) and about the type of sedation used during the procedure (45.3%).

The Cronbach α correlation coefficient for this domain was 0.75 (Table 2).

Questions	N = 296 n (%)
$Q01_{pre}$: Do you feel sufficiently informed about the indication of the procedure?	
Yes, very well informed	191 (64.5)
Yes, a little bit informed	97 (32.8)
No, not informed	8 (2.7)
$Q02_{pre}$: Do you feel sufficiently informed about the different steps of the endoscopy?	
Yes, very well informed	158 (54.1)
Yes, a little bit informed	116 (39.7)
No, not informed	18 (6.2)
No answer	4
$Q03_{pre}$: Do you feel sufficiently informed about the sedation of the procedure?	
Yes, very well informed	131 (45.3)
Yes, a little bit informed	105 (36.3)
No, not informed	53 (18.3)
No answer	7
$Q05_{pre}$: Do you know what gastroscopy is and what will be done during the procedure? (N=236)	
Yes, I know very well	103 (38.9)
Yes, I know a little bit	131 (49.4)
No, I don't know anything	31 (11.7)
No answer	31
$Q06_{pre}$: Do you know what colonoscopy is and what will be done during the procedure? (N= 78)	
Yes, I know very well	40 (51.3)
Yes, I know a little bit	34 (43.6)
No, I don't know anything	4 (5.1)

Table 2: *Knowledge about the disease and about the procedure.*

The Cronbach alpha correlation coefficient for this dimension was 0.75 ($Q04_{pre}$, $Q09_{pre}$, $Q11_{pre}$).

Wait time and bowel preparation

The majority of the patients (83.3%) felt that the wait time duration was adequate. However, 4.8% thought that it was too fast, while 11.9% found the wait time long or very long.

Among the patients who had a colonoscopy, 25.6% them found the bowel cleaning process adequate, while the rest disliked it, finding it uncomfortable (42.3%) or very uncomfortable (32.1%).

The Cronbach's alpha were not calculated for these domains, as they only contained one item each.

Satisfaction regarding professional conduct

Ninety six percent of patients enjoyed their meeting with the nurse before their procedure. In the endoscopy room, the majority found the doctor (91.5%), the nurse (91.1%) and the medical attendant (86.0%) very kind. A high level of trust for the physician and the support staff was identified in 82.6% of participants. The Cronbach α correlation coefficient for this domain was 0.60 (Table 3).

Questions	N = 296 n (%)
$Q08_{pre}$: Did you enjoy your meeting with the nurse this morning?	
No, I did not like it	6 (2.2)
Yes, a little	55 (20.4)
Yes, it was very pleasant	205 (75.9)
I did not see the nurse	4 (1.5)
No answer	26
$Q09_{pre}$: Could you ask the questions you wanted to ask the nurse this morning?	
Yes, I asked everything I wanted to know	119 (44.0)
Yes, but not all the questions I had	17 (6.3)
No, I had questions, but I did not ask them	5 (1.9)
I did not have questions	127 (47.0)
I did not see the nurse yet	2 (0.7)
No answer	26
$Q10_{pre}$: If you asked questions, did you understand the answers?	
Yes, I understood very well the answers	122 (45.0)
Yes, I understood a bit the answers	15 (5.5)
I did not ask questions	134 (49.5)
No answer	25
$Q11_{pre}$: Do you trust the doctor, the nurse and the attendant who will perform the endoscopy?	
Yes, I trust them entirely	223 (82.6)
Yes, but not entirely	44 (16.3)
No, I don't trust them at all	3 (1.1)
No answer	26
$Q09_{post}$: How do you rate the doctor's (endoscopist) kindness?	
The doctor is very kind	268 (91.5)
The doctor is nice enough	22 (7.5)
The doctor is not very nice	3 (1.0)
No answer	3
$Q10_{post}$: In the endoscopy room, how do you rate the nurse's kindness?	
The nurse is very kind	265 (91.1)
The nurse is nice enough	22 (7.5)
The nurse is not very nice	4 (1.4)
No answer	5
$Q11_{post}$: In the endoscopy room, how do you rate the attendant's kindness?	
The attendant is very kind	
The attendant is nice enough	245 (86.0)
The attendant is not very nice	37 (13.0)
No answer	3 (1.0)
	11

Table 3: *Satisfaction regarding professional conduct.*

The Cronbach alpha correlation coefficient for this dimension was 0.60 ($Q08_{pre}$-$Q11_{pre}$, $Q09_{post}$-$Q11_{post}$).

Anxiety, pain and comfort

A significant number of patients felt pain: before (12.3%), during (32.7%), or after (30.9%) the procedure. Only 128 (43.2%) patients did not feel pain at any time on the day of the procedure. Among the 96 patients who felt pain during the endoscopy, 92 underwent the endoscopy under sedation, while the other 4 had general anesthesia. Twenty-one patients (7.1%) felt unacceptable discomfort and 15 (5.1%) asked to stop the procedure. Similarly, the procedure was more uncomfortable than anticipated for 86 (29.1%) patients. The Cronbach α correlation coefficient for this domain was 0.57 (Table 4).

Questions	N = 296 n (%)
$Q12_{pre}$: Visual anxiety score (0-10)	
A little anxious (0-3)	229 (77.4)
Anxious (4-7)	60 (20.3)
Very anxious (8-10)	7 (2.3)
$Q02_{post}$: Did you feel pain before the exam?	
Yes	36 (12.3)
No	252 (85.7)
I do not remember	6 (2.0)
No answer	2
$Q03_{post}$: Did you feel pain during the exam?	
Yes	96 (32.7)
No	185 (62.9)
I do not remember	13 (4.4)
No answer	2
$Q04_{post}$: Did you feel pain after the exam?	
Yes	91 (30.9)
No	198 (67.1)
I do not remember	6 (2.0)
No answer	1
$Q05_{post}$: How do you evaluate your level of comfort during the exam?	
Acceptable	152 (51.5)
Unacceptable discomfort	21 (7.1)
Discomfort, but acceptable	78 (26.4)
I don't know	44 (14.9)
No answer	1
$Q06_{post}$: Was the procedure more uncomfortable than you thought?	
Yes	86 (29.1)
No	176 (59.7)
I don't know	33 (11.2)
No answer	1
$Q07_{post}$: Did you ask to stop the procedure?	
Yes	15 (5.1)
No	259 (87.8)
I don't know	21 (7.1)
No answer	1

Table 4: *Anxiety, pain and comfort before, during and after the procedure.*
The Cronbach alpha correlation coefficient for this dimension was 0.57 ($Q12_{pre}$, $Q01_{post}$-$Q06_{post}$).

The comparison between the hetero-evaluation and self-evaluation of pain by patients under conscious sedation (n = 150) showed poor inter-rater reliability. In fact, 50 (33.3%) procedures were rated as uncomfortable by both the research assistant and the patient, while 29 (19.3%) were rated as uncomfortable only by the patient and 39 (26.0%) only by the research assistant. The patients (4.4%) who could not recall their pain level were included in this analysis in the low pain level group (Table 5). The Cohen's kappa coefficient for the inter-rater evaluation of pain was 0.084 (95% confidence interval, -0.074-0.242).

Hetero-evaluation, n (%)		Self-evaluation, n (%) ($Q02_{post}$)		Cohen's kappa coefficient (95% CI)
		No	Yes	
	No 0-5 (Less pain)	32 (21.3)	29 (19.3)	0.084 (-0.074-0.242)
	Yes 5-10 (Pain)	39 (26.0)	50 (33.3)	
	Total	71 (47.3)	79 (52.7)	

Table 5: *Inter-rater agreement regarding the comfort level during the endoscopy for patients under sedation* (N = 150).*

**There were 56 missing evaluations for the quality of the sedation. They were excluded for this analysis. Therefore, the number of patients included in this analysis is 150 instead of 206 patients who underwent the endoscopy under sedation.*

Overall satisfaction

In total, 260 (87.8%) patients were satisfied with the explanation of the procedure and 76.4% of them were willing to repeat the procedure under the same conditions. This satisfaction rate was quite similar between the different cohorts.

Content validity

The comments given by patients in the open-ended questions were grouped into categories. The most frequent comments were about the sedation, the wait time, the taste of the lidocaine-based oral analgesic spray, the discomfort after the anesthesia and the lack of mental preparation and explanations given to the patients.

Reliability

The Cronbach α coefficient for patients who underwent a gastroscopy was 0.67. For patients who underwent a colonoscopy, the Cronbach α coefficient was 0.64. The global Cronbach α correlation coefficient for all patients was 0.66.

Twenty-eight patients answered the follow-up online questionnaire. Out of the 17 questions, 8 displayed moderate to perfect intra-rater agreement (κ: 0.47 to 1.00) and 4 questions had slight or fair agreement (κ: 0.16 to 0.26). The sample size was too small to produce a kappa coefficient for 5 questions. The percentage of agreement was calculated and ranged between 61% and 93% (Figure 1).

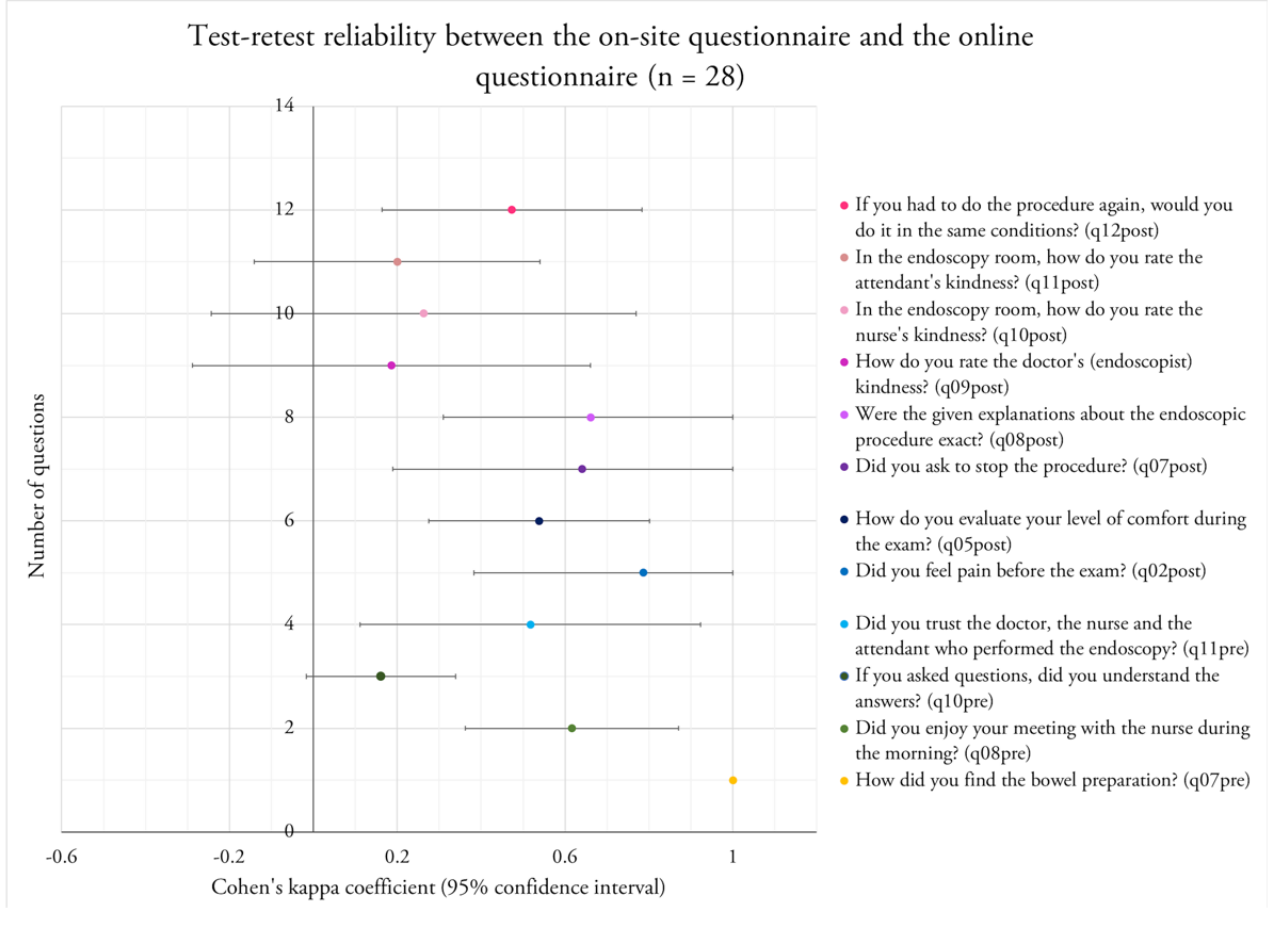

Figure 1: *Intra-rater agreement between the on-site questionnaire and the online questionnaire.*

Discussion

Digestive endoscopies are invasive procedures that are increasingly performed by doctors in order to evaluate and treat several gastrointestinal diseases [29]. While they are a routine procedure in adults, the necessity and demand for endoscopies has also increased in pediatric gastroenterology centres although the annual volume, even in tertiary centres, remains low as compared to adults [19]. Very few studies have evaluated patient satisfaction regarding endoscopy or have established a satisfaction measurement program in a pediatric setting. It is therefore a relevant step in order to ensure quality and safety in pediatric digestive endoscopy units and could be used as a tool in the "Plan, do, study, act" cycle of continuous improvement. A pediatric patient endoscopy experience study consisting of 47 phone interviews recommended that pre-procedure explanations and post-procedure follow-up needed to be improved and standardized [15]. In the study by Wan., *et al*. the patient experience questionnaire as part of the P-GRS quality improvement initiative identified areas needing improvement [32]. It highlighted the need for better patient preparation and specific spaces and activities for adolescents [32].

However, it did not have any reliability testing and did not contain certain domains such as preprocedural anxiety and bowel preparation appreciation [32].

Reliability and validity

The global Cronbach's alpha was 0.66. This is similar to a pediatric study by Khour., *et al*. where the reliability testing produced a Cronbach alpha coefficient of 0.62 [17]. For patients who underwent a gastroscopy, the alpha was 0.67. For colonoscopy patients, the alpha was 0.64. Del Rio., *et al*. found that the type of procedure did not affect the reliability [10]. According to Beattie., *et al*. questionnaire results that are used for quality improvement can tolerate lower levels of reliability but require educational impact and acceptability. Instruments that have fallen just below the criteria set can be used simply with some caution, as validity and reliability are strengthened over time [4]. When looking at individual domains, the alpha ranged from 0.57 to 0.75. The poor inter-item correlation may be the result of domains that were not questioned. Nonetheless, the analysis of open-ended questions did not display any new dimension that could have been missed in the questionnaires. It is known that the Cronbach's alpha has strict assumptions including unidimensionality and tau-equivalence [30]. If the assumptions are not met, the alpha can overestimate or underestimate the true reliability. An underestimation of reliability is possible in this multidimensional questionnaire.

Test-retest was done as another method to assess the reliability of the questionnaire. Therefore, 67% of the questions displayed moderate to perfect agreement and 33% had slight to fair agreement; the latter were mostly pertaining to details about interactions with staff. Five out of 17 questions did not produce a kappa due to the limited sample size. The observed percentage of agreement was above 60% for all questions missing a kappa, but this does not take into consideration chance agreement. Taking all this into consideration, the reliability of the questionnaire could be estimated to be adequate by test-retest.

The variation between immediate and delayed responses could be explained by recall bias. The amnesic effect of drugs used could have increased forgetfulness [17]. In the immediate post procedure setting, the remaining effect of sedation can induce a mild euphoric state, resulting in higher satisfaction scores [24]. Therefore, the appropriate timing for the post procedural evaluation has yet to be determined. According to Del Rio., *et al*. long-term assessment is less influenced by potential findings and the diagnosis [10]. In contrast, Ko., *et al*. found that patient satisfaction tended to decrease over time [18].

Global satisfaction

In this study, patients' satisfaction rate was quite high. This is similar to the study by Khour., *et al*. where patient satisfaction did not necessarily reflect quality of care, considering that all patients were satisfied despite minor flaws [17]. According to an adult study, an important aspect of the patient experience is the interactions with the staff. The patients in this study rated their interactions very high. This may have impacted the overall satisfaction despite the presence of other unsatisfactory dimensions [14].

The questionnaire helped shed light on some problematic areas that were present in our endoscopic suite. For instance, analgesia for patients under sedation was inadequate, as many patients reported feeling pain and discomfort; most of them expressed high levels of preprocedural anxiety. These results led us to perform a randomized controlled double blinded trial to assess the impact of lorazepam as a preprocedural drug to lower anxiety in children before endoscopy, which showed that lorazepam did not perform better than placebo [6]. Following those results and a worldwide survey of pediatric endoscopic practice in children in 2018, we have changed our practice. Before 2019, procedures in our center were performed either under endoscopist-led sedation or under general anesthesia. Twenty percent of health centers worldwide still performed procedures under endoscopist-led sedation, although most pediatric endoscopic procedures in North America are performed under anesthesiologist-administered deep sedation and general anesthesia [16]. All of our procedures are now performed under general anesthesia or anesthesiologist-led deep sedation.

Long wait time and perception of insufficient explanations about the procedure and the sedation methods were also highlighted. Wait times for the appointment varied between patients, but the majority of patients found the timeframe appropriate. Long wait time is a risk factor for medical non-attendance, yet 80% of participants in a study by Yu., *et al*. did not meet the wait time targets set by the Canadian Association of Gastroenterology, averaging 229 days [19,34]. While we assessed the wait time on the day of the procedure, we did not include a question about the patient's perception of that delay. For patients undergoing a colonoscopy, satisfaction regarding the bowel preparation was poor, which can be compared to a study by Denis., *et al*. where 20% of patients were dissatisfied [11].

Various interventions could be implemented to increase the level of satisfaction. Some have already been established during the study (e.g. general anesthesia or deep sedation for all the procedures, design and implementation of endoscopy information booklets etc.). Timeliness could also be improved by monitoring patient, anesthesia, and process related factors [31]. More changes can be made based on the comments made by the patients in open-ended questions.

Pain evaluation

The inter-rater discrepancy seen between patients and the research assistant rates signifies that an external observer's perception of the endoscopy's quality does not accurately reflect what the patient has experienced. This supports the idea that the patient's point of view should be an important component of the evaluation of the quality of the endoscopy. However, rigorous observation and comfort monitoring are also important especially in view of the amnesic effect of some drugs used during sedation or general anesthesia. Safety monitoring, including monitoring the risks associated with anesthesia and sedation, is also a very important quality indicator in pediatric endoscopy [22].

Limitations of the Study

This study has several limitations. The construct and criterion validity of the questionnaire were not assessed. This is mainly due to the fact that there is no gold standard to measure the validity of a satisfaction questionnaire [5,13,26,28]. Cronbach's alpha were lower than acceptable values, but were possibly limited by strict assumptions such as unidimensionality. Test-retest was able to assess reliability in an incomplete manner, as the sample size was limited. Furthermore, the study was conducted at a single tertiary Canadian health care center. However, a recent survey demonstrated that 68.3% of the pediatric endoscopic procedures worldwide are performed in tertiary public academic centers [16]. Nonetheless, further work should be done to assess the internal and external validity of the questionnaire.

Some patients were assisted by their parents during the administration of the questionnaire. Age is known to affect patient satisfaction scores and parental supervision can lead to response bias [23]. Analysis was not stratified according to age. Furthermore, the timing of the immediate post-procedure questionnaire varied for each patient (between 1 and 2 hours post-procedure). Therefore, the effect of sedation could still be present and cause a mild euphoric state, thus contributing to a higher degree of satisfaction [24].

Conclusion

Patient satisfaction is a critical metric for the quality improvement process. We suggest that the PESQ be used as an important component in the quality improvement process in other pediatric endoscopy centers. The PESQ demonstrates adequate reliability and evidence of face and content validity. As validity and reliability are cumulative and tend to increase over time, further work should be done to refine and strengthen this tool [4].

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Conflict of Interest

None.

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The Pediatric Endoscopy Satisfaction Questionnaire (PESQ)

Pre-procedure questions

1. Do you feel enough informed about the indication of the procedure?		
1 □ Yes, very well informed	2 □ Yes, a little bit informed	3 □ No, not informed
2. Do you feel enough informed about the different steps of the endoscopy?		
1 □ Yes, very well informed	2 □ Yes, a little bit informed	3 □ No, not informed
3. Do you feel enough informed about the sedation of the procedure?		
1 □ Yes, very well informed	2 □ Yes, a little bit informed	3 □ No, not informed
4. Do you think the delay between the appointment with the gastroenterologist and the day of the procedure was:		
1 □ Too fast 2 □ Adequate	3 □ Long 4 □ Very long	5 □ Too long
***** The following question (5) is only for patients who will undergo a gastroscopy*****		
5. Do you know what gastroscopy is and what will be done during the procedure?		
1 □ Yes, I know very well	2 □ Yes, I know a little bit	3 □ No, I don't know anything
***** The two following questions (6 and 7) are only for patients who will undergo a colonoscopy*****		
6. Do you know what colonoscopy is and what will be done during the procedure		
1 □ Yes, I know very well	2 □ Yes, I know a little bit	3 □ No, I don't know anything
7. How did you find the bowel preparation?		
1 □ It was adequate.	2 □ I did not like it, it was uncomfortable	3 □ I did not like it, it was **VERY** uncomfortable
8. Did you enjoy your meeting with the nurse this morning?		
1 □ No, I did not like it	2 □ Yes, a little	3 □ Yes, it was good
9. Could you ask the questions you wanted to ask the nurse this morning?		
1 □ Yes, I asked everything I wanted to know 2 □ Yes, but not all the questions I had		3 □ No, I had questions, but I did not ask them 4 □ I did not have questions
10. If you asked questions, did you understand the answers?		
1 □ Yes, I understood very well the answers 2 □ Yes, I understood a bit the answers		3 □ No, I did not understand the answers 4 □ I did not ask questions

11. Do you trust the doctor, the nurse and the attendant who will perform the endoscopy?		
1 □ Yes, I totally trust them	2 □ Yes, but not totally	3 □ No, I don't trust them at all
12. On a scale of 0 to 10, how anxious are you? _____		
13. Do you have any other comments? _____		

Post-procedure questions

1. How much time passed between your arrival at the hospital's day center and the beginning of your procedure?		
1 □ Less than one hour	2 □ One to two hours	3 □ More than two hours
2. Did you feel pain <u>before</u> the exam?		
1 □ Yes	2 □ No	
3. Did you feel pain <u>during</u> the exam?		
1 □ Yes	2 □ No	
4. Did you feel pain <u>after</u> the exam?		
1 □ Yes	2 □ No	
5. How do you evaluate your level of comfort during the exam?		
1 □ Acceptable 2 □ Unacceptable discomfort		3 □ Discomfort, but acceptable 4 □ I don't know
6. Was the procedure more uncomfortable than you thought?		
1 □ Yes	2 □ No	3 □ I don't know
7. Did you ask to stop the procedure?		
1 □ Yes	2 □ No	3 □ I don't know
8. Were the given explanations about the endoscopic procedure exact?		
1 □ Yes, totally exact	2 □ Yes, but not totally	3 □ No, not exact at all
9. How do you rate the doctor's (endoscopist) kindness?		
1 □ The doctor is very kind 2 □ The doctor is nice enough		3 □ The doctor is not very nice 4 □ The doctor is not nice at all
10. In the endoscopy room, how did you rate the nurse's kindness?		
1 □ The nurse is very kind 2 □ The nurse is nice enough		3 □ The nurse is not very nice 4 □ The nurse is not nice at all
11. In the endoscopy room, how did you rate the attendant's kindness?		
1 □ The attendant is very kind 2 □ The attendant is nice enough		3 □ The attendant is not very nice 4 □ The attendant is not nice at all
12. If you had to do the procedure again, would you do it in the same conditions?		
1 □ Yes	2 □ No	3 □ I don't know
13. What would you like to change about the procedure? _____ **_____**		

Supplemental Questionnaire: *The PESQ questionnaire.*

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