Pediatric Endoscopy Quality Improvement Network (PEnQuIN) Pediatric Endoscopy Reporting Elements

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ABBREVIATIONS

- American Academy of Pediatrics: AAP
- American Board of Pediatrics: ABP
- American College of Gastroenterology: ACG
- American Society for Gastrointestinal Endoscopy: ASGE
- American Society of Anesthesiologists: ASA
- Canadian Association of Gastroenterology: CAG
- Direct Observation of Procedural Skills: DOPS
- Electrocardiogram: ECG
- Endotracheal tube: ETT
- European Society for Paediatric Gastroenterology Hepatology and Nutrition: ESPGHAN
- European Society of Gastrointestinal Endoscopy: ESGE
- Gastrointestinal: GI
- GI Quality Improvement Consortium: GIQuIC
- Global Rating Scale: GRS
- Inflammatory bowel disease: IBD
- Interquartile range: IQR
- National Health Service: NHS
- North American Society for Pediatric Gastroenterology, Hepatology and Nutrition: NASPGHAN
- Pediatric Endoscopy Quality Improvement Network: PEnQuIN
- Percutaneous endoscopic gastrostomy: PEG
- Surgical Safety Checklist: SSC
- United Kingdom: UK
- World Health Organization: WHO

ABSTRACT

Introduction: High quality procedure reports serve as a cornerstone for high-quality pediatric endoscopy by ensuring the clear communication of procedural events and outcomes, guiding patient care, and facilitating continuous quality improvement. The aim of this document is to outline those standard reporting elements for pediatric endoscopy that achieved international consensus for inclusion in high-quality pediatric endoscopy procedure reports.

Methods:
With support from the North American and European Societies of Pediatric Gastroenterology Hepatology and Nutrition (NASPGHAN and ESPGHAN), an international working group of the Pediatric Endoscopy Quality Improvement Network (PEnQuIN) used Delphi methodology to identify key elements that should be found in all pediatric endoscopy reports. Item reduction was attained through iterative rounds of anonymous online voting using a 6-point scale. Responses were analyzed after each round and topics were excluded from subsequent rounds if ≤50% of panelists rated them as 5 ('agree moderately') or 6 ('agree strongly"). Reporting elements that ≥70% of panelists rated as 'agree moderately' or 'agree strongly' were considered to have achieved consensus.

Results: Twenty-four PEnQuIN group members from 25 centers internationally rated 63 potential reporting elements that were generated from a systematic literature review and Delphi panelists. The response rates were 100% across all three survey rounds. Thirty reporting elements reached consensus as essential for inclusion within a pediatric endoscopy report.

Discussion:
It is recommended that the PEnQuIN standard endoscopy reporting elements for pediatric endoscopy be universally employed across all endoscopists, procedures and facilities as a foundational means of ensuring high quality endoscopy services, while facilitating quality improvement activities in pediatric endoscopy.

INTRODUCTION

High quality procedural documentation is foundational to high quality pediatric endoscopy, and can be defined by the degree to which they contain key reporting elements.[1–4] Also commonly referred to as procedure notes, endoscopy reports serve multiple purposes for multiple users and are susceptible to omission of key information.[5] To date, the minimum standard reporting elements for pediatric endoscopy that should be required to be included in the procedure report have not been established.[6–8]

Although all members of an endoscopy team, including endoscopists, nurses, technical assisting personnel, and anesthesia staff when present, may be responsible for documenting various elements of patient care in the medical record, the endoscopy report itself is paramount to clear communication of procedural events and outcomes to all stakeholders, including referring physicians, other healthcare providers, facilities, payors, oversight boards, as well as patients and their caregivers. Endoscopy reports are also important to performing endoscopists in guiding patient care and clinical management decision-making. Assuring complete and standardized endoscopy reports is central to continuous quality improvement activities that are focused on endoscopy services for children and facilitates longitudinal monitoring for auditing and benchmarking purposes. Ideally, high-quality endoscopy reports use a systematic approach to succinctly convey all salient information that does not place undue documentation burden on the endoscopist.

Regarding endoscopic procedures in adult patients, various international regulatory agencies and medical societies have worked for more than two decades to determine minimum standard terminology, as well as standard reporting elements that should be universally employed.[1,3,9–13] Nevertheless, numerous multicenter studies have determined unwarranted variation in endoscopy reporting worldwide, and clear gaps in documentation quality.[14–21] More promising results from quality improvement studies, including those from a joint American Society of Gastrointestinal Endoscopy (ASGE) and American College of Gastroenterology (ACG) initiative, suggest documentation quality improves when endoscopists receive education about key reporting elements.[19,22]

There is evidence of parallel gaps in documentation quality by pediatric endoscopists, who may be similarly amenable to quality improvement initiatives. A multicenter study by Thakkar et al. from the Pediatric Endoscopy Database System (PEDS)-CORI found low rates of reporting for potential quality indicators for pediatric colonoscopy across 14 pediatric endoscopy facilities, including ileal intubation rate.[23] Nevertheless, there is reason to believe that quality improvement initiatives may improve the quality of endoscopy reports. For example, preliminary data from Sahr et al suggests that documentation rates of endoscopy quality metrics may significantly improve if metrics are incorporated into endoscopy report templates.[24]

The Pediatric Endoscopy Quality Improvement Network (PEnQuIN), a joint North American and European Societies of Pediatric Gastroenterology Hepatology and Nutrition (NASPGHAN and ESPGHAN) initiative, has established quality standards and indicators, several of which pertain directly to endoscopy reporting (i.e, standards 32 and 51; indicators 42, 43, and 45). In particular, these highlight the importance of standardized, complete and timely endoscopy reports. Both NASPGHAN and ESPGHAN have encouraged the identification of minimum key endoscopy reporting elements that should be universally employed across all procedures and facilities as a key launching pad for quality improvement activities in pediatric endoscopy.

In turn, a critical inaugural effort by PEnQuIN has been to achieve consensus on standard reporting elements for endoscopic procedures performed on pediatric patients. Primary assumptions of the PEnQuIN process are that all pediatric endoscopy reporting elements identified through rigorous evidence review and consensus will be useful in the following ways: (1) To guide formation of a high quality endoscopy report; (2) To assess the quality of endoscopy reporting; (3) To serve as a basis for quality

improvement activities; (4) To provide guidance for individual providers and their facilities seeking to assess the quality of endoscopy reporting and identify areas for improvement.

METHODS

Study Design

Delphi methodology was used to achieve consensus among PEnQuIN working group members to determine key elements that should be found in all pediatric endoscopy reports (i.e., required reporting elements). The Delphi method is a widely used structured technique for achieving consensus in a timely, rigorous and systematic manner.[25] It is well suited to the present content area, where there is limited available data, as it enables one to draw on the 'collective intelligence' of experts to achieve consensus through iterative rounds of online questionnaires.[25–28] Delphi methodology, through the provision of expert professional judgment, provides content-related validity evidence for the pediatric endoscopy reporting elements reaching consensus.[2930]

Delphi panel

Twenty-six PEnQuIN working group members, who contributed to the development of the PEnQuIN quality standards and indicators, participated in an iterative online voting process which took place from January to June 2020. Standard Delphi processes were employed, including seeking an appropriate panel size of 15-30 members, as is considered adequate for most purposes.[26–28,31] Panelists were chosen to ensure diversity was achieved with respect to geography, practice setting, and scope of practice (general endoscopy versus advanced endoscopy).

Item generation

In accordance with the Delphi technique, an initial list of items (i.e., potential reporting elements) to be presented to Delphi panelist were generated from three sources: (i) a systematic literature review, (ii) a hand-search of reference lists from published endoscopy-related consensus statements and (iii) input from Delphi panelists during the first round.

The search strategy for published literature on the topics of endoscopy quality and safety to generate potential endoscopy reporting elements was developed in collaboration with a reference and instruction librarian (***Supplemental Appendix 1)***. Databases were searched for all relevant English language articles from 2015 through to July 24, 2018, including Medline, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL). Additionally, pediatric-focused records were included from 1990 through to July 24, 2018. Citations were exported into EndNote® (Philadelphia, Pennsylvania) and duplicates removed. These were divided among three authors (CMW, JRL and MT) who independently performed a title and abstract screen to identify potentially relevant citations. Subsequently, two investigators (CMW and JRL) reviewed the full-text sources independently and in duplicate and extracted relevant items. The compiled list of potential endoscopy reporting elements was then reviewed, and redundant items were removed. Additionally, during the first round of the Delphi process, panelists were asked to propose further potential, endoscopy reporting elements for consideration by the group.

Item Reduction

Item reduction was accomplished through iterative rounds of Delphi surveys, using principles outlined by Dillman's tailored design method to optimize response rates, including personalized correspondence, easy-to-understand language and up to four email reminders for each survey.[32,33] For each round, PEnQuIN working group members were provided with a link to the respondent-friendly online survey. As an alternative method for survey completion, a printable paper-based version of the survey was provided.

During the first round, panelists were asked to indicate how strongly they agreed or disagreed that each item should be a required element of a pediatric endoscopy report using a 6-point ordinal scale ('disagree

strongly', 'disagree moderately', 'disagree slightly', 'agree slightly', 'agree moderately'; and' agree strongly'). Panelists were also given the opportunity to provide open-ended comments on the wording and/or validity of any of the proposed items. Reporting elements were combined and/or their wording modified based on comments from the Delphi panel. The updated survey was redistributed for rating.

In subsequent rounds, the expert participants were asked to re-rate the remaining reporting elements using the same 6-point ordinal scale. Participants were informed of what the group median score and interquartile range (IQR) and mean and standard deviation (SD) was for each item in the preceding round. Once again, they were invited to provide open-ended comments. This iterative voting process continued until consensus among the expert panel was achieved using the criteria described below.

Data Analysis

After each Delphi round panelists' anonymized responses were analyzed and the median rating ± IQR, mean rating ± SD and proportion of panelists rating an item within each category (1 to 6) were calculated. The opinions of all panelists were given equal weight. Three authors (CMW, JRL and MT), blinded to the sources of the data, reviewed panelists' ratings and qualitative comments. Consensus, or consistency of opinion of the expert panelists, was defined *a priori* based on percent agreement.[34,35] Endoscopy reporting elements that ≥70% of the panel rated as 'agree moderately' or 'agree strongly' were considered to have reached consensus for inclusion. Reporting elements were excluded from subsequent rounds if ≤50% of panelists rated them as 'agree moderately' or 'agree strongly.' Items not reaching consensus for either inclusion or exclusion were carried forward to the next round of voting. It was determined *a priori* that the Delphi process would continue in an iterative fashion as required to maximize the items that reached consensus to a maximum of 3 total round.

RESULTS

Twenty-six PEnQuIN working group members from 25 centers in 8 countries across North America and Europe. The Delphi panel member demographics are outlined in **Table 1**. Of the participating panelists, all 26 (100%) completed all three rounds. Across all 3 Delphi rounds, xx% of the items had missing ratings.

Table 1: Profile of PEnQuIN working group members (n=26) participating in the Delphi consensus process

Characteristic	Category	N (%)
Specialty	Pediatric gastroenterologist	25 (96.2%)
	Adult gastroenterologist	1 (3.8%)
Region	North America	17 (65.4%)
	Europe	9 (34.6%)
Endoscopic practice type	Academic	23 (88.5%)
	Community	3 (11.5%)
Location of endoscopic practice (all that apply)	Hospital setting	26 (100%)
	Out-of-hospital facility	3 (11.5%)
Performs endoscopy in a pediatric-only unit	Yes	18 (69.2%)
	No	8 (30.8%)
Scope of practice (all that apply)	Upper endoscopy	36 (100%)
	Lower endoscopy	33 (100%)
	Therapeutic endoscopy	13 (50.0%)
Supervises endoscopic trainees	Yes	21 (80.8%)
	No	5 (19.2%)

Sixty-two potential endoscopy reporting elements were identified from the systematic literature review and hand-search of reference lists from published endoscopy-related consensus statements. One additional

element was suggested by the Delphi panel during Round 1. The flow of reporting elements through the Delphi process is outlined in **Figure 1**. Items not reaching consensus for either inclusion or exclusion were retained, and the survey was updated and distributed for subsequent voting. After three rounds of voting, 30 items reached consensus as key standard reporting elements for endoscopic procedures performed on pediatric patients (**Table 2**). Twenty-eight reporting elements met criteria for elimination, and 5 reporting elements did not reach criteria for elimination or consensus after three survey rounds (***Supplemental Appendix 2***). **Table 2** outlines the consensus for each key reporting element as well as the PEnQuIN quality standards and indicators to which each relates, when applicable.

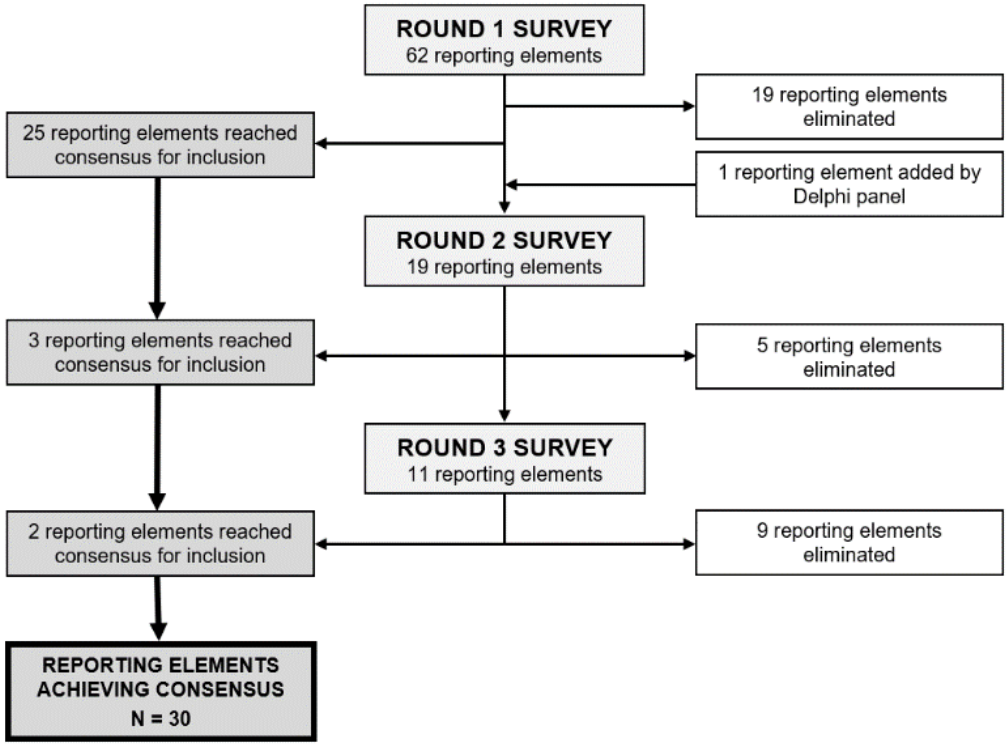

Figure 1: Overview of the Delphi process to identify key standard reporting elements for endoscopic procedures performed on pediatric patients

Components to be included in a standard pediatric endoscopy report

Detailed below are the reporting elements that reached consensus for inclusion as required elements of a pediatric endoscopy report along with literature to support their use within a standard pediatric endoscopy report.

Procedure(s) performed, timing and procedural personnel: Type of procedure(s) performed, date and time of procedure(s) and the names of the responsible staff endoscopist and other providers involved in performing the procedure (including trainees) should be documented in each procedure report. If the procedure(s) was not performed as planned this should be specified (e.g. if a colonoscopy was performed when an *ileo*colonoscopy was planned).

Patient demographics: The patient name, medical record, date of birth and sex should be documented. Digestive disease in children can vary by age and sex. Inclusion of date of birth and sex enables an understanding of gastrointestinal disease at that time in a child's life, may facilitate longitudinal care and provides a context for analysis of quality metrics and outcomes based on age and sex.

Indication(s) for the procedure: Endoscopists performing procedures on pediatric patients should be familiar with appropriate procedural indications. The indication(s) for the procedure(s) should be documented clearly in the endoscopy report and, in line with PEnQuIN standard 31, pediatric endoscopic procedures should be performed for an appropriate, clearly documented indication, consistent with current evidence-based guidelines, when available. Documentation of the indication(s) within the endoscopy report facilitates continuous quality improvement as it enables tracking of related PEnQuIN indicators, including indicator 9, "rate with which the procedure note documents the indication for the procedure," and indicator 10 "rate with which endoscopy is performed for an indication that is in accordance with current evidence-based guidelines and/or published standards, when available." Additionally, documentation of the indication(s) for the procedure(s) enables timely performance of elective endoscopic procedures (standard 17, indicator 11), and facilitates monitoring of standards of high-quality pediatric endoscopy procedures, including assurance that biopsies are obtained for an appropriate indication (standard 35) and that procedures are performed according to their indication (standard 43). Adult literature has demonstrated that up to 40% of upper endoscopies are performed for inappropriate indications, and that some colorectal cancer screening endoscopies are being performed at an inappropriate interval or unnecessarily.[36–45] The number of procedures in children with negative results has been shown to be as high as 50%,[46–50] raising the specter that some pediatric procedures may be performed for inappropriate indications. To date, specific pediatric studies examining the association between diagnostic yield and procedure indication are lacking and specific guidelines outlining appropriate indications for endoscopy in children have not been published.[51]

Informed consent/assent for the procedure: Written informed consent/assent should be obtained before any pediatric endoscopic procedure is performed in a manner consistent with local law. While the consent form will be part of the patient chart, documentation of consent should also be entered in the endoscopy report.[52] Ideally, the individual providing consent should be documented (i.e., caregiver, child). Assuming a child is too young to provide consent for themselves, it is recommended they should participate in the decision-making process commensurate with their development and provide assent to care (a child's affirmative agreement) whenever reasonable.[53,54] In line with PEnQuIN standard 27 (and related indicator 3) the patient and/or caregiver must be advised, in a timely fashion, of all relevant information about the procedure, including its risks, benefits and alternatives, if any. Additionally, they should be given the opportunity to raise any questions with a physician knowledgeable about the procedure and this process should be documented. Barriers to communication (e.g. language, impaired hearing, vision and/or literacy) should be addressed prior to the consent process.[52] Pediatric research pertaining to endoscopy, although limited, suggests that documentation of the informed consent process is often inadequate, and alternatives to performing endoscopy are rarely discussed as part of the consent process.[55,56]

Sedation/anesthetic plan and type of sedation/anesthesia: The planned level of procedural sedation, whether it be general anesthesia, deep, moderate, or minimal sedation or no sedation at all, should be recorded within the endoscopy report in all cases. Additionally, it should be documented whether sedation/anesthesia provided during the case is anesthesiologist-directed or endoscopist-directed. In at least the latter case of endoscopist-directed, medication names and doses administered should be recorded within the procedure report. Documentation within the report will facilitate monitoring of related PEnQuIN standards (33 and 34) and indicators (33 and 36). In adults, appropriate sedation/anesthesia has been shown to be associated with examination completeness and a lower risk of acute complications.[57]

Endoscope(s) and ancillary equipment used: General details of the endoscope(s) used during the procedure should be documented in the endoscopy report, including size (e.g., pediatric, neonatal, adult) and type (e.g., gastroscope, colonoscope, side-viewing). Additionally, any ancillary equipment (e.g., biopsy forceps, polypectomy snare, clips) used should be documented.

Extent of examination: The anatomic extent of the endoscopic examination and the method by which it was confirmed should be documented in the procedure report. Image documentation is imperative for ascertaining the distal extent of examination. For upper endoscopy, notation and photo/video documentation of the most distal location viewed is considered acceptable. For ileocolonoscopy, notation and photo/video documentation of the cecum and the terminal ileum should be included in every report to confirm procedure completion. Landmarks ideally included in cecal images are the appendiceal orifice, the ileocecal valve and the cecal strap fold.[58–60] Terminal ileum intubation can also be confirmed histologically with biopsy of the ileum. For ileocolonosocpy, cecal and terminal ileal intubation are essential markers of procedure completeness and clear documentation of the extent of examination facilitates tracking of related key quality indicators (cecal and terminal ileal intubation rates). As mentioned, if the procedure is not completed as planned, this should be documented in the report.

Completeness of examination: Procedural completeness is critical to the adequacy of examination. Completeness of examination, related to PEnQuIN standard 47, should include inspection of all relevant areas, acquisition of appropriate biopsies and completion of all appropriate interventions in accordance with procedural indication. At a minimum this reporting element should be documented as a binary measure in the endoscopy report (e.g., the procedure was complete versus incomplete). Inclusion of an explicit statement of areas seen is suggested. Photo/video documentation of anatomical landmarks within the report can help to corroborate this.[61–67] Among the PEnQuIN group, there is consensus that image documentation of an upper endoscopy should, at minimum, include the duodenum, gastric fundus via retroflexed view and the gastro-esophageal junction, while image documentation of ileo-colonoscopy should include photo/video documentation of the cecum/appendiceal orifice, and the terminal ileum. The European Society of Gastrointestinal Endoscopy's standards for images documentation to ascertain quality control suggest eight standards images for both upper endoscopy and colonoscopy.[58]

Quality of bowel preparation: The quality of bowel preparation should be documented in each endoscopy report using a tool with strong validity evidence such as the Boston Bowel Preparation scale (adequate: ≥ 6)[68,69], the Ottawa Bowel Preparation scale (adequate: ≤ 7)[70], or the Aronchick Scale (adequate: excellent, good or fair)[71] or at a minimum, using standard language with clear definitions (e.g., excellent, good or fair). Quality of bowel preparation is a recognized indicator of quality and performance as poor bowel preparation can lead to prolonged procedure time and a higher proportion of incomplete procedure.[6,57,72,73]

Quality of visualization: It is important to document within the endoscopy report whether visualization, the ability to achieve a clear endoscopic view of the mucosa, was adequate or inadequate. The report should document limitations to achieving complete inspection and measures taken to improve the quality of visualization, such as flushing, positional changes and mechanical removal of debris, and the results of those measures should be recorded.[74] A clear mucosal view is essential to ensuring complete inspection of all relevant areas (standard 47). In the future artificial intelligence could potentially be used to quantify (and improve) mucosal visualization.

Relevant findings (including no findings) and photodocumentation of relevant finding: Written and photo documentation of all visualized abnormal findings should be recorded in the endoscopy report. An appropriate and clear description of findings is required, including relevant measurements (e.g., polyp size, stricture diameter, esophageal length) and documentation of severity (where applicable) and location/distribution; factors essential to permit subsequent tracking of interval change. Standard disease-related terminology, scales, and scoring systems with strong validity evidence should be used to standardize reporting when available (standard 51). If the examination is unremarkable this should be explicitly documented and pertinent negatives should be specified depending on the context.[75]

Endoscopic interventions performed and results of therapeutic interventions: The endoscopy report should detail what interventions were performed during the procedure and the results of those interventions, using standard terminology and descriptions when available.

A clear statement of what the endoscopist did during the procedure should be included in the report, again using standard terminology and descriptions. Also, the number and location of the biopsies performed should be recorded. Details of pathology specimens: The details of the polyps seen and resected should be part of all reports, with a clear description of whether tissue was sent to pathology and what sample is present in each container

Details pathology and other specimens: The number and anatomic location of all biopsies and other pathological specimens (e.g. polyps) should be documented in the endoscopy report. General details of other specimens obtained during the procedure should be outlined within the endoscopy report, including foreign bodies, brushings, aspirates for microbiology, and tissue for disaccharidase activity.

Diagnostic impression: A diagnostic impression that is developed in consideration of endoscopic findings, as well as other available data including the patient history and examination, laboratory investigations, and imaging, should be detailed within the endoscopy report. Use of standard terminology and scales with validity evidence should be used when available. If the diagnostic impression is 'normal' this should be stated explicitly.

Adverse events and resulting interventions: Intra-procedural and immediate postprocedural adverse events should be documented within the endoscopy report, including any resulting unplanned interventions, if applicable. Where applicable, adverse events should be recorded using relevant, standardized descriptions and scale with strong validity evidence.[11–13,76] If the procedure was uneventful, a statement of no adverse events should be included. Currently most centers lack a means to track and link late adverse events to the endoscopy report.

Reason for premature termination of procedure: Any reason(s) for premature termination of a procedure (e.g., poor bowel preparation, adverse event(s)) should be documented clearly in the endoscopy report.

Post-procedural management recommendations: Details regarding recommendations for management following endoscopy should be outlined in the endoscopy report. These may be succinct in nature, and may include, as appropriate, information regarding disposition, plans for follow-up of pathology results, medication(s), dietary changes(s), and/or plans for future clinical appointments and/or investigation(s).

Table 2: PEnQuIN reporting elements (n=30) reaching consensus as essential for inclusion within a pediatric endoscopy report

PEnQuIN Endoscopy Reporting Element	Consensus (%)	Related PEnQuIN Standard(s)	Related PEnQuIN Indicators(s)
1. Type of procedure(s)	100.00%	---	---
2. Changes to planned procedure(s)*†	96.15%	---	---
3. Date and time of procedure(s)	96.15%	---	---
4. Name of responsible staff endoscopist	96.15%	---	---

5. Name(s) of other providers involved in the performing the endoscopic procedure, including trainee(s)*	100.00%	---	---
6. Patient name and medical record number	100.00%	---	---
7. Patient date of birth†	72.00%	---	---
8. Sex of patient†	80.77%	---	---
9. Indication(s) for the procedure(s)	92.31%	31, 47, 17, 35, 43	9, 10, 11
10. Documentation of informed consent/assent‡	73.08%	27	3
11. Documentation of sedation/anesthetic plan	73.08%	33	33
12. Type of sedation/anesthetic used (anesthesiologist or endoscopist-directed) and medication names and dose(s) administered if endoscopist-directed‡	73.08%	34	36
13. Type of endoscope(s) used	96.15%		
14. Anatomic extent of examination	100.00%	47, 43	60, 62
15. Method by which 'anatomic extent of examination' was confirmed	80.77%	47, 43	60, 62
16. Completeness of examination	76.92%		
17. Quality of bowel preparation*	96.15%	46	4, 23
18. Quality of visualization	92.31%	47	
19. Relevant findings (including no findings)	100.00%	47, 51	25
20. Photodocumentation of relevant finding*	96.15%	47	50
21. Ancillary equipment used*	76.00%		
22. Endoscopic interventions performed*	100.00%	47	19, 20
23. Results of therapeutic interventions*	100.00%	47	19, 20
24. General details pathology specimens*	100.00%	35	
25. Anatomic location(s) of pathology specimens*	92.31%	35	
26. General details of other specimens*	92.31%		
27. Diagnostic impression (including normal)	88.00%		
28. Adverse events and resulting interventions (or statement of no adverse events)	100.00%	38	28, 29
29. Reason for premature termination of procedure*	100.00%	38	
30. Post-procedural management recommendations	73.08%		

*If applicable
†Reached consensus during Delphi round 2
‡Reached consensus during Delphi round 3

DISCUSSION

A major goal of the PEnQuIN working group was to achieve international consensus on a list of minimum recommended standard endoscopy reporting elements that should be utilized in procedural

documentation by all providers who perform endoscopy in children, in accordance with best evidence. The reporting elements outlined in this document are those that should be documented within the endoscopy report itself. The PEnQuIN working group recognizes that there will be other pertinent procedure-related information (e.g., history and physical examination, equipment serial numbers, anesthetic drug doses) that will be documented elsewhere in the patient chart by a variety of healthcare team members integral to providing pediatric endoscopy services, including nursing and anesthesia staff. As such, the minimum standard reporting elements described in this document should be understood to pertain to the endoscopy report only. Collectively, these key reporting elements have been determined by the PEnQuIN consensus process to encompass critical and pertinent information, without overburdening pediatric endoscopists responsible for documentation.

Ideally, the PEnQuIN key endoscopy reporting elements can be used to develop reporting templates at the individual endoscopist and/or facility level. In this way, they also can facilitate complete and accurate reporting on related quality metrics, and can be used for feedback, benchmarking and as a basis for activities that promote improvement. Traditionally, the content, format and structure of endoscopy reports has been left to the discretion of the provider and has often been comprised of unstructured free-text phrases without photodocumentation. This non-systematic approach leads to suboptimal documentation for clinical and legal purposes, and prevents meaningful data extraction, presenting a barrier to developing an evidence basis through research and quality assurance for pediatric endoscopy.[5,14,15,18–21,77] In addition, standardized key reporting elements are critical for continuous quality improvement activities in pediatric endoscopy as they can be used to facilitate longitudinal monitoring of high-quality pediatric endoscopy, as defined by related PEnQuIN standards and indicators.

The endoscopy report represents a vital component of pediatric endoscopy practice and serves many functions including being the primary means of communicating procedure-related information to all stakeholders, including patients and caregivers. Spodik et al. showed that providing endoscopy reports to patients can help to diminish anxiety and increase adherence with regard to follow-up plans.[78] Additionally the endoscopy report acts as a historical record of the procedure, and provides data to guide continuous quality improvement efforts. In the adult context, standardized language (e.g., Minimal Standard Terminology[9,74], Gastrointestinal Endoscopic Terminology Coding[79]) has been developed to unify endoscopy reporting within and between countries and aid measurement of adherence to quality requirements.[9,74,79–81] These frameworks provide a systematic approach to the description of endoscopic findings and assist in standardizing endoscopic image documentation and storage.[9,74,79–82] The need for such standardized terminology in both adult and pediatric endoscopy is underscored by the widespread implementation of electronic medical records for reporting of gastrointestinal endoscopic procedures.

Although the PEnQuIN working group recognized that electronic platforms may not yet be universally employed around the world for pediatric endoscopy, in large part due to cost, they also concurred with emerging statements that electronic endoscopy reporting systems are the ideal.[1,3,83,84] The use of electronic platforms for endoscopy reports facilitates standardized documentation of endoscopic procedures, expedites access for pertinent stakeholders, permits comparison of reports and images from across repeated procedures, potentially simplifies tracing of equipment, enables continuous data monitoring for quality and research-related purposes and linkage of data across institutions and with other data sources.[3] Such electronic systems can also incorporate mandatory reporting elements and reporting templates and help ensure consistent use of terminology and rating scales (e.g., bowel preparation scale). Additionally, they potentially enable some information to be automatically inputted into the endoscopy report from other parts of the health record as opposed to relying on manual entry; a process that can help to lessen errors.[5] There is also data to suggest there is a financial benefit from investing in a computerized reporting system after 3 years, and that electronic documentation is equally efficient as other methods of report preparation.[85,86]

Electronic endoscopy reporting systems also can be integrated into the hospital patient record system (i.e., electronic health record) thereby facilitating data linking between endoscopy services and main patient record systems both within the hospital and between connected hospitals.[3] They also should be structured in such a way to enable reliable data entry and straightforward extraction of reports for quality improvement and research puruposes.[3] Electronic endoscopy reporting systems also can facilitate improved image documentation storage and linkage with patient records. Image documentation has been shown to be important to enabling documentation of a complete examination (e.g., proof of terminal ileal intubation), procedure quality (e.g., mucosal visualization), pathology and therapy.[87] While video recording endoscopic procedures is becoming increasingly available, at the present time full video documented of procedures is not a general requirement.

In conclusion, the PEnQuIN key reporting elements that have been outlined in this document have achieved excellent international consensus and should be recognized to be universally applicable to the documentation of all endoscopic procedures in children. In turn, their use will assure complete and standardized endoscopy reports, support continuous quality improvement activities focused on endoscopy services for children, and facilitate longitudinal monitoring for auditing and benchmarking purposes. It is the hope of the PEnQuIN working group that use of these standard reporting elements will place pediatric gastroenterologists around the world one step closer to being able to create national and international databases of pediatric endoscopy reports for quality purpose that ultimately will help to improve endoscopic care for children everywhere.

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