SGNA Society of Gastroenterology Nurses and Associates, Inc.

GUIDELINE

ASGE American Society for Gastrointestinal Endoscopy

Quality indicators for gastrointestinal endoscopy units

Prepared by: ASGE ENDOSCOPY UNIT QUALITY INDICATOR TASKFORCE

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INTRODUCTION

Significant efforts have been dedicated to defining what constitutes high-quality endoscopy. These efforts, centered on developing, refining, and implementing procedure-associated quality indicators[1-5] have been helpful in promoting best practices among endoscopists and providing evidence-based care for our patients. At the same time, the American Society for Gastrointestinal Endoscopy (ASGE) has generated programming to assist physicians and allied healthcare professionals in understanding how to translate quality concepts into practice. With this work, we now have a stronger sense of how to measure quality at the patient and procedural level.

A critical component of high-quality endoscopy services relates to the site of the procedure: the endoscopy unit. Unlike many procedure-associated quality indicators, evidenced-based indicators used to measure the quality of endoscopy units are lacking. Outside of the United States, the United Kingdom's National Health Services developed the Global Rating Scale (GRS) in 2004[6] with the dual aims of enhancing quality while developing uniformity in endoscopy unit processes and operations. This scoring system was the first to assess service at the level of the endoscopy unit and has been instrumental in reducing wait times, identifying service gaps, increasing patient satisfaction, and reducing adverse events within endoscopy units in the United Kingdom.[7] Additionally, the GRS has demonstrated that measuring an endoscopy unit parameter repeatedly and incorporating it into a quality improvement program leads to improvement for many indicators.[6-8] Use of the GRS has spread with modification and adoption for use in other countries across Europe[8,9] and Canada.[10,11] However, there are limitations with the GRS. Whether improvements in 1 particular indicator are correlated with other areas of endoscopy unit performance and outcomes cannot be ascertained from the GRS data. Also, the process for developing and reaching consensus on the GRS indicators has varied extensively in their rigor and breadth of stakeholder participation. To date, no such effort to identify and promote endoscopy unit–level quality indicators has been performed in the United States.

A compendium of quality indicators for endoscopy units in the United States is needed to strengthen programming around the promotion of quality and to give endoscopy units an organizational framework within which they can direct their efforts. As healthcare reimbursement in the United States becomes more dependent upon demonstration of performance and quality, endoscopists, governing organizations, payers, and patients will be looking for guidance on endoscopy unit–wide performance. Consequently, the ASGE convened a taskforce whose primary objectives were to (1) develop a comprehensive document that identifies key quality indicators for endoscopy units as defined by the literature and expert opinion and (2) achieve consensus on these quality indicators from important stakeholders involved in endoscopy unit operations and quality improvement (Video 1, available online at www.VideoGIE.org).

METHODS

Endoscopy unit quality indicator taskforce

A taskforce composed of a diverse group of 16 representatives from various GI practice settings both in the United States and internationally was assembled on May 19, 2013. The taskforce consisted of gastroenterologists (14) and GI nurses (2); 8 of the members also held leadership roles within their endoscopy units. The taskforce was further divided into 5 working subgroups to address the following domains: (1) patient experience, (2) employee experience, (3) efficiency and operations, (4) procedure-related

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endoscopy unit issues, and (5) safety and infection control. The leader of each working subgroup plus the 2 taskforce chairs (L.W.D and J.C.) formed the steering committee.

Study design

The project was divided into 3 phases: (1) systematic literature review and generation of potential endoscopy unit quality indicators by each of the 5 subgroups; (2) approval of these potential endoscopy unit quality indicators by the steering committee and then rating of these potential indicators on several parameters by invited participants using a modified Delphi method; and (3) reaching consensus on a final set of endoscopy unit quality indicators. The steering committee unanimously agreed upon the methodology as outlined above.

Generation, development, and finalization of potential endoscopy unit quality indicators

Over the course of 9 months each subgroup leader conducted a systematic literature review using PubMed, Google Scholar, Embase, and Medline using key search terms to identify endoscopy unit quality indicators for their respective domain. In the absence of data that linked endoscopy unit level indicators with improved patient outcomes, subgroups relied on expert opinion and existing regulatory standards. The subgroups initially examined the work of the United Kingdom's GRS[6] and the Canadian Association of Gastroenterology consensus guidelines on safety and quality indicators[10] to help develop a framework for generating potential endoscopy unit quality indicators. The subgroups used this framework to generate a candidate list of endoscopy unit quality indicators that were then reviewed by the steering committee. The steering committee subsequently met on March 7 to 8, 2014, to refine these potential endoscopy unit quality indicators and unanimously agreed upon 155 potential quality indicators (patient experience, 46; employee experience, 33; efficiency and operations, 25; procedure-related, 24; and safety and infection control, 27) for the voting phase of the study.

For the purposes of this guideline, the taskforce defined a quality indicator as a particular parameter that is being used for comparison. A quality indicator is often reported as a ratio between the incidence of correct performance and the opportunity for optimal performance, or as the proportion of interventions that achieve a predefined goal.[12]

Reaching consensus on endoscopy unit quality indicators

Given the lack of available data on endoscopy unit quality indicators, the steering committee used a modified Delphi method[13-15] to reach consensus on which of the 155 proposed indicators to include in the final guideline. The goal of the Delphi process was to measure 2 main parameters for consensus: (1) the extent to which respondents agreed with the importance and relevance of a potential quality indicator and (2) the extent to which respondents agreed with one another.[16] The consensus process consisted of 2 rounds of online voting using the REDCap program (UCSF, San Francisco, Calif). Each participant was randomly assigned to complete a survey related to 1 of the 5 domains. There were 495 individuals invited to participate in the survey, including physicians, nurses, practice managers, and quality officers who were involved with or impacted by quality in U.S. endoscopy units.

In the first round of voting, participants provided demographic information, including gender, role within an endoscopy unit, and practice setting, and then were asked to rate each potential quality indicator on the following 4 questions:

- "Is this potential indicator an important parameter related to the quality of care for a patient in an endoscopy unit?" (ie, related to quality)
- "Is this a meaningful element of a high-quality endoscopy unit / important outcome?" (ie, meaningful to measure)
- "Is this feasible to measure?" (ie, feasible to measure)
- "Is your endoscopy unit currently compliant with this parameter?" (ie, compliance with the indicator in their own endoscopy unit)

Ratings were based on a 5-point scale (1=strongly disagree, 2=disagree, 3=neutral/uncertain, 4=agree, 5=strongly agree). Only those respondents who participated in the first round of voting were invited to participate in the second round. In the second round, participants were shown the same set of potential quality indicators along with the individual's previous response and the most common response of the overall group for the question on relatedness of the indicator to quality. Participants were then asked "How would you now rate this parameter?" using the same rating scale. Two reminder emails were sent to all invited participants during the course of the survey. No incentives were offered.

After both rounds of voting were complete, research questions were generated by each subgroup and then reviewed and unanimously agreed on by the steering committee.

Invited participants

Given that a number of groups are involved with quality as it pertains to an endoscopy unit, a broad range of individuals were invited to participate in the survey. Invited participants included the nurse manager and medical director from endoscopy units participating in the ASGE's Endoscopy Unit Recognition Program, all members of the ASGE's Quality Assurance in Endoscopy Committee, regional presidents of the Society for Gastrointestinal Nursing Association, and members of the American Gastroenterological Association and American College of Gastroenterology's committees on quality. All respondents were

TABLE 1. Characteristics of the respondents for the endoscopy unit quality indicator survey

	Patient experience, n (%)	Employee experience, n (%)	Efficiency and operations, n (%)	Procedure-related, n (%)	Safety and infection control,* n (%)	Total, N (%)
Invited, n	107	90	93	102	103	495
Any partial or complete response, n (%)	35 (32.7)	39 (43.3)	36 (38.7)	32 (31.4)	29 (28.2)	171 (34.5)
Completed part 1 only, n (%)	12 (11.2)	8 (8.9)	10 (10.8)	8 (7.8)	11 (10.7)	49 (9.9)
Completed part 1 and 2, n (%)	15 (14.0)	30 (33.3)	25 (26.9)	22 (21.6)	18 (17.5)	110 (22.2)
Female gender, n (%)	24 (68.6)	26 (66.7)	21 (58.3)	15 (46.9)	14 (50.0)	100 (58.8)
Role, n (%)						
Physician	15 (42.9)	17 (43.6)	16 (44.4)	18 (56.3)	15 (53.6)	81 (47.6)
Nurse	9 (25.7)	11 (28.2)	7 (19.4)	5 (15.6)	5 (17.9)	37 (21.8)
Practice manager	5 (14.3)	5 (12.8)	6 (16.7)	4 (12.5)	3 (10.7)	23 (13.5)
Quality officer/administrator	3 (8.6)	4 (10.3)	5 (13.9)	4 (12.5)	5 (17.9)	21 (12.4)
Other	3 (8.6)	2 (5.1)	2 (5.6)	1 (3.1)	0 (0.0)	8 (4.7)
Setting, n (%)						
Hospital-based	17 (48.6)	19 (48.7)	18 (50.0)	18 (56.3)	18 (64.3)	90 (52.9)
Ambulatory center	15 (42.9)	16 (41.0)	18 (50.0)	13 (40.6)	9 (32.1)	71 (41.8)
Office suite	3 (8.6)	3 (7.7)	0 (0.0)	0 (0.0)	1 (3.6)	7 (4.1)
VA	0 (0.0)	1 (2.6)	0 (0.0)	1 (3.1)	0 (0.0)	2 (1.2)

VA, Veterans Administration.
*Note: 1 respondent did not complete the demographics section.

deidentified with respect to name and institution during the 2 rounds of voting.

Statistical analysis

Respondent characteristics that were collected as continuous data were presented as means with standard deviations, whereas categoric data were presented as proportions (Table 1). The median was reported along with the associated percentage of individuals who reported that median for each of the questions asked on the first and second rounds of voting for all of the potential endoscopy unit quality indicators (Tables 2-6).

Potential indicators had to meet 2 initial requirements to be considered for inclusion in the final guideline (ie, the consensus threshold): (1) the indicator had to have a median of "5" (strongly agree) on the second round of voting, and (2) the indicator needed to have ≥80% of respondents rate that indicator as a "5" on the second round of voting. Afterward, only the 6 highest-rated indicators (ie, those indicators with the highest percentage scores for respondents rating that indicator a "5" in the second round of voting) from each domain were included in the final guideline. These cutoff criteria were established to identify those indicators that were rated most important by respondents and to provide endoscopy units a feasible framework for which to identify and start measuring quality indicators. Finally, from among this group of indicators, the steering committee identified 5 priority indicators that were determined as those most compelling to measure for a high-quality endoscopy unit. These 5 indicators were selected using previous definitions of a "high-priority quality indicator" and were based on clinical relevance and importance, and evidence or consensus that there was significant performance variation of the indicator among endoscopy units.[4]

To avoid excluding other important endoscopy unit quality indicators, all potential endoscopy unit quality indicators, and their representative scores from the survey, are included in Tables 2 to 6.

Ethical considerations

This study was part of an ongoing quality improvement project aimed at developing quality indicators for endoscopy units in the United States. Given that the study was related to quality improvement and no personal health information was collected at any time, formal institutional review was not required.

RESULTS

Survey respondent characteristics

There were 495 individuals that were invited to participate in the survey. The overall survey response rate for both the first and the second round of voting was 22.2% (range, 14.0% to 33.3%) with the greatest response rate in the domains of employee experience and efficiency and operations. The majority of respondents were female (58.8%) with respondent's role in the endoscopy unit being either a physician (47.6%) or a nurse (21.8%). Most

TABLE 2. Survey results using the Delphi method to examine potential endoscopy unit quality indicators for the Patient Experience domain

	1st round voting (n = 27), median (%), 1 = strongly disagree, 5 = strongly agree				2nd round voting (n = 15), median (%)
Patients' communication needs and performance	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Communication needs are recorded as part of the nursing assessment.	5	5 (64.7)	4.5 (50.0)	4 (22.9)	5 (80.0)
Language translation services are available when needed.*	5	5 (71.4)	5 (74.3)	5 (58.8)	5 (80.0)
The identity of the interpreter is documented.	4	4 (31.4)	5 (60.0)	4 (28.6)	5 (75.0)
Patient information is available on all endoscopic procedures performed in the endoscopy unit that conforms to literacy, language, and cultural appropriateness of the patient population cared for by the endoscopy unit.	5	5 (56.3)	5 (65.6)	4 (31.3)	5 (75.0)
The method of provision of information to the patient is documented.	5	5 (51.5)	5 (57.6)	5 (56.3)	5 (75.0)
Endoscopy unit has access to a quiet area that provides privacy for discussions with patients and care partner(s).	5	5 (55.9)	5 (58.8)	4 (23.5)	5 (55.0)
Unit policy discourages the use of family and friends as interpreters.	4	4 (17.1)	4 (28.6)	4 (25.7)	4 (15.8)
Scheduling and appointments	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Patients are informed of their appointment (ie, in person, by mail, phone, or email).	5	5 (79.4)	5 (79.4)	5 (75.8)	5 (85.0)
A preprocedure review is undertaken to screen patients for appropriateness and to communicate with patients about key elements of their procedure.*	5	5 (88.2)	5 (79.4)	5 (73.5)	5 (80.0)
Methods are in place for identifying appropriate surveillance appointment needs, and timely notification and scheduling of appointments is provided.	5	5 (66.7)	5 (57.6)	5 (46.9)	5 (60.0)
Patients and referring physicians are informed of their missed appointments, with commentary regarding the potential health consequences of missed appointments.*	5	5 (54.6)	5 (54.6)	4 (18.2)	4 (35.0)
Data on facility costs and quality are available and transparent to prospective patients, families, and referring physicians.	4	4 (18.2)	5 (51.5)	3 (27.3)	4 (10.0)
Informed consent	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Signatures are obtained on a consent form for all patients who are able to sign the form, and procedures are in place for those who cannot provide consent independently.	5	5 (82.4)	5 (91.2)	5 (87.5)	5 (95.0)
All patients are given an opportunity to ask questions about the procedure before the endoscopy by a professional trained in the consent process.	5	5 (79.4)	5 (76.5)	5 (76.5)	5 (90.0)
Informed consent is obtained and documented by the provider performing the procedure.*	5	5 (79.4)	5 (82.4)	5 (72.7)	5 (80.0)
Unit has a policy to review informed consent forms and process on a regular basis.	5	5 (51.4)	5 (51.5)	4 (15.2)	5 (70.0)

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TABLE 2. Continued

Informed consent	Related to quality	Meaningful to measure (%)	Feasible to measure (%)	Compliance in own endoscopy unit (%)	Related to quality (%)
Published written patient information sheet that includes guidance on frequently asked questions for all procedures (both endoscopic and nonendoscopic) performed in the department is available to patients.	5	5 (52.9)	5 (57.7)	5 (50.0)	5 (65.0)
Endoscopy unit has a written policy for withdrawal of consent during an endoscopic procedure.	4	4 (18.8)	4 (25.0)	3 (33.3)	3 (70.0)
Procedural indications	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
The unit adopts standard indications for endoscopic procedures based upon current national guidelines.*	5	5 (79.4)	5 (75.8)	5 (60.6)	5 (84.2)
Unit policy exists to regularly review the indications for performed procedures according to published list of standard indications.	5	5 (58.8)	5 (52.9)	4 (14.7)	5 (60.0)
Use of an indication or time-to-procedure interval that is outside of accepted standards is clearly documented in the patient's health record.	4	4 (18.2)	4 (27.3)	3 (28.1)	4 (25.0)
Communication of results	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Procedure reports are communicated to referring providers.*	5	5 (90.9)	5 (87.9)	5 (72.7)	5 (95.0)
Pathology reports for patients with cancer are dispatched to referrers after the receipt of the report.*	5	5 (78.8)	5 (75.8)	5 (64.5)	5 (90.0)
Pathology reports are received by the endoscopist (or referrer) responsible for acting upon them within a timely manner.*	5	5 (90.9)	5 (87.9)	5 (81.8)	5 (87.9)
The unit uses a process for timely communication of results to referring providers that complies with HIPAA statutes and other state or federal privacy guidelines.*	5	5 (78.1)	5 (78.1)	5 (64.5)	5 (85.0)
Results (ie, from the endoscopy report) for all inpatients are available in the medical record before the patient leaves the department.	5	5 (54.6)	5 (51.5)	5 (45.5)	5 (72.2)
If the endoscopist has responsibility for taking action or making recommendations based on pathology reports, then the time it takes the endoscopist to act on the results or provide recommendations is tracked.*	5	5 (60.6)	5 (51.5)	4 (18.2)	5 (65.0)
Postprocedure communication/coordination of care	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Patients receive discharge instructions that include recommendations for follow-up, anticoagulation plan, need for antibiotics or other specific therapy (as indicated), and timing of resumption of prior medications.*	5	5 (87.9)	5 (84.9)	5 (81.8)	5 (90.0)
Process in place for patient to receive a copy of the endoscopy report.	5	5 (69.7)	5 (75.8)	5 (66.7)	5 (90.0)

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TABLE 2. Continued

Postprocedure communication/coordination of care	Related to quality	Meaningful to measure (%)	Feasible to measure (%)	Compliance in own endoscopy unit (%)	Related to quality (%)
Communication of results to the patient and/or family is complete and timely, including prompt acknowledgement of recognized adverse events and incomplete or neglected therapies, or sampling.	5	5 (81.8)	5 (78.8)	5 (68.8)	5 (85.0)
Upon discharge from the endoscopy unit, patients are given instructions, both written and verbal, that conforms to literacy and language appropriateness. Instructions document pertinent procedure findings, treatment, contact number in case of emergencies, and follow-up care.*	5	5 (81.3)	5 (78.8)	5 (63.6)	5 (85.0)
Disaster preparedness	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Endoscopy unit maintains a written disaster preparedness plan that provides for the emergency care of all persons in the facility in the event of fire, natural disaster, equipment failure, or other unexpected events or circumstances that are likely to threaten the health and safety, and they coordinate the plan with state and local authorities, as appropriate.*	5	5 (78.8)	5 (84.9)	5 (87.9)	5 (87.9)
Appropriate drills of disaster preparedness plan are performed and documented.	5	5 (66.7)	5 (74.2)	5 (72.7)	5 (87.9)
Ability to provide feedback	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Endoscopy unit has a person or committee responsible for reviewing patient complaints.*	5	5 (78.1)	5 (78.1)	5 (64.5)	5 (85.0)
Basic monitoring and recording of patient comfort and pain levels before, during, and after the procedure.	5	5 (84.9)	5 (84.4)	5 (81.8)	5 (85.0)
Endoscopy unit has a system for gathering patient feedback such as satisfaction surveys, focus groups, or invited comments.	5	5 (84.4)	5 (81.3)	5 (74.2)	5 (80.0)
Actions are planned in response to reported patient complaints.*	5	5 (81.3)	5 (78.1)	5 (67.7)	5 (80.0)
Documented process for adjudicating patient grievances exists on the unit, as required by state or federal law.	5	5 (75.0)	5 (75.0)	5 (68.8)	5 (80.0)
Patients can submit ad hoc patient concerns or positive comments about their care.	5	5 (68.8)	5 (63.6)	5 (60.6)	5 (75.0)
Patient is given realistic expectation that some discomfort may be experienced during the procedure.	5	5 (71.9)	5 (62.5)	5 (62.5)	5 (75.0)
Patient comfort and respect (surveys and nurse records) are reviewed.	5	5 (56.3)	5 (57.6)	5 (56.3)	5 (70.0)
Yield of return from patient satisfaction surveys is tracked and trended.	5	5 (69.7)	5 (75.0)	5 (69.7)	5 (70.0)
Patient comfort and respect results (from surveys and nurse records) are fed back to individual endoscopists and the endoscopy team and are acted upon to ensure issues have been effectively addressed.	5	5 (70.0)	5 (67.7)	5 (54.8)	5 (65.0)

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TABLE 2. Continued

Ability to provide feedback	Related to quality	Meaningful to measure (%)	Feasible to measure (%)	Compliance in own endoscopy unit (%)	Related to quality (%)
Patient satisfaction surveys include questions regarding the quality of patient information provided.	5	5 (66.7)	5 (66.7)	4.5 (50.0)	5 (65.0)
Accessibility to facilities (ie, parking, way-finding).	4	4 (30.4)	5 (54.6)	5 (51.5)	4 (40.0)
Waiting room amenities are conducive to a positive patient experience (ie, ambiance, WiFi, seating, cleanliness, noise).	4	4 (21.9)	4 (24.2)	4 (39.4)	4 (35.0)

Indicators that are shaded white had consensus reached on them (ie, median of "5" on the second round of voting for the relatedness parameter with ≥80% of respondents rating it a "5") and were the 6 highest-rated indicators for this domain.
Note: Patients and payers did not participate in the voting process. Both groups were initially invited but opted not to participate.
HIPAA, Health Insurance Portability and Accountability Act of 1996.
*Mandated by national regulatory or accreditation standards.

respondents were located at a hospital-based endoscopy unit (52.9%), followed by ambulatory endoscopy centers (41.8%).

There were 155 potential endoscopy unit quality indicators that were assessed. With regard to the individual parameters related to quality, meaningfulness, feasibility, and current compliance, the majority of potential indicators had a median of "5" (ie, strongly agree) in each of these 4 areas on the first round of voting. 66 quality indicators met our consensus threshold (ie, had a median of "5" with ≥80% of respondents rating it a "5" in the second round of voting). From this list, the highest-rated 6 indicators from each of the 4 domains were selected (1 domain had only 5 indicators that met the consensus threshold), yielding 29 endoscopy unit quality indicators that were included in the final guideline.

Feasibility for measuring endoscopy unit quality indicators

Across all 5 of the domains there was marked variation in perceived feasibility of measuring the proposed quality indicators. Although most quality indicators had a median of "5" in the parameter "Feasible to measure," the percentage of respondents who reported this median ranged from 96.2% to 44.8%. It was well recognized that some indicators are clearly significant and deemed meaningful but are less feasible for measurement and implementation in practice and therefore limited in application. Those that were rated highly with regard to feasibility addressed specific endoscopy unit policies and processes. In contrast, the feasibility of measuring endoscopy unit quality indicators was rated most difficult in areas where data were more detailed, harder to collect, and/or needed to be communicated to staff.

Compliance on measuring endoscopy unit quality indicators

Respondents were asked whether their endoscopy units were compliant with the proposed quality indicators. Again, in each of the 5 domains there was marked variation. Although most potential indicators had a median of "5" in the parameter "Compliance with indicator in their own endoscopy unit," the percentage of respondents who reported this median ranged from 13.3% to 93.3%. Similar to the feasibility results, greater compliance was reported for indicators that addressed specific policies or processes as compared with those that focused on gathering and reporting data.

Patient experience

The patient experience domain incorporated 46 proposed structural and process quality indicators related to 8 subdomains. These subdomains included patients' communication needs and performance, scheduling and appointments, informed consent, procedural indications, communication of results, postprocedure communication and coordination of care, disaster preparedness, and ability to provide feedback. Initially, 23 indicators across the 8 subdomains met the initial consensus threshold with the highest-rated 6 indicators then identified (Table 2). These top 6 quality indicators centered on 3 areas: (1) informed consent (ie, obtaining necessary signatures and answering patients' questions), (2) communication of results, specifically to referring providers, and (3) postprocedure communication to patients about discharge instructions and the process for how patients could receive their endoscopy reports. Among these 6 indicators there was strong agreement during round 1 voting for the "Meaningful to measure" and for "Feasible to measure" parameters. The majority of voters deemed their own units to be in compliance with all 6 of these endoscopy unit quality indicators. Among the originally proposed indicators that did not reach the initial consensus threshold, 16 had a median of 5 ("strong agreement") with less uniformity (<80%), 6 had a median of 4, and 1 had a median of 3 ("neutral") in the second round of voting. None of the proposed indicators had a median of 2 ("disagreement") or 1 ("strong disagreement") on any parameter in both rounds of voting.

TABLE 3. Survey results using the Delphi method to examine potential endoscopy unit quality indicators for the Employee Experience domain

	1st round voting (n = 38), median (%), 1 = strongly disagree, 5 = strongly agree				2nd round voting (n = 30), median (%)
Employee orientation	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Employee orientation process is in place and documented.*	5	5 (64.1)	5 (66.7)	5 (65.8)	5 (70.0)
Current professional physician and nursing practice guidelines and position statements are available.	5	5 (52.6)	5 (50.0)	5 (54.1)	5 (70.0)
Staff are oriented to HIPAA compliance and safety in addition to their job specific tasks.*	5	5 (65.8)	5 (68.4)	5 (81.1)	5 (66.7)
Employee safety	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Staff are up to date on their influenza vaccinations.	5	4.5 (50.0)	5 (84.6)	5 (71.1)	5 (66.7)
Disruptive staff behavior is addressed and resolved.	5	5 (56.4)	4 (43.6)	5 (50.0)	5 (63.3)
Organization provides information on environmental health and safety policies that must be followed in the workplace.*	5	5 (61.5)	5 (69.2)	5 (73.0)	5 (53.3)
Workplace policies include processes to reduce or prevent occupational injuries and illnesses through appropriate training and preventive activities.*	5	4 (41.0)	4 (30.8)	5 (55.3)	5 (53.3)
Employee recognition	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Employee recognition program is in place.	4	4 (34.2)	4 (39.5)	4 (42.1)	4 (36.7)
Employee growth	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Organization provides continuing education opportunities.	5	5 (61.5)	5 (56.4)	4 (43.2)	5 (63.3)
Employees are given opportunities for leadership and promotion.	4	4 (38.5)	4 (41.0)	4 (39.5)	4 (56.7)
Employee feedback	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Unit promotes a culture where staff are empowered to raise concerns about safety and quality in daily operations without fear of retribution.	5	5 (80.6)	4 (18.9)	5 (58.3)	5 (90.0)
Formal staff meetings (including staff and clinic leadership) occur.	5	5 (57.9)	5 (79.0)	5 (57.1)	5 (83.3)
Employees have formal avenues of unit and organizational communication.	5	5 (62.2)	5 (54.1)	5 (52.8)	5 (73.3)
System in place for ongoing and regular feedback from staff on the quality of their work environment.	5	5 (66.7)	5 (51.4)	4.5 (47.2)	5 (70.0)
Employees receive results of employee feedback surveys.	5	5 (48.7)	5 (59.5)	5 (41.7)	5 (63.3)
Employees are invited to provide job satisfaction feedback to their organization.	5	5 (54.1)	5 (62.2)	5 (58.3)	5 (58.6)

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TABLE 3. Continued

Employee feedback	Related to quality	Meaningful to measure (%)	Feasible to measure (%)	Compliance in own endoscopy unit (%)	Related to quality (%)
Employee satisfaction survey results are considered in development of facility/unit plans.	4	4 (36.1)	4 (33.3)	4 (14.7)	5 (55.2)
Process in place for exit interviews to be recorded and/or feedback to clinical and general managers.	4	4 (40.5)	4 (24.3)	4 (16.7)	4 (43.3)
Performance evaluation	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Employees receive individualized performance evaluations with reports.*	5	5 (70.3)	5 (69.4)	5 (62.9)	5 (82.8)
System in place for ongoing and regular feedback to staff on the quality of their work, with periodic formal documentation.	5	5 (71.1)	5 (70.3)	5 (62.2)	5 (75.9)
Action plans are in place to address performance issues identified during appraisal and assessment.	5	5 (52.6)	5 (67.6)	4 (13.5)	5 (75.9)
Rate of unauthorized absenteeism is tracked.	5	5 (37.8)	5 (54.1)	5 (31.4)	5 (62.1)
Average retention rates for employees are tracked and benchmarked.	4	4 (21.6)	5 (54.1)	3 (40.0)	4 (43.3)
Job vacancy rate is tracked.	4	4 (21.6)	5 (54.1)	4 (36.1)	4 (28.6)
Overall and first-year staff turnover rates are tracked.	4	4 (27.0)	5 (55.6)	4 (8.6)	4 (27.6)
Training	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Endoscopy unit has regular education, training programs, and continuous quality improvement for all staff on new equipment/ devices and endoscopic techniques.*	5	5 (76.3)	5 (63.2)	5 (51.4)	5 (90.0)
Team training is used for new techniques/ technology to emphasize communication between providers and nurses.	5	5 (56.8)	4.5 (50.0)	4 (27.0)	5 (86.7)
Staff feedback is considered in development of training programs and in-services.	5	5 (57.9)	4 (26.3)	4.5 (47.2)	5 (83.3)
Endoscopy unit uses training checklists to maximize training opportunity for low-volume procedures.	5	5 (68.4)	5 (62.2)	4 (13.5)	5 (80.0)
Training includes emphasis on trouble-shooting commonly experienced and high-risk problems.	5	5 (63.2)	5 (52.6)	4 (27.0)	5 (80.0)
Training programs are competency-based and modified in response to staff feedback.	5	5 (63.2)	5 (52.6)	4 (26.5)	5 (80.0)
Trainers are competent for what they teach and a mechanism is in place to assess their ability to teach.	5	5 (63.2)	4 (29.0)	4 (35.1)	5 (80.0)
Identified staff member coordinates training checklists.	5	5 (55.3)	5 (55.3)	4 (32.4)	5 (66.7)

Indicators that are shaded white had consensus reached on them (ie, median of "5" on the second round of voting for the relatedness parameter with $\geq$80% of respondents rating it a "5") and were the 6 highest-rated indicators for this domain.

Note: Patients and payers did not participate in the voting process. Both groups were initially invited but opted not to participate.

*Mandated by national regulatory or accreditation standards.

TABLE 4. Survey results using the Delphi method to examine potential endoscopy unit quality indicators for the Efficiency and Operations domain

	1st round voting (n = 35), median (%), 1 = strongly disagree, 5 = strongly agree				2nd round voting (n = 25), median (%)
Leadership/strategic planning	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Endoscopy unit has a defined leadership structure.*	5	5 (66.7)	5 (83.3)	5 (77.8)	5 (92.0)
Designated individual within the leadership hierarchy oversees quality.*	5	5 (66.7)	5 (69.4)	5 (61.1)	5 (84.0)
Mission statement incorporates and physician leadership champions a "culture of quality."	5	5 (61.1)	4 (30.6)	5 (63.9)	5 (76.0)
Endoscopy unit participates in formal quality benchmarking.	5	5 (63.9)	5 (63.9)	4 (37.1)	5 (72.0)
Staff participates in appraisal of unit policies and daily operations and are encouraged to suggest improvements.	5	5 (75.0)	5 (61.1)	5 (61.1)	5 (72.0)
Endoscopy unit has a process in place to address unexpected operational challenges in a timely manner.	5	5 (58.3)	4 (41.7)	4 (37.1)	5 (68.0)
Endoscopy unit has a practice administrator with advanced business training or experience.	4	3 (27.8)	4 (27.8)	5 (50.0)	4 (48.0)
Endoscopy unit leadership has an annual strategic planning meeting.	4.5	4 (25.0)	5 (63.9)	4 (28.6)	4 (32.0)
Operations	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Endoscopy unit adheres to regulatory requirements, including federal, state, local, and institutional, with respect to facilities and operating space.*	5	5 (83.3)	5 (83.3)	5 (91.7)	5 (87.5)
Endoscopy unit has a policy on administering monitored anesthesia care (MAC) and moderate sedation.	5	5 (64.7)	5 (61.1)	5 (51.4)	5 (87.5)
Unit committee(s) structure includes effective governance with physician and other stakeholder participation.	5	5 (86.1)	5 (85.7)	5 (88.6)	5 (84.0)
Endoscopy unit has a quality assurance committee that develops and enforces quality standard policies, meets regularly, generates quality reports for the endoscopy center and leadership, and manages quality improvement projects.*	5	5 (80.6)	5 (63.9)	5 (69.6)	5 (72.0)
Unit has a process in place to regularly trend and adjust resource availability, including equipment, space, time, and staff (eg, procedures/room/day, number of endoscopes/room)	5	5 (58.3)	5 (61.8)	4 (31.4)	5 (68.0)
Endoscopy unit has a policy on the formal review and evaluation for new devices and equipment.*	5	5 (55.6)	5 (58.3)	4 (33.3)	5 (68.0)
Endoscopy unit staff (eg, technician, nurse) are cross-trained.	5	5 (65.7)	5 (63.9)	5 (72.2)	5 (64.0)
Key intervals of patient throughput in the endoscopy unit are measured (eg, room turnover time, recovery time).	5	4 (47.2)	5 (66.7)	4 (42.9)	5 (60.0)

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TABLE 4. Continued

Operations	Related to quality	Meaningful to measure (%)	Feasible to measure (%)	Compliance in own endoscopy unit (%)	Related to quality (%)
Rate of "no shows" and canceled appointments or procedures.	4	5 (52.8)	5 (66.7)	5 (52.8)	5 (56.0)
Endoscopy unit has a policy for late-arriving staff (including physicians).	5	5 (55.9)	5 (58.8)	4 (20.0)	4 (32.0)
Endoscopy unit has a policy for late-arriving patients.	4	4 (30.6)	4 (31.4)	3 (30.6)	4 (28.0)
Rate of on-time first case start.	4	4.5 (50.0)	5 (66.7)	4 (25.2)	4 (28.0)
Rate of room turnover time (case complete to next case start time).	4	4 (30.6)	5 (63.9)	5 (54.3)	4 (28.0)
Timeliness	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Time from procedure request to procedure date for routine procedures is tracked.	4	4 (38.9)	4 (22.9)	3.5 (19.4)	4 (28.0)
Endoscopy unit has a system in place to classify endoscopy referrals into emergent, urgent, and routine categories.	5	5 (47.2)	4.5 (44.4)	4.5 (36.1)	4 (20.8)
Endoscopy wait times are communicated to the endoscopy team and made available to referring physicians.	4	4 (27.8)	4 (13.9)	3 (23.5)	3 (28.0)
Wait time for urgent and semiurgent (within 24 hours) procedures.	4	4 (20.6)	4 (25.7)	3 (31.4)	3 (28.0)

Indicators that are shaded white had consensus reached on them (ie, median of "5" on the second round of voting for the relatedness parameter with $\geq$80% of respondents rating it a "5") and were the 6 highest-rated indicators for this domain.
Note: Patients and payers did not participate in the voting process. Both groups were initially invited but opted not to participate.
*Mandated by national regulatory or accreditation standards.

Overall patient experience quality indicators were rated highly with respect to the feasibility of their measurement, with 41 of 46 indicators having a median of 5. Lower scores for "own unit compliance" were more closely associated with the excluded indicators on round 2 voting than were lower scores for "relatedness to quality," "meaningful to measure," or "feasible to measure." Indicators receiving lower compliance ratings and considered by the respondents to be less related to quality included: making data on facility costs and quality available, documentation in the patient's health record of indications or surveillance intervals that depart from recommendations or guidelines, and maintenance of a written policy for withdrawal of consent during a procedure.

Research questions

- To what extent does "documentation," as opposed to performance measurement, stimulate improvement, or enhance care?
- Can language barriers in written and verbal communication be overcome with acceptable quality at tolerable expense?
- Do written and verbal informed consent processes provide adequate patient and family understanding of the true risks, alternatives, and rates of adverse events?
- Once indicators pertaining to processes are established, how should an endoscopy unit measure its performance on the indicator?
- How can endoscopy unit quality programs (EUQPs) evaluating patient experience best develop, select, and measure indicators that are patient identified, accurately measure our patients' actual health care encounter experience, and address those concerns that are of greatest importance to our patients?
- Can the GI professional societies facilitate standardized and benchmarked unit quality programs by developing a web-based program modeled on the GRS and Gastrointestinal Quality Unit Improvement Consortium (GIQuIC)?
- To what extent do patient experience quality indicators correlate with other indicators of traditional quality outcomes in endoscopy?

Employee experience

There were 33 potential endoscopy unit quality indicators that were originally developed by expert consensus in the employee experience domain. This domain was further subdivided into areas that covered employee feedback, performance evaluation, training, employee orientation, employee safety, employee recognition, and employee growth. Initially, 10 of those indicators that were proposed met our consensus threshold, of which the 6 top rated indicators were highlighted (Table 3). Among these 6 quality indicators, all had a median of

TABLE 5. Survey results using the Delphi method to examine potential endoscopy unit quality indicators for the Procedure-Related domain

	1st round voting (n = 30), median (%), 1 = strongly disagree, 5 = strongly agree				2nd round voting (n = 22), median (%)
Preprocedure	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Endoscopy unit has a process to ensure that all elements of the preprocedure assessment are documented before the procedure begins.	5	5 (86.7)	5 (82.8)	5 (83.9)	5 (90.9)
Preprocedure process is reviewed by clinic leadership on a regular basis.	5	5 (62.1)	5 (62.1)	5 (69.0)	5 (71.4)
Preprocedure space is monitored to ensure that it meets patient and staff needs and is clean, functional, quiet, ensures patient privacy, and has amenities conducive to a positive patient experience.	5	5 (66.7)	4 (23.3)	5 (67.7)	5 (61.9)
Patients and families are kept informed about procedure-related wait to manage expectations.	4	4 (22.6)	5 (48.4)	5 (46.9)	4.5 (50.0)
Procedure	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Mechanism(s) are in place to detect, assess, and address concerns raised regarding physicians' competence.	5	5 (89.7)	5 (75.9)	4 (17.2)	5 (86.4)
Endoscopy unit records, tracks, and monitors procedure quality indicators for both the endoscopy unit and individual endoscopists.	5	5 (89.7)	5 (75.9)	5 (62.1)	5 (86.4)
Unit has policy in place for patient pause/time-out that satisfies all key elements.*	5	5 (90.0)	5 (82.8)	5 (93.3)	5 (82.8)
Endoscopy unit has a privileging policy and committee to make decisions that a physician's training and performance is in accordance with nationally accepted indicators.*	5	5 (85.7)	5 (82.1)	5 (58.6)	5 (81.8)
Data on quality indicators are communicated to staff and endoscopists.	5	5 (89.7)	5 (81.8)	5 (53.6)	5 (81.8)
Endoscope and accessories used in a procedure are identified in a procedure record.*	5	5 (69.0)	5 (69.0)	5 (75.9)	5 (81.8)
Endoscopy unit develops quality improvement projects that address indicators which are below targets.	5	5 (78.6)	5 (75.9)	5 (60.0)	5 (81.8)
Peer review of procedures by endoscopists is performed.	5	5 (80.0)	5 (82.8)	4 (10.3)	5 (77.3)
ERCP volume and sphincterotomy volume by physician and unit are tracked and considered for privileging.	5	5 (41.3)	5 (44.8)	5 (13.3)	5 (57.9)
Rate of scheduled procedures cancelled/rescheduled by provider.	5	5 (51.7)	5 (56.7)	4 (20.7)	5 (52.4)
Rate of scheduled procedures cancelled/rescheduled by patient.	4	4 (10.3)	5 (55.2)	4 (20.7)	4.5 (50.0)
Postprocedure	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Unit has a policy on reconciliation of specimen requisition to ensure physician and staff agree on specimen labeling.*	5	5 (90.0)	5 (82.8)	5 (86.2)	5 (95.5)
Patients are not discharged unless formal discharge criteria are met.*	5	5 (89.3)	5 (85.7)	5 (86.2)	5 (86.4)

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TABLE 5. Continued

Postprocedure	Related to quality	Meaningful to measure (%)	Feasible to measure (%)	Compliance in own endoscopy unit (%)	Related to quality (%)
Recovery space is clean, functional, quiet, ensures patient privacy, has adequate postprocedure monitoring for patients, and has amenities conducive to a positive patient experience.	5	5 (75.9)	5 (69.0)	5 (79.3)	5 (81.8)
Rate of hospital admissions after procedure.	5	5 (79.3)	5 (75.9)	5 (66.7)	5 (77.3)
Patient has an opportunity to speak with the provider who performed the procedure before discharge.	5	5 (69.0)	5 (55.2)	5 (64.3)	5 (77.3)
Unit has a policy in place for postprocedure follow-up call.	5	5 (72.4)	5 (75.9)	5 (73.3)	5 (77.3)
Rate of mislabeled/missing pathologic specimens.	5	5 (82.8)	5 (75.9)	5 (69.0)	5 (77.3)
Unit has a policy in place for lack of a responsible adult patient escort after procedure.*	5	5 (69.0)	5 (69.0)	5 (83.3)	5 (72.7)
Success rate of patient follow-up call after procedure.	5	5 (58.6)	5 (65.0)	5 (53.3)	5 (54.6)

Indicators that are shaded white had consensus reached on them (ie, median of "5" on the second round of voting for the relatedness parameter with ≥80% of respondents rating it a "5") and were the 6 highest-rated indicators for this domain.
Note: Patients and payers did not participate in the voting process. Both groups were initially invited but opted not to participate.
*Mandated by national regulatory or accreditation standards.

5 in the parameter of "Meaningful to measure," whereas 3 of these indicators had a median of 5 for "Feasible to measure" during round 1 voting. One third of respondents deemed their own units to be out of compliance with these 6 indicators. By contrast, among the originally proposed indicators that did not meet our initial consensus threshold, 17 had a median of 5 with less uniformity (<80%) and 6 had a median of 4 in the second round of voting. None of the proposed indicators had ratings for "disagreement" or "strong disagreement" on any parameter.

Several themes emerged among the top rated 6 quality indicators for employee experience. For example, half of these indicators underscored the important relationship between training and overall employee experience. Respondents agreed that endoscopy units should provide regular education programs and continuous quality improvement for all staff on new equipment/devices and endoscopic techniques, using tools such as checklists and team training. Furthermore, this training should be competency based, modified in response to staff feedback, and provided by competent trainers. One third of the 6 indicators valued the importance of employee feedback. In this arena, respondents thought that high-quality endoscopy units should foster a culture wherein staff feel empowered to raise concerns about the safety and quality of the endoscopy unit and that there were formal staff meetings. Finally, 1 indicator reflected the importance of performance evaluations and formalized goal setting for employees.

Research questions

- Is there a correlation between employee experience and other measures of endoscopy unit quality?
- Is there a relationship between the quality of the education and a quality outcome (eg, education on endoscope reprocessing and subsequent compliance with all steps)?
- Is there a relationship between the manager/supervisor performance and the quality of employee experience?
- Is there a relationship between physician attitudes and the overall quality of the endoscopy unit?
- What are ways to improve compliance for education and training quality indicators that are rated as meaningful and feasible?
- What is the relationship between employee recognition programs and the overall quality of the unit?
- What are the important opportunities for leadership and professional growth in the endoscopy unit?
- What durations of training are required for safe and independent performance in specific roles within the endoscopy unit?
- How effective are efforts to enhance staff satisfaction/training in improving patient satisfaction and other procedure outcomes?

Efficiency and operations

In the efficiency and operations domain, 25 potential endoscopy unit indicators were originally developed by expert consensus. They primarily addressed endoscopy unit and individual leadership, endoscopy unit efficiency, and specific endoscopy unit policies, and were organized into 3 subdomains of leadership/strategic planning, operations, and timeliness. Five indicators met our consensus threshold on the second round of voting (Table 4). All 5 of these indicators had a median of 5 in the parameter of "Meaningful to measure," "Feasible to measure," and

TABLE 6. Survey results using the Delphi method to examine potential endoscopy unit quality indicators for the Safety and Infection Control domain

	1st round voting (n = 29), median (%), 1 = strongly disagree, 5 = strongly agree				2nd round voting (n = 18), median (%)
Safety	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Nurses and physicians are credentialed with endoscopy unit policy relative to moderate sedation.*	5	5 (82.1)	5 (85.7)	5 (85.7)	5 (92.3)
Endoscopy unit has a written environmental disinfection policy.	5	5 (81.5)	5 (85.2)	5 (76.9)	5 (92.3)
Endoscopy unit has a system for reviewing adverse events and implementing strategies to prevent or reduce them.*	5	5 (92.3)	5 (77.8)	5 (71.4)	5 (83.3)
Presence of all sedation reversal agents is verified each day the facility is in operation.*	5	5 (64.3)	5 (75.0)	5 (75.0)	5 (83.3)
Endoscopy unit has a system for monitoring that all medical equipment, including rescue devices, are in proper working condition, and this is verified each day the facility is in operation.*	5	5 (75.0)	5 (85.7)	5 (66.7)	5 (83.3)
Resuscitation equipment, availability, and functional status are verified each day the facility is in operation.*	5	5 (82.1)	5 (92.9)	5 (82.1)	5 (82.4)
Endoscopy unit has written policies detailing safety procedures in the facility.	5	5 (57.1)	5 (75.0)	5 (67.9)	5 (72.2)
Endoscopy unit has a system for recording and tracking endoscopy-related adverse events.*	5	5 (89.3)	5 (67.9)	5 (71.4)	5 (72.2)
Endoscopy unit has a process in place to identify patients at risk for falls.*	5	5 (53.6)	5 (57.1)	5 (57.1)	5 (72.2)
Rate of unplanned admissions, emergency department visits, and observation stays within 7 days after receiving a colonoscopy.	5	5 (69.2)	4 (48.2)	2 (22.2)	5 (66.7)
Use of reversal agents for sedation is documented and tracked on a regular basis.*	5	5 (64.3)	5 (81.5)	5 (64.3)	5 (61.1)
Rates of modification, interruption, or termination of scheduled procedures because of sedation-related events.*	5	5 (60.7)	5 (64.3)	4.5 (50.0)	5 (61.1)
Number of adverse events that occur within 14 days of an endoscopic procedure including in-hospital deaths and nonelective hospital admissions is recorded.	5	5 (64.3)	5 (51.9)	4 (14.3)	5 (33.3)
Mechanism in place to contact patients 14 to 30 days after their procedure to identify delayed adverse events.	5	4 (25.0)	4 (17.9)	2 (14.3)	4 (27.8)
Infection control	**Related to quality**	**Meaningful to measure (%)**	**Feasible to measure (%)**	**Compliance in own endoscopy unit (%)**	**Related to quality (%)**
Process is in place to track each specific endoscope from storage, use, reprocessing, and back to storage.	5	5 (82.1)	5 (78.6)	5 (85.7)	5 (94.4)
Endoscopy unit has instructions immediately available for high-level disinfection that are specific to the endoscope models being used.*	5	5 (85.7)	5 (89.3)	5 (81.5)	5 (94.4)

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TABLE 6. Continued

Infection control	Related to quality	Meaningful to measure (%)	Feasible to measure (%)	Compliance in own endoscopy unit (%)	Related to quality (%)
Endoscopy unit has policies and procedures in place to ensure that reusable medical devices are cleaned and reprocessed in accordance with manufacturer's instructions appropriately before use in another patient.*	5	5 (88.9)	5 (85.2)	5 (78.6)	5 (94.4)
Endoscopy unit has policies and procedures in place to identify damaged equipment and remove that equipment from service.*	5	5 (75.0)	5 (75.0)	5 (66.7)	5 (94.4)
Process is in place to maintain a log on the successful completion of each key step in reprocessing, including sufficient patient demographic information and endoscope identification for appropriate postprocedure event.	5	5 (85.2)	5 (84.6)	5 (84.6)	5 (88.9)
Endoscopy unit has a specific policy discussing the proper use of single-dose medication vials.	5	5 (75.0)	5 (85.7)	5 (71.4)	5 (88.9)
Endoscopy unit has policies and procedures that adhere to current ASGE and SGNA guidelines concerning safety and infection control in endoscopy.	5	5 (82.1)	5 (85.7)	5 (70.4)	5 (88.9)
Endoscopy unit has policies and procedures in place to ensure the proper use of devices marked single use only.	5	5 (78.6)	5 (82.1)	5 (82.1)	5 (88.9)
Policy to avoid the use of multidose vials when possible and document their appropriate use when they are used.	5	5 (77.8)	5 (77.8)	5 (74.1)	5 (88.9)
Handwashing facilities and alcohol-based hand gel are available to patients, visitors, and staff.	5	5 (78.6)	5 (78.6)	5 (85.2)	5 (88.9)
Core competencies for personnel involved in reprocessing endoscopes are verified initially and at least annually or when there is an adverse event or change in endoscopes or reprocessing equipment.*	5	5 (85.2)	5 (96.2)	5 (84.6)	5 (88.2)
Endoscopy unit monitors and records adherence to hand hygiene guidelines and provides feedback to personnel.	5	5 (67.9)	5 (60.7)	5 (64.3)	5 (77.8)
Process is in place to document the successful completion of training in safe injection practices, and then verification of compliance of all personnel regarding safe injection practices on a semiannual basis.	4	4 (21.4)	4 (32.1)	3.5 (17.9)	4 (22.2)

Indicators that are shaded white had consensus reached on them (ie, median of "5" on the second round of voting for the relatedness parameter with ≥80% of respondents rating it a "5") and were the 6 highest-rated indicators for this domain.

Note: Patients and payers did not participate in the voting process. Both groups were initially invited but opted not to participate.

ASGE, American Society for Gastrointestinal Endoscopy; *SGNA*, Society of Gastroenterology Nurses and Associates.

*Mandated by national regulatory or accreditation standards.

"Compliance in own endoscopy unit." These indicators tended to concentrate on leadership in the endoscopy unit, with a particular emphasis on its structure and governance, and also focused on quality and meeting regulatory requirements.

Among the 20 original quality indicators that did not meet our initial consensus threshold, 10 had a median of 5 with less uniformity (<80%), 8 had a median of 4, and 2 had a median of 3 in the second round of voting. None of the proposed indicators received "disagreement" or "strong disagreement" on any parameter. Additionally, respondents deemed that several important indicators were not feasible to measure and that their endoscopy units were noncompliant. These included the following: that the endoscopy unit has a policy for late arriving patients, wait times for urgent and semiurgent procedures are

tracked, and wait times are communicated to the endoscopy team and made available to referring physicians.

Research questions

- What methods are there to foster/develop physician and administrative endoscopy unit leadership skills?
- What methods should be used to identify a "physician champion" for the endoscopy unit quality program?
- What methods should be developed to implement a "quality culture" at all levels of patient care and delivery of services within an endoscopy unit?
- How do efficient practices correlate with specific patient satisfaction measures and other procedure-related outcomes?

Procedure-related

In the procedure-related domain, 24 quality indicators were originally developed. This domain was further divided into 3 subdomains: preprocedure, procedure, and postprocedure. Among these 3 subdomains, 11 quality indicators met our initial consensus threshold. Among the highest-rated 6 indicators in this group, all had a median of 5 during the first round of voting for both "Meaningful to measure" and "Feasible to measure" with only 1 of these indicators not having a median of 5 in the "Compliance in own endoscopy unit" parameter (Table 5). Moreover, several themes were observed among these 6 highlighted procedure-related quality indicators, which included the preprocedure processes (eg, preprocedure assessment, patient pause/time out) and postprocedure processes (eg, discharge criteria, pathology specimen reconciliation), assessing and addressing physician competence, and quality measurement and improvement.

Among the 13 originally proposed quality indicators that did not meet our initial consensus threshold, 11 had a median of 5 with less uniformity (<80%) with 2 having a median of 4.5 on the second round of voting. None of the potential indicators in the procedure-related domain received ratings of neutral, disagreement, or strong disagreement on any of the 4 measured parameters. Additionally, an overwhelming majority of proposed procedure-related quality indicators scored highly as they related to quality, meaningfulness, and feasibility with most respondents reporting that their endoscopy units were currently compliant with all of these indicators. Yet, 2 main areas scored lower in terms of endoscopy units currently being compliant with proposed indicators: (1) assessing competence of endoscopists, specifically having a process in place to detect and address endoscopists' competence and performing peer review of procedures by endoscopists, and (2) measuring the rate of scheduled procedures cancelled/rescheduled by both the patient and the provider.

Research questions

- What is the exact rate of mislabeled specimens obtained in endoscopic procedures?
- What is the optimal and efficient method for collecting data on procedure quality indicators?
- How should the privileging and credentialing process be used to maintain and improve quality in the endoscopy unit, and how does this process influence procedure outcomes?
- What is the optimal process for endoscopy units to maintain and aggregate endoscopist-specific data on behalf of individual practitioners?

Safety and infection control

In this domain, 27 quality indicators were originally developed and were divided into 2 subdomains: safety and infection control. These proposed indicators included issues related to endoscopy equipment and its handling and issues related to personnel and training in safety and infection control. Seventeen indicators across both subdomains met our initial consensus threshold. The highest-rated 6 indicators from this domain were then identified (Table 6). Among these 6, all had a median of 5 for the "Meaningful to measure," "Feasible to measure," and "Compliance in own endoscopy unit" during round 1 voting. The core elements of these top 6 indicators focused on disinfection and maintenance of endoscopic equipment and associated devices and the credentialing of staff (including physicians and nurses) with regard to moderate sedation.

Among the 10 originally proposed indicators that did not meet our initial consensus definition, 8 had a median of 5 with less uniformity (<80%), and 2 had a median of 4 on the second round of voting. None of the proposed indicators received strong disagreement on any parameter. Importantly, nearly all of the proposed quality indicators were rated highly with respect to the "Related to quality" parameter on both rounds of voting, and most respondents reported compliance within their own endoscopy units, showing that indicators of high-quality safety and infection control practices in endoscopic facilities are now well recognized and being practiced.

Several indicators were judged to be of significant importance, but ultimately were thought to be less feasible to measure and were among those that were rated lower in terms of compliance. Indicators in this category included the following: mechanisms are in place to contact patients regarding any adverse event after a procedure, and tracking the rate of unplanned admissions/emergency rooms visits for patients who had undergone a colonoscopy. It was well recognized that some safety and infection control indicators may be clearly of significance, and deemed to be meaningful, but ranked as not feasible to be put into easy practice and therefore possibly limited in practical application.

Research questions

- What systems can be incorporated into the current data collection programs (eg, endoscopy report–generating software) to capture essential indicators on safety and infection control without undue burden?

- How would vendor participation in designing and maintaining systems for capturing essential indicators on safety and infection control improve data collection?
- What is/are the best method(s) for capturing information on delayed adverse events?
- What is/are the best approach(es) to collate, trend and remediate adverse events?
- What is/are the best method(s) for tracking and trending unplanned admissions/emergency room visits after procedures?

DISCUSSION

Through a comprehensive process that consisted of an extensive literature review and soliciting expert opinion, 155 proposed endoscopy unit quality indicators were developed. These proposed quality indicators spanned 5 domains, which included patient experience, employee experience, efficiency and operations, procedure-related endoscopy unit issues, and safety and infection control. Subsequently, to reach consensus on which indicators to include in this guideline a modified Delphi method was used and identified 29 quality indicators related to the quality of an endoscopy unit. This represents the first effort in which quality indicators have been identified for U.S. endoscopy units, and it serves as a tool by which endoscopy units can begin to measure and improve their quality, initiate the process of benchmarking these indicators, and further determine which indicators are closely aligned with patient outcomes.

Patient experience

Consistent with the national adoption of patient experience indicators and reporting mechanisms, numerous studies of patient satisfaction and experience have been performed to assess their correlation with variables of care. Through this work a number of factors have been associated with greater patient satisfaction in endoscopy units. Such factors include the staff's personal manner, technical skill of the endoscopist, endoscopy unit environment, clear communication from the endoscopist both before and after the procedure, and prompt access to endoscopic services.[17,18] Additionally, the importance of pain control and patient experience at an endoscopy unit has been widely reported, with the correlation between the 2 varying among studies. In fact, recent data suggest a surprising inverse relationship between patient comfort and dosing of moderate sedation, but directly correlated with outcomes of adenoma detection and cecal intubation rates.[19] Many of the quality indicators identified in this guideline serve to monitor and measure many of these factors with the goal of ultimately improving them.

At the same time, none of the studies on patient experience have developed or evaluated patient-reported outcome or experience measures (ie, generated from the patients' perspective), which are now recognized to be an increasingly important element of validity.[20] For example, a recent meta-analysis identified that most studies have varied between a focus on the generation of new endoscopy-specific patient experience measures versus modification or validity testing of existing measures, and that most patient experience measures are derived from a clinician's perspective.[21] Finally, although it is important to ensure that patients have a positive healthcare experience, it does remain unclear whether higher patient satisfaction results in better outcomes for patients.[22] In the future, other measures of patient satisfaction and experience will likely be developed and be correlated with accepted quality outcomes in endoscopy. Finally, future work will need to focus on developing and validating interventions aimed at improving the patient experience in endoscopy units.

Employee experience

Although patient satisfaction is well accepted as a quality metric in medicine, employee engagement and experience has been less well explored. Existing literature in the healthcare and nonhealthcare industries demonstrates a direct and positive relationship between patient/customer experience and employee engagement and performance. In healthcare, overall employee workplace experience has tangible consequences, including the successful recruitment and retention of skilled employees. Furthermore, the link between employee engagement and patient satisfaction ultimately affects the quality of patient care.[23-48] Research published by well-known organizations, including Gallup and Press Ganey, demonstrates the direct correlation between patient and employee experience. However, to date, there are limited studies that identify specific indicators measuring employee experience in GI and endoscopy unit settings in the United States.[37,40,49-54] Much of the literature on employee experience in healthcare has examined promoting high-level leadership practices,[55] having a strong relationship with and support from managerial staff, organizational commitment,[56,57] work content that is valued by the employee, and workplace environment.[58,59] Improvements in these areas leads to improved staff retention, less absenteeism, improved team communication, and greater patient satisfaction. Our current study provides one of the first attempts to identify quality indicators as they pertain to employee experience in the endoscopy unit and builds on many of these key concepts noted in the literature. Key indicators identified through our approach highlight that staff empowerment through meetings; ongoing performance evaluations; and training that is continuous, team-based, and modified on the basis of staff feedback are essential to measure, track, and improve on within the endoscopy unit. By measuring employee experience, an endoscopy unit can better understand and implement strategies to

improve employee, and therefore patient, experience and thus the overall quality of the unit.

Efficiency and operations

In the current healthcare environment, value is best defined by the delivery of efficient and high-quality healthcare. Although the study of efficiency has been the focus of management in many industries, incorporating efficiency models into healthcare has occurred only recently. In the United States there are few evidence-based publications evaluating operations and efficiency in GI endoscopy[60-62] and only 1 of these was performed during a time period that represents the current environment of endoscopic practice in the United States. These articles; an expert, opinion-based review article[63]; and previous operations research conducted by the ASGE and the Medical Group Management Association provided the foundation that was used to develop the categories within the domain of efficiency and operations. Our indicators offer the first attempt to expand on and refine this expert opinion and also construct a framework by which endoscopy units can begin to more consistently measure and track their operations management and efficiency. Having a defined and inclusive leadership with a focus on meeting regulatory requirements with regard to space and operations appeared to be areas of greatest agreement among respondents in our study. Given that these quality indicators and the majority of others in this domain were process measures with little supporting data from the literature, future studies aimed at developing more outcome-based indicators are needed.

Procedure-related

There has been a dramatic rise in the request for GI specialty care in the United States, in particular endoscopic services, over the past 3 decades.[64-66] In parallel, multiple quality indicators for various endoscopic procedures have been identified.[1-5] However, these indicators have been focused on individual providers and specific procedures rather than on how they relate to or impact the endoscopy unit. Our study addressed this observation by focusing on procedure-related indicators and how they impact the quality of an endoscopy unit. From our data we discovered several important indicators in the preprocedure, intraprocedure, and postprocedure processes in the endoscopy unit.

Few studies are available that have examined procedure-related quality indicators for endoscopy units. Furthermore, indicators that have been reported in this domain are overwhelmingly process measures with little supporting data. Much of the literature on procedure-related quality indicators has focused on aspects of the preprocedure and postprocedure process. For example, documenting and performing endoscopic procedures for an appropriate indication increases the diagnostic yield of findings during endoscopy and decreases inappropriate use[67-70]; improved safety outcomes have been demonstrated for performing a patient pause/time-out immediately before the beginning of a procedure[71-75]; and the use of validated, standardized discharge criteria has documented benefits in safely discharging patients home after a procedure.[76-79] Likewise, intraprocedural quality indicators have been enumerated; monitoring[1-3,5] and communicating[80] data on quality indicators to providers performing endoscopic procedures has resulted in improved quality and reduced practice variation among providers. Not surprisingly, some of the highest-rated indicators in the procedure-related domain from our study correlated with work from the published literature. However, much of the literature on procedure-related quality indicators for endoscopy units is based on expert opinion. Areas such as privileging and credentialing for performing procedures,[4,12,81-85] obtaining/documenting informed consent,[6,10] performing a preprocedure assessment,[4,86,87] and providing discharge instructions to patients,[4,10] although identified as important procedure-related quality indicators, have no patient outcomes-related data available to date. This void in robust studies examining outcomes with regard to procedure-related quality indicators highlights the need for continued research in this area.

Safety and infection control

Safety and infection control are of paramount importance to the overall success and efficacy of GI endoscopy. Consequently, performance assessment of endoscopic units must include measures designed to evaluate these elements. Infections related to GI endoscopy are rare events, and most have been related to breaches in established protocols for handling and reprocessing endoscopes. In line with this and concordant with ASGE guidelines, indicators deemed of highest importance in the safety and infection control domain were related to the proper training of staff and having policies and processes in place to ensure maintenance of adequate infection control in the endoscopy unit. Safety and infection control in endoscopic facilities have been the topic of many reviews and guidelines[88,89] and recently have been the focus of media headlines, with patients experiencing carbapenem-resistant Enterobacteriaceae infections after undergoing ERCP.[90] Multiple individual guidelines exist on infection control in endoscopy,[91] adequate room staffing,[92] sedation in endoscopy,[87] and quality indicators in GI endoscopy.[4] Although several guidelines in this area exist, in general many requirements for safety and infection control have little supporting outcomes data. Instead, such recommendations come from consensus by experts with experience in the safe delivery of care in the GI endoscopy setting. Continued work in this area will likely be centered on the development and study of more outcome-based indicators, with supporting benchmark data to help guide improvement work in endoscopy units.

PRIORITY INDICATORS FOR A HIGH-QUALITY ENDOSCOPY UNIT

This guideline provides the first comprehensive list of quality indicators for U.S. endoscopy units. Our rigorous process of examining the available literature, leveraging the knowledge of experts in the field, and soliciting feedback from endoscopy unit stakeholders yielded 155 indicators across 5 key domains, of which we discuss 29 of the highest-rated indicators. Yet, given the large number of quality indicators proposed, we wanted to highlight 5 endoscopy unit quality indicators from among this list that were considered the most compelling to measure and track for a high-quality endoscopy unit. The taskforce selected these priority indicators using the following criteria:

- Existing support in the literature for an association with improved patient outcomes
- Consensus among the taskforce members that performance gaps and variation existed

These 5 priority endoscopy unit quality indicators include:

- Endoscopy unit has a defined leadership structure.
- Endoscopy unit has regular education, training programs, and continuous quality improvement for all staff on new equipment/devices and endoscopic techniques.
- Endoscopy unit records, tracks, and monitors procedure quality indicators for both the endoscopy unit and individual endoscopists.
- Procedure reports are communicated to referring providers, and a process is in place for patients to receive a copy of their endoscopy report.
- Process is in place to track each specific endoscope from storage, use, reprocessing, and back to storage.

These priority indicators reflect the key elements of a high-quality endoscopy unit, and several of them span many of the domains discussed in this guideline. First, ensuring that a defined leadership is in place helps to promote high-performance leadership and organizational commitment, which not only magnifies efficiency and operations of the endoscopy unit but advances staff experience. Second, promoting education and training among staff and endoscopists, and monitoring and providing feedback on their performance, not only stimulates professional development but helps ensure that patients undergoing endoscopic procedures are receiving high-quality and safe care. Third, communication with patients and referring providers about a patient's care within the endoscopy unit helps foster a more patient-centered environment, thereby improving the patient experience and improves transitions in care. Finally, embedded within a high-quality endoscopy unit is a culture of safety and high standards for infection control; central to this theme are practices and policies along with monitoring related to endoscope reprocessing. Although these elements are the foundation of a high-quality endoscopy unit, they are by no means complete and all-inclusive. These priority indicators should be considered a starting point from which an endoscopy unit could build on during ongoing quality improvement efforts.

LIMITATIONS

Several limitations exist with our method. Selection bias was present because respondents were a highly motivated and engaged group. Although patients and payers were invited to participate, our voting sample did not include these representatives. Moreover, our response rate of 22.2% is low and can impact the generalizability of our results. Our respondents' interpretation of whether an indicator was related to quality may have been influenced by their own endoscopy units' experience and compliance. Our proposed indicators do not establish formal measure definitions or performance thresholds. The latter is currently limited because of the lack of adequate methods for benchmarking these parameters in practices across the country. The majority of the quality indicators included in the study were process and structural measures; many require development of systems for data gathering and tracking. We acknowledge and anticipate variability in measurement across different practice settings. Last, many of the quality indicators in the survey received high ratings that ultimately did not meet our predefined consensus threshold; it is for this reason that all potential endoscopy unit quality indicators queried appear in the tables.

CONCLUSION

A lack of information on the performance variation among endoscopy departments, and the lack of a current organizational framework by which endoscopy units can direct their quality improvement efforts, suggest a need for evidence-based quality indicators targeted at the endoscopy unit level. Using the Delphi method to establish consensus among leaders in U.S. endoscopy units, we evaluated proposed indicators for endoscopy unit quality. This survey, the first of its kind in the United States, was comprehensive in scope and rigorous in design. The consensus process identified 29 quality indicators related to the quality of an endoscopy unit among 5 domains that included patient experience, employee experience, efficiency and operations, procedure-related, and safety and infection control. Five priority endoscopy unit quality indicators were identified as the most compelling to measure and track for a high-quality endoscopy unit.

The intent for disseminating this information is to guide endoscopy units in their efforts to assess and improve quality by identifying those areas currently deemed most important to measure. Future efforts should include maturation of the indicators into formal measures and development of appropriate tools to capture these types of quality data. As the capability to record

and track these endoscopy unit quality indicators grows over time we will learn which parameters are most closely linked to important patient outcomes. We will also be able to apply the same principles of quality improvement using these data on endoscopy unit performance that are currently used to improve endoscopic procedure-related outcomes.

This document was reviewed and approved by the governing board of the American Society for Gastrointestinal Endoscopy (ASGE) and was reviewed and endorsed by the Society of Gastroenterology Nurses and Associates (SGNA).

DISCLOSURE

Dr Valori is a director of Quality Solutions for Healthcare LLP and of Anderval Ltd. All other authors disclosed no financial relationships relevant to this publication.

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