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Pediatric Endoscopy Quality Improvement Network (PEnQuIN) Pediatric Endoscopy Reporting Elements: A Joint NASPGHAN/ESPGHAN Guideline

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ABBREVIATIONS

- American College of Gastroenterology: ACG
- American Society for Gastrointestinal Endoscopy: ASGE
- European Society for Paediatric Gastroenterology Hepatology and Nutrition: ESPGHAN
- European Society of Gastrointestinal Endoscopy: ESGE
- Interquartile range: IQR
- North American Society for Pediatric Gastroenterology, Hepatology and Nutrition: NASPGHAN
- Pediatric Endoscopy Database System-Clinical Outcomes Research Initiative: PEDS-CORI
- Pediatric Endoscopy Quality Improvement Network: PEnQuIN
- Standard Deviation: SD

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ABSTRACT

Introduction:

High quality procedure reports are a cornerstone of high quality pediatric endoscopy as they ensure the clear communication of procedural events and outcomes, guide patient care and facilitate continuous quality improvement. The aim of this document is to outline standardized reporting elements that achieved international consensus as requirements for 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 anonymized online voting using a 6-point scale. Responses were analyzed after each round and items 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-six PEnQuIN group members from 25 centers internationally rated 63 potential reporting elements that were generated from a systematic literature review and the Delphi panelists. The response rates were 100% for 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 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.

KEYWORDS:

- Documentation/standards
- Electronic Health Records/*standards
- Medical Record Systems, Computerized/*organization & administration
- Endoscopy, Digestive System/*statistics & numerical data
- Registries

INTRODUCTION

High quality procedural documentation, defined by the inclusion of all key reporting elements, is foundational to high quality pediatric endoscopy (1–4). Also commonly referred to as procedure notes, endoscopy reports serve multiple purposes for multiple users and are susceptible to the omission of critical information (5). To date, the minimum standardized reporting elements for pediatric endoscopy that should be required in each procedure report have not been established (6–8). In some jurisdictions, certain components of the endoscopy report may be mandated for regulatory or billing purposes. However, these requirements are variable and inconsistent, and may not reflect best practices for pediatric endoscopy.

Although all members of an endoscopy team, including endoscopists, nurses, technicians, pathologists 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, which are ultimately the responsibility of endoscopists, are also important for guiding patient care and clinical management decision-making. Ensuring 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 standardized 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-Clinical Outcomes Research Initiative (PEDS-CORI) found low rates of reporting potential quality indicators for pediatric colonoscopy, including ileal intubation rate, across 14 pediatric endoscopy facilities (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 (e.g., Standards 37 and 38; Indicators 35, 36 and 37) (25). 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 launching pad for quality improvement activities in pediatric endoscopy.

In turn, a parallel inaugural effort by PEnQuIN has been to achieve consensus on standardized Reporting Elements for pediatric endoscopy procedure reports. 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 evaluate the quality of endoscopy reporting; (3) To serve as a basis for quality improvement activities; and (4) To provide guidance for individual providers and their facilities seeking to evaluate 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 on key elements that should be included 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 (26). It is well suited to the present content area, where there are limited available data, as it enables one to draw on the 'collective intelligence' of experts to achieve consensus through iterative rounds of voting (26–29). Delphi methodology, through the provision of expert professional judgment, provides content-related validity evidence for the pediatric endoscopy reporting elements reaching consensus (29,30).

Delphi panel

Twenty-six PEnQuIN working group members who contributed to the development of the PEnQuIN quality standards and indicators participated as panelists 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, which is considered adequate for most purposes (27–29,31). Panelists were chosen to ensure diversity 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 panelists was 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,*** http://links.lww.com/MPG/C460*)*. 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 MAT) 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 other potential endoscopy reporting elements for consideration by the group.

Item reduction

Item reduction was accomplished through iterative rounds of online Delphi surveys, using principles of 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 links to the respondent-friendly online survey. As an alternative method for survey completion, a printable paper-based version of the survey was provided upon request.

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 Delphi panelists were asked to re-rate the remaining reporting elements using the same 6-point ordinal scale. Panelists were informed of the group median score and interquartile range (IQR) and mean and standard deviation (SD) 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 according to 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 MAT), 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 rounds.

RESULTS

Twenty-six PEnQuIN working group members from 25 centers in 8 countries across North America and Europe took part. 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, 0.48% of the items had missing ratings.

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**. After three rounds of voting, 30 items reached consensus as key 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,*** http://links.lww.com/MPG/C460). **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.

Components to be included in a standard pediatric endoscopy report

Detailed below are the PEnQuIN 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). Additionally, the names of the responsible staff endoscopist and any other endoscopy provider(s), including trainees, directly involved in performing the procedure (i.e., endoscope insertion, withdrawal, and/or therapeutic maneuvers) should be documented in each procedure report. This does not include the names of nurses, technicians, anesthesia providers or other team members who are not directly performing the procedure. If no other providers are listed, it should be assumed that the procedure was performed entirely by the responsible staff endoscopist.

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). Otherwise, the endoscopy report should contain an explicit statement that the procedure was performed as planned.

Patient demographics: The patient's name, medical record number, 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 endoscopy quality metrics and other outcomes based on patient age and sex.

Indication(s) for the procedure: The indication(s) for the procedure(s) should be documented clearly in the endoscopy report and, in line with PEnQuIN Standard 28, 'pediatric endoscopic procedures should only 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 17, 'rate with which the procedure note documents the indication for the procedure,' and Indicator 18 '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 measurement of whether elective endoscopic procedures are performed in a timely manner (Standard 2, Indicator 1) and facilitates monitoring of standards of high quality pediatric endoscopic procedures, including assurance that biopsies are obtained for appropriate indications (Standard 36) and that procedures are performed completely according to their indication (Standard 47). 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 no abnormal findings (particularly upper endoscopies) has been shown to be as high as 50% (46–56), raising the specter that some pediatric procedures may be performed for inappropriate indications. Appropriate diagnostic yield is a topic that may warrant further study. In a recent retrospective review, Croft et al found that vomiting was the clinical symptom that led to the highest diagnostic yield for upper endoscopy, while 89% of upper endoscopies performed for reflux or abdominal pain as the primary indication were histologically normal (52). For lower endoscopies, bleeding per rectum was the clinical symptom that led to the highest diagnostic yield (52). To date, large scale prospective pediatric studies examining the association between procedure indication and diagnostic yield are lacking, and specific guidelines outlining appropriate indications for endoscopy in children have not been published (57).

Informed consent/assent for the procedure: Written informed consent/assent should be obtained in a manner consistent with local law before any pediatric endoscopic procedure is performed. While the consent form will be part of the patient chart, documentation of consent/assent should also be entered in the endoscopy report (58). Ideally, the individual providing consent should be documented (e.g., caregiver, child). If a child is too young to provide consent for themselves, it is recommended that they participate in the decision-making process commensurate with their development and provide assent (a child's affirmative agreement) whenever reasonable (59,60). This is in line with PEnQuIN Standard 29 (and related Indicator 19), '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/assent process (58). 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 (61,62).

Sedation/anesthetic plan, type and level of sedation/anesthesia administered: The planned level of procedural sedation (i.e., general anesthesia, deep, moderate, minimal sedation, or no sedation) should be recorded within the endoscopy report in all cases. Additionally, the level of sedation achieved during the case should be documented, as well as whether the sedation/anesthesia provided was anesthesiologist-directed or endoscopist-directed. In at least the latter case of endoscopist-directed sedation, medication names and doses administered should be recorded within the procedure report. Documentation within the report will facilitate monitoring of related PEnQuIN Standards (30 and 31) and Indicators (20 and 23). In adults, appropriate sedation/anesthesia has been shown to be associated with examination completeness and a lower risk of acute complications (63).

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). Any ancillary equipment (e.g., hot biopsy forceps, cold polypectomy snare, clips) used should also be documented. Specific details such as endoscope serial number and model number are appropriate to document in the medical chart for equipment traceability purposes, but these did not reach consensus for inclusion within the endoscopy report itself (***Supplementary Appendix 2,*** http://links.lww.com/MPG/C460).

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, written 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 (64–71). Terminal ileum intubation can also be confirmed histologically with biopsy of the ileum. For ileocolonoscopy, cecal and terminal ileal intubation are essential markers of procedure completeness, and clear documentation of the extent of examination facilitates tracking of related important quality indicators (cecal and terminal ileal intubation rates (Indicators 44 and 45)). 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 34 and Indicator 30, refers to 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 corroborate completeness of examination (64,72–77). While the PEnQuIN working group agreed that such photo documentation is useful, they did not feel it should be mandated for inclusion within the endoscopy report itself. There was agreement 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 ileocolonoscopy should include photo/video documentation of the cecum/appendiceal orifice and the terminal ileum. The European Society of Gastrointestinal Endoscopy's (ESGE) standards for image documentation to ascertain quality control suggest eight standard images for both upper endoscopy and colonoscopy (64).

Quality of bowel preparation: The quality of bowel preparation should be documented in each lower endoscopy report using a tool with strong validity evidence, such as the Boston Bowel Preparation scale (adequate: ≥6) (78,79), the Ottawa Bowel Preparation scale (adequate: ≤7) (80) or the Aronchick Scale (adequate: excellent, good or fair) (81); 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 procedures (6,23,63,82).

Quality of visualization: At a minimum, 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 any 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 (68). A clear mucosal view is essential to ensuring complete inspection of all relevant areas (Standard 34). In the future, artificial intelligence could potentially be used to quantify (and improve) the quality of 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), documentation of severity (where applicable) and location/distribution, which are 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 38). If the examination is unremarkable, this should be explicitly documented and pertinent negatives should be specified depending on the context (83).

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.

Details of pathology and other specimens: The anatomic location of all biopsies and other pathological specimens (e.g., polyps) should be documented in the endoscopy report. Although the number of biopsy specimens per anatomic site can be documented within the endoscopy report for quality purposes, this proposed reporting element did not reach consensus (***Supplementary Appendix 2,*** http://links.lww.com/MPG/C460). 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 scales with strong validity evidence (11–13,84). 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).

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, comorbidities, equipment serial numbers, anesthetic drug doses, patient comfort) 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. The working group also considered that open-access procedures do not

occur in pediatrics, and patients will have been evaluated by a pediatric gastroenterologist prior to scheduling endoscopy. As such, the minimum PEnQuIN 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 pertinent information, without overburdening pediatric endoscopists responsible for documentation.

Generally speaking, the endoscopy report represents a vital component of pediatric endoscopic practice and serves many functions. In particular, it represents 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 reduce disease-related anxiety and increase adherence with regard to follow-up plans (85). Additionally, the endoscopy report acts as a historical record of the procedure, and provides data to guide continuous quality improvement efforts.

Inclusion of standardized key reporting elements outlined in this document can be used to facilitate longitudinal monitoring of high quality pediatric endoscopy, as defined by the PEnQuIN standards and indicators. Ideally, these reporting elements will be used to develop reporting templates at the individual endoscopist and/or facility level. In this way, they 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 idiosyncratic approach leads to suboptimal documentation for clinical and legal purposes, and prevents systematic data extraction, creating a barrier to developing an evidence base through research and quality assurance for pediatric endoscopy (3,5,14,15,18–21). In the adult context, standardized language (e.g., Minimal Standard Terminology (9,68), Gastrointestinal Endoscopic Terminology Coding (86)) has been developed to unify endoscopy reporting within and across countries and aid measurement of adherence to quality requirements (9,68,86–88). These frameworks provide a systematic approach to the description of endoscopic findings and assist in standardizing endoscopic image documentation and storage (9,68,86–89). The value of 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 concurred with emerging statements that electronic endoscopy reporting systems are the ideal (1,3,90,91). 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 can facilitate linkage of data across institutions and with other data sources (3). Such electronic systems can also incorporate reporting templates with mandatory reporting elements, such as those outlined in this guideline, and help ensure consistent use of

terminology and rating scales (e.g., bowel preparation scales). Additionally, they potentially enable some information to be automatically entered into the endoscopy report from other parts of the health record, as opposed to relying on manual entry; a process that can lessen errors and reduce the burden of reporting (5). There are also data to suggest a financial benefit to investing in a computerized reporting system after 3 years, and that electronic documentation is equally efficient as other methods of report preparation (92,93).

Electronic endoscopy reporting systems can be free-standing or they 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 should be structured in such a way to enable reliable data entry and straightforward extraction of reports for quality improvement and research purposes (3). Electronic endoscopy reporting systems can also 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 (94). Although video recording of endoscopic procedures is becoming increasingly available, it is not a requirement at the present time.

In conclusion, the PEnQuIN Reporting Elements outlined in this document achieved excellent international consensus and should be recognized to be universally applicable to the documentation of all endoscopic procedures in children. Over time, 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 standardized 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 purposes, which will ultimately help to improve endoscopic care for children everywhere.

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FIGURE LEGEND

Figure 1: Overview of the Delphi process to identify key standardized PEnQuIN Reporting Elements for pediatric endoscopy procedure reports

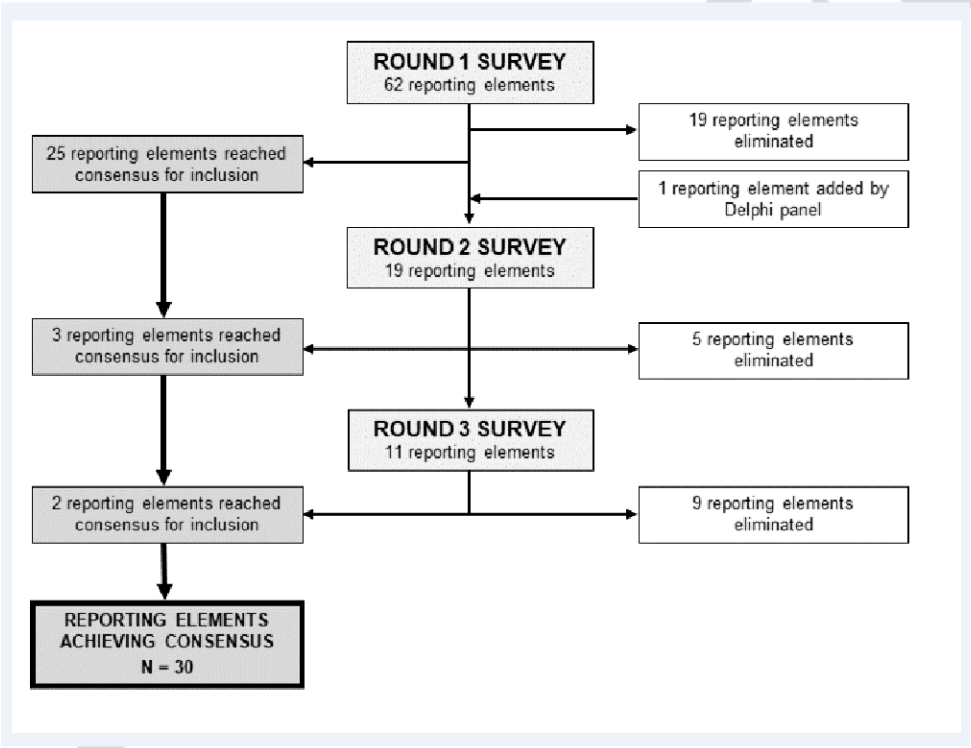

TABLE LEGENDS

Table 1 Profile of PEnQuIN working group members (n=26) who participated 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 (all that apply)	Academic	23 (88.5%)

	Community	4 (15.4%)
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	26 (100%)
	Lower endoscopy	26 (100%)
	Therapeutic endoscopy	13 (50.0%)
Supervises endoscopic trainees	Yes	21 (80.8%)
	No	5 (19.2%)

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) (25)	Related PEnQuIN Indicators(s) (25)
1. Type of procedure(s)	100%	---	---
2. Changes to planned procedure(s)†	96.2%	---	---
3. Date and time of procedure(s)	96.2%	---	---
4. Name of responsible staff endoscopist	96.2%	---	---
5. Name(s) of other providers involved in performing the endoscopic procedure, including trainee(s)*	100%	---	---
6. Patient name and medical record number	100%	---	---
7. Patient date of birth†	72.0%	---	---
8. Sex of patient†	80.8%	---	---
9. Indication(s) for the procedure(s)	92.3%	2, 28, 34, 36, 47	1, 17, 18
10. Documentation of informed consent/assent‡	73.1%	29	19
11. Documentation of sedation/anesthetic plan (i.e., level of sedation to be targeted: general anesthesia, deep, moderate, minimal sedation, or no sedation)	73.1%	30	20
12. Type (anesthesiologist or endoscopist-directed) and level of sedation/anesthetic administered. If endoscopist-directed, medication names and dose(s) administered‡	73.1%	31	23
13. Type of endoscope(s) used	96.2%	21	---
14. Anatomic extent of examination	100%	34, 47	44, 45
15. Method by which 'anatomic extent of examination' was confirmed	80.8%	34, 47	44, 45

16. Completeness of examination	76.9%	34, 47	30
17. Quality of bowel preparation*	96.2%	33	28, 29
18. Quality of visualization	92.3%	34	----
19. Relevant findings (including no findings)	100%	34, 38	34
20. Photodocumentation of relevant findings*	96.2%	34, 35	30
21. Ancillary equipment used*	76.0%	----	----
22. Endoscopic interventions performed*	100%	34	31, 32
23. Results of therapeutic interventions*	100%	34	31, 32
24. General details of pathology specimens*	100%	36	33
25. Anatomic location(s) of pathology specimens*	92.3%	36	33
26. General details of other specimens*	92.3%	---	---
27. Diagnostic impression (including normal)	88.0%	---	---
28. Adverse events and resulting interventions (or statement of no adverse events)	100%	12, 45	7, 8
29. Reason for premature termination of procedure*	100%	34, 45	30
30. Post-procedural management recommendations	73.1%	---	---

*If applicable

†Reached consensus during Delphi round 2

‡Reached consensus during Delphi round 3