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Triage of General Gastrointestinal Endoscopic Procedures During the COVID-19 Pandemic: Results From a National Delphi Consensus Panel

Joseph D. Feuerstein, MD,¹ Mohammad Bilal, MD,¹ Tyler M. Berzin, MD, FASGE, FACG,¹ Audrey H. Calderwood, MD, MS,² Praveen Gudur, MD, FACG,³ Anna C. Juncadella, MD,⁴ Gyanprakash Ketwaroo, MD,⁵ Daniel S. Mishkin, MD,⁶ David G. Perdue, MD, MSPH,⁷ Sandeep Sekhon, MD,⁸ Neil Sengupta, MD,⁹ Shailendra Singh, MD,¹⁰ Douglas K. Pleskow, MD, FASGE, AGAF,¹ and Mandeep S. Sawhney, MD, MS, FASGE¹

¹Division of Gastroenterology & Hepatology, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA. 330 Brookline Avenue, Boston, Massachusetts; ²Department of Medicine, Section of Gastroenterology & Hepatology, Dartmouth Hitchcock Medical Center, Lebanon, NH, USA 1 Medical Center Dr, Lebanon, New Hampshire; ³Puget Sound Gastroenterology, Seattle, WA, 501 N 34th St #101, Seattle, Washington; ⁴Naples Community Hospital, Naples, FL 350 7th St N, Naples, Florida; ⁵Division of Gastroenterology & Hepatology, Baylor College of Medicine, Houston, TX, 1 Baylor Plaza, Houston, Texas; ⁶Atrius Health, Boston, MA, 133 Brookline Ave, Boston, Massachusetts; ⁷MNGI Digestive Health, Minneapolis, MN, 3001 Broadway St NE UNIT 120, Minneapolis, Minnesota; ⁸Digestive Disease Consultants, Fresno, CA, 1187 E Herndon Ave # 101, Fresno, California; ⁹Section of Gastroenterology, Hepatology, and Nutrition, University of Chicago Medicine, Chicago, IL, 5841 S Maryland Ave, Chicago, Illinois; and ¹⁰West Virginia University, Charleston Area Medical Center, Charleston, WV, 301 RHL Blvd, Charleston, West Virginia

ABSTRACT

BACKGROUND AND AIMS: As the COVID-19 pandemic moves into the postpeak period, the focus has now shifted to resuming endoscopy services to meet the needs of patients who were deferred. By using a modified Delphi process, we sought to develop a structured framework to provide guidance regarding procedure indications and procedure time intervals.

METHODS: A national panel of 14 expert gastroenterologists from throughout the US used a modified Delphi process, to achieve consensus regarding: (1) common indications for general endoscopy, (2) critical patient-important outcomes for endoscopy, (3) defining time-sensitive intervals, (4) assigning time-sensitive intervals to procedure indications. Two anonymous rounds of voting were allowed before attempts at consensus were abandoned.

RESULTS: Expert panel reached consensus that procedures should be allocated to one of three timing categories: (1) time-sensitive emergent = scheduled within 1 week, (2) time-sensitive urgent = scheduled within 1-8 weeks, (3) nontime sensitive = defer to > 8 weeks and reassess timing then. The panel identified 62 common general endoscopy indications (33 for EGD, 21 for colonoscopy, 5 for sigmoidoscopy). Consensus was reached on patient-important outcomes for each procedure indication, and consensus regarding timing of the procedure indication was achieved for 74% of indications. Panelists also identified adequate personal-protective-equipment, rapid point-of-care testing, and staff training as critical preconditions before endoscopy services could be resumed.

CONCLUSION: We used the validated Delphi methodology, while prioritized patient-important outcomes, to provide consensus recommendations regarding triaging a comprehensive list of general endoscopic procedures.

Keywords: Endoscopy; COVID-19; Delphi; Gastroenterology.

Introduction

The SARS-CoV-2/Novel Coronavirus-19 (COVID-19) was declared a global pandemic by the World Health Organization (WHO). On March 14, 2020 the Surgeon

General of the United States advised hospitals to cancel all elective procedures including elective endoscopy.¹ Since then, several guidelines have attempted to categorize endoscopic procedures into those that should

What You Need to Know

Background

There is consensus that all elective procedures should be cancelled during the COVID-19 pandemic. However, as the COVID-19 cases surge again, there is pressure to triage gastrointestinal endoscopic procedures.

Findings

Gastrointestinal endoscopy procedures should be allocated to one of three categories during the COVID-19 pandemic (1) Time-sensitive emergent (should be scheduled within 1 week), (2) Time-sensitive urgent (should be scheduled within 1-8 weeks), (3) Nontime sensitive (defer to > 8 weeks and reassess timing then). Using a modified Delphi method, consensus was reached on establishing patient important outcomes for each procedure indication. Consensus recommendations for procedure indication time-intervals was reached in three-fourth of indications.

Implications for patient care

While each patient's symptoms must be interpreted in a case-by-case context, this manuscript will provide valuable guidance to practicing gastroenterologists who are triaging procedures in the setting of the ongoing pandemic, as the COVID-19 cases re-surge.

continue to be performed, and those that could safely be deferred. A Joint GI Society Message on COVID-19 on March 15, 2020 recommended classification of endoscopic procedures into urgent, nonurgent/postpone and nonurgent/perform² However, no guidance was provided on which indications would fall into these respective categories. Subsequently, a Gastroenterology Professional Society Guidance on Endoscopic Procedures recommended that all elective endoscopic procedures should be delayed, while emergent/urgent procedures should not.³ Only broad guidance was provided on how to allocate procedural indications into these categories, and timeframe during which these procedures should be performed was not proposed. In their guidelines, the AGA recommended that all procedures should be categorized as time-sensitive (performed in less than 8 weeks) or non time-sensitive (deferred by 8 weeks or more)⁴.

While there is consensus that all life-saving endoscopic procedures should continue to be performed, no universal consensus on timing of urgent or elective procedures has been achieved.⁵ Now we are entering the post-peak period of the COVID-19 pandemic, where in most parts of the United States new viral infections are slowly beginning to decrease in frequency.⁶ Most centers are now gradually resuming endoscopic services. The need to determine which procedures should be prioritized, and in what timeframe is now even more critical. There are limited outcomes data regarding how long certain

procedures can be safely deferred without resulting in harm. To provide more specific guidance in this area, we formed a panel of expert gastroenterologists from diverse practice settings and used a validated methodology to address the issue of procedural timing pertinent to this phase of the COVID-19 pandemic.

Methods

Our study design was as follows:

1. Selection of expert panel

An expert panel consisting of 14 gastroenterologists were selected to emphasize diversity in geography, practice location (academic, private practice and Veterans Administration), and practice type (general gastroenterology and advanced endoscopy).

2. Development of first survey

A survey instrument was created and piloted among 2 gastroenterologists who were not part of the expert panel. Iterative changes were made based upon feedback. The survey was anonymous and sent to the expert panel using Qualtrics software (Provo, Utah, USA, Copyright 2020). The survey asked the panelists to (1) list up to 20 of the most common indications for esophagogastroduodenoscopy (EGD), colonoscopy and flexible sigmoidoscopy in their practice; (2) stratify indications proposed as a "symptom" or "screening/surveillance," (3) list critical and secondary patient-important outcomes for each indication, and (4) define time-intervals during which procedures should be performed during the current pandemic.

An introductory email for the project provided explanatory material. Information on patient-important outcomes (PIOs), along with examples based on prior studies were provided.^{7,8} Additionally, the study team suggested defining a time interval during which "time-sensitive" procedures should be scheduled as proposed by the AGA guidelines.⁴ Under this scheme, procedures that were considered "non-time sensitive" could be deferred beyond that specified time interval. The time-sensitive interval was left as an open-ended question for the panelists with the plan to narrow this down further during the first consensus call. Consensus threshold for survey responses were set at 66.7%.

3. First voting conference

All 4 elements of the survey mentioned above were reviewed. All responses that did not achieve consensus threshold were discussed in the first consensus video conference call. Each response that failed to achieve consensus on the survey was open to discussion and voting. Two rounds of voting were allowed to achieve consensus with open discussions before each round of voting. If consensus was not achieved in 2 rounds, attempts at consensus

for that response were abandoned. Voting was anonymous using Poll Everywhere.⁹

Consensus was established for 2 endpoints: (1) PIOs for each indication and (2) time intervals. PIOs were then grouped into the following classes: (i) avoidance of death / prolongation of life, (ii) avoidance of cancer / avoidance of cancer progression, (iii) avoidance of major surgery and/or hospitalization, (iv) improvement, diagnosis or palliation of symptoms, and (v) other. Time intervals were categorized into one of 3 categories: (1) Time-sensitive emergent = should be scheduled within 1 week, (2) Time-sensitive urgent = should be scheduled within 1-8 weeks, (3) Non-time sensitive = defer to > 8 weeks and reassess timing then.

4. Second survey

A second anonymous survey was sent to the panelists asking them to place each procedural indication into one of the three categories mentioned above. Panelists were instructed to prioritize PIOs when making their decision on timing of the procedure. Panelists were also allowed to consider other outcomes but told to consider them lower in their decision-making process. Consensus threshold was set at 75%, and those responses not reaching this threshold were discussed at a second video conference call. Rules similar to those described for first video consensus conference call were used to help achieve expert consensus.

5. Second voting conference

Any procedure time-sensitive interval that had not achieved consensus on the survey was then discussed and voted on. Each response that failed to achieve consensus on the survey was open to discussion and voting. The discussion included panelists sharing their views regarding why they felt the procedural indication should be triaged in the respective time interval. Two rounds of voting were allowed to achieve consensus with open discussions before each round of voting. If consensus was not achieved in 2 such rounds, attempts at consensus for that response were abandoned. The voting was completely anonymous using Poll Everywhere application.

6. Consensus recommendations on how to re-open the endoscopy suite:

As a part of the last survey, the panelists were asked to list measures to be able to re-open endoscopy suites or resume normal endoscopic procedures. The statements from the panelists were reviewed. During the second video conference call, these statements were discussed. The most common themes discussed were then anonymously voted on using Poll Everywhere. The recommendations to re-open the endoscopy suite were voted on as critical, important, helpful but not important, and not needed. We considered a consensus agreement was

reached when over 75% of the voting members agreed on an option.

Results

The expert panel consisted of 14 U.S. gastroenterologists and all experts who were invited to participate in the survey agreed upon first invitation. Five advanced endoscopists and 9 general gastroenterologists composed the panel. The average years in practice was 10 years (range 1-33 years). Eight of the panelists work in either academic, teaching or Veterans Administration hospitals, and 6 worked in private or community practices. Six of the panelists only performed endoscopy in the hospital, while 8 performed endoscopy in both ambulatory surgical centers and the hospital. Eight panelists were from Northeastern, 2 from Western, 2 from Mid-Western, and 2 from Southern United States. The average number of procedures performed by panelists were 1507 per year (Range: 600-2500). As of April 1, 2020, 10 of 14 panelists were still performing endoscopic procedures at their institutions. The average proportion of procedures being performed now compared to before the pandemic was 10.4% (Range: 2%-33%).

Time Intervals for Time-Sensitive Procedures

In the first survey, the panel was asked to define the time-interval for a time-sensitive and non-time-sensitive endoscopic procedure during the COVID-19 pandemic. However, no consensus was reached. The responses ranged from 12 weeks ($n = 1$), 8 weeks ($n = 3$), 4 weeks ($n = 7$), 5 days ($n = 1$), 2 days ($n = 1$), and 1 day ($n = 1$). After consensus discussion, the panel recommended three time intervals into which procedures should be categorized: time-sensitive emergent, time-sensitive urgent and those that can be deferred at this time. After using the modified Delphi process, the panel reached consensus on the following: (1) time-sensitive emergent = should be scheduled within 1 week, (2) time-sensitive urgent = should be scheduled within 1-8 weeks, (3) non-time sensitive = defer to > 8 weeks and reassess timing then.

Common Indications for Gastrointestinal Endoscopy

The panel identified 62 indications for general endoscopic procedures for which they determined the group should provide guidance regarding procedural urgency. There were 28 indications for EGD, 21 indications for colonoscopy, and 8 indications for flexible sigmoidoscopy. After initial discussion, 5 of the indications for EGD were sub-classified to provide better specificity, increasing the total number of EGD indications to 33. Procedures are listed in [Table 1](#).

Critical Patient-Important Outcomes

The critical PIO for each of the procedural indications was determined. There was consensus on critical PIO for each of the indications [[Tables 1-3](#)].

Table 1. List of final EGD indications and interval recommendations.

Indication	Agreed critical PIO	Time-sensitive Emergent (within 1 week) [%]	Time-sensitive Urgent (within 8 weeks) [%]	Can defer to > 8 weeks (Not time-sensitive) [%]
Symptoms				
Abnormal imaging suggestive of malignancy	Avoidance of cancer / avoidance of cancer progression	25	75	0
Acute iron deficiency anemia needing hospitalization or transfusions ^{†,*,‡}	Avoidance of death / prolongation of life	16.7	66.7	16.7
Bravo pH probe placement	Other: diagnosis and treatment, prevent morbidity, symptom control	0	0	100
Chest pain	Improvement or palliation of symptoms	0	16.7	83.3
Chronic anemia / Iron deficiency anemia ^{†,*,‡}	Avoidance of death / prolongation of life	0	33.3	66.7
Diarrhea	Improvement or palliation of symptoms	0	25	75
Duodenal stenting for duodenal / pancreatic cancer	Improvement or palliation of symptoms	75	25	0
Dyspepsia / Epigastric pain	Improvement or palliation of symptoms	0	16.7	83.3
Dysphagia	Improvement or palliation of symptoms	16.7	75	8.3
Early satiety*	Avoidance of death / prolongation of life	0	84.6	15.4
Esophageal cancer stenting ^{*,‡}	Improvement or palliation of symptoms	58.3	41.7	0
Esophageal food impaction	Avoidance of major surgery and/or hospitalization	100	0	0
Esophageal narrowing / stenosis needing treatment ^{*,‡}	Improvement or palliation of symptoms	16.7	66.7	16.7
Foreign body removal	Avoidance of major surgery and/or hospitalization	100	0	0
Gastric polyp	Avoidance of cancer / avoidance of cancer progression	0	8.3	91.7
GERD	Other: diagnosis and treatment, prevent morbidity, symptom control	0	8.3	91.7
GI bleeding / hematemesis/ melena	Avoidance of death / prolongation of life	100	0	0
Nausea and vomiting (daily/persistent) ^{*,‡}	Improvement or palliation of symptoms	7.7	92.3	0
Nausea and vomiting (intermittent) ^{*,‡}	Improvement or palliation of symptoms	0	15.4	84.6
PEG tube placement ^{*,‡}	Improvement or palliation of symptoms	0	61.5	38.5
Unexplained weight loss*	Avoidance of death / prolongation of life	0	76.9	23.1
Screening / Surveillance				
Barrett's esophagus surveillance (non-dysplastic)	Avoidance of cancer / avoidance of cancer progression	0	0	100
Barrett's esophagus with LGD [‡]	Avoidance of death / prolongation of life	0	16.7	83.3
Barrett's esophagus with HGD ^{†,*,‡}	Avoidance of death / prolongation of life	0	66.7	33.3
Celiac disease	Improvement or palliation of symptoms	0	0	100
Duodenal adenoma without high grade dysplasia [‡]	Avoidance of cancer / avoidance of cancer progression	0	8.3	91.7
Duodenal adenoma with high grade dysplasia of intramucosal cancer [‡]	Avoidance of cancer / avoidance of cancer progression	0	91.7	8.3
Eosinophilic Esophagitis (EoE) surveillance*	Avoidance of major surgery and/or hospitalization	0	15.4	84.6

(continued)

Table 1 (Continued)

Indication	Agreed critical PIO	Time-sensitive Emergent (within 1 week) [%]	Time-sensitive Urgent (within 8 weeks) [%]	Can defer to > 8 weeks (Not time-sensitive) [%]
Esophageal varices for primary prophylaxis [‡]	Avoidance of death / prolongation of life	0	25	75
Esophageal varices for secondary prophylaxis [‡]	Avoidance of death / prolongation of life	0	75	25
Follow-up of gastric ulcer ^{*;‡}	Avoidance of death / prolongation of life	0	7.7	92.3
Gastric intestinal metaplasia	Avoidance of death / prolongation of life	0	0	100
Helicobacter Pylori	Avoidance of death / prolongation of life	0	8.3	91.7

^{*}Procedural indications in which consensus was not achieved on first vote and were subject to re-vote

[‡]Procedural indications in which consensus was not achieved after discussion and re-vote

[‡]Procedural indications which were sub-classified based on discussion and feedback from expert panel

Time-Sensitive Intervals for Procedural Indications

Among indications for EGD, there were 7 indications for which initial consensus was not achieved, and out of which there were 6 indications for which consensus was not achieved even after re-vote (percutaneous endoscopic gastrostomy (PEG) tube placement, acute iron deficiency anemia needing hospitalization or transfusions, chronic anemia / iron deficiency anemia, esophageal narrowing / stenosis needing treatment, Barrett's esophagus with high-grade dysplasia, and stent placement for esophageal cancer). Consensus was achieved in 79% of indications. There were 7 colonoscopy indications for which initial consensus was not achieved, and eventual consensus was not achieved in all 7 of these (lower gastrointestinal bleeding, abnormal imaging suggestive of malignancy, change in bowel habits, colon stricture dilation, endoscopic mucosal resection of colon polyp, positive fecal immunohistochemical testing and weight loss). Consensus was achieved in 67% of indications. For flexible sigmoidoscopy, there were 3 indications in which initial consensus was not achieved and final consensus was not achieved in the 3 of these indications (colonic pseudo-obstruction, pouchitis, rectal bleeding). Consensus was achieved in 63% of indications. The list of all procedural indications with recommended time-intervals are listed in Tables 1-3 with a summary in Table 4.

Steps Needed to Re-Open the Endoscopy Suites

Panel members noted that availability of testing (eg, antibody testing for immunity and testing for active COVID-19) would influence some recommendations. Agreed upon critical recommendations to re-open the endoscopy suite were: presence of adequate PPE and adequate training of staff to screen for COVID-19 and manage suspected COVID-19 patients. There was no consensus among other recommendations (Table 5).

Discussion

Our expert panel suggested that for the purposes of procedural timing while re-opening the endoscopy suites, gastrointestinal endoscopic procedures should be categorized in to one of the following: (1) Time-sensitive emergent (schedule within 1 week), (2) Time-sensitive urgent (scheduled within 1 to 8 weeks), (3) Non-time sensitive (defer to > 8 weeks and reassess timing then). We used a modified Delphi process to achieve consensus among experts in categorizing 62 common general gastrointestinal endoscopy indications into one of these 3 categories. We placed patient priorities at the center of this decision-making process by asking experts to prioritize PIOs. Using this approach, we were able to achieve consensus regarding procedural timing in three-fourths of the indications. We also provide a decision-making framework by which endoscopists can consider timing for those endoscopic procedures that are not included in this manuscript.

Our expert panel rejected terms like urgent and elective in favor of modification of AGA recommendations of categorizing procedures into time-sensitive and nontime sensitive.⁴ They recommended creating three procedural categories to provide more specific guidance. Several panelists underscored the limitation of categorizing procedures into urgent and elective. There is currently no information regarding how long the COVID-19 pandemic will last, creating uncertainty among gastroenterologists as to how long "elective" procedures should be deferred, and when a reassessment of the appropriateness of the ongoing delay is needed. The expert panel therefore voted to divide the procedures into: i) time-sensitive emergent (schedule within 1 week), ii) time-sensitive urgent (schedule within 1 to 8 weeks), and iii) non-time sensitive (that can be deferred > 8 weeks, but need to reassess then). Prior recommendations for endoscopy during this pandemic focused primarily on emergent procedures, for which there is clearer consensus. For instance, there is reasonable consensus that

Table 2. List of final colonoscopy indications and interval recommendations.

Indication	Agreed critical PIO	Time-sensitive Emergent (within 1 week) [%]	Time-sensitive Urgent (within 8 weeks) [%]	Can defer to > 8 weeks (Not time-sensitive) [%]
Symptoms				
Abdominal pain	Improvement or palliation of symptoms	0	8.3	91.7
Abnormal imaging suggestive of malignancy ^{*†}	Avoidance of death / prolongation of life	16.7	66.7	16.7
Bloody diarrhea / bright red blood per rectum [*]	Avoidance of cancer / avoidance of cancer progression	0	92.3	7.7
Change In bowel habits ^{*†}	Avoidance of death / prolongation of life	0	33.3	66.7
Colon stricture dilation ^{*†}	Improvement or palliation of symptoms	33.3	66.7	0
Constipation	Improvement or palliation of symptoms	0	8.3	91.7
Diarrhea (chronic)	Other: diagnosis and treatment, prevent morbidity, symptom control	0	8.3	91.7
Endoscopic mucosal resection (EMR) of colon polyp ^{*†}	Avoidance of death / prolongation of life	0	33.3	66.7
Follow up of diverticulitis	Avoidance of cancer / avoidance of cancer progression	0	8.3	91.7
Graft versus host disease evaluation [*]	Other: Change in management with confirmation of GVHD	7.7	92.3	0
Heme positive stool [*]	Avoidance of cancer / avoidance of cancer progression	0	23	77
Iron deficiency anemia / symptomatic anemia [*]	Avoidance of cancer / avoidance of cancer progression	0	92.3	7.7
Lower gastrointestinal bleed ^{*†}	Avoidance of death / prolongation of life	46.1	53.9	0
Obstruction / needing colon stent	Avoidance of major surgery and/ or hospitalization	83.3	16.7	0
Pseudo-obstruction	Perforation / death and preventing emergent surgery	83.4	8.3	8.3
Sigmoid volvulus	Avoidance of major surgery and/ or hospitalization	100	0	0
Unexplained weight loss ^{*†}	Avoidance of cancer / avoidance of cancer progression	0	46.1	53.9
Screening / Surveillance				
Colitis / Inflammatory Bowel Disease surveillance	Avoidance of death / prolongation of life	0	16.7	83.3
Colorectal cancer screening	Avoidance of death / prolongation of life	0	0	100
Colorectal cancer surveillance, history of colon polyps, and post endoscopic mucosal resection surveillance	Avoidance of cancer / avoidance of cancer progression	0	8.3	91.7
Fecal immunohistochemical testing/Positive Cologuard ^{*†}	Avoidance of death / prolongation of life	0	33.3	66.7

^{*}Procedural indications in which consensus was not achieved on first vote and were subject to re-vote

[†]Procedural indications in which consensus was not achieved even after discussion and re-vote.

[‡]Procedural indications which were sub-classified based on discussion and feedback from expert panel

patients presenting with non-variceal upper gastrointestinal hemorrhage should undergo an EGD within 24 hours,¹⁰ but a patient with subacute colon obstruction needing a colon stent could in some instances be delayed if awaiting testing

for COVID-19. The expert panel recognized that the majority of the indications that fall within the one-week category will likely be performed sooner than the full 7 days. In addition, having a second category of “time-sensitive urgent”

Table 3. List of final flexible sigmoidoscopy indications and interval recommendations.

Indication	Agreed critical PIO	Time-sensitive Emergent (within 1 week) [%]	Time-sensitive Urgent (within 8 weeks) [%]	Can defer to > 8 weeks (Not time-sensitive) [%]
Symptoms				
Abnormal CT scan / imaging concerning for malignancy	Avoidance of death / prolongation of life	16.7	75	8.3
Anorectal symptoms	Improvement or palliation of symptoms	0	16.7	83.3
Colitis flare	Improvement or palliation of symptoms	16.7	75	8.3
Colonic pseudo-obstruction* [†]	Avoidance of death / prolongation of life	66.7	25	8.3
Diarrhea	Improvement or palliation of symptoms	0	16.7	83.3
Rectal bleeding* [†]	Avoidance of cancer / avoidance of cancer progression	0	61.5	38.5
Screening / Surveillance				
Pouchitis* [†]	Other: Evaluate for pouchitis	0	69.2	30.8
Rectal cuff surveillance	Avoidance of cancer / avoidance of cancer progression	0	16.7	83.3

[†]Procedural indications in which consensus was not achieved on first vote and were subject to re-vote

*Procedural indications in which consensus was not achieved even after discussion and re-vote. [†]Procedural indications which were sub-classified based on discussion and feedback from expert panel

procedures allows for the gastroenterologists to triage procedures depending on availability of PPE, resources, staff, and the timing of the peak and surge of COVID-19 cases in the region during the pandemic. Categorizing some procedures as needing to be done within 1 to 8 weeks, can allow the gastroenterologist to schedule patients for this time interval and/or to keep a list of patients that potentially would need to be done within these 8 weeks and can be reassessed at short intervals based on patient symptomatology and the evolving pandemic.

The expert panel underscored the limited availability of data on patient outcomes when procedures are delayed. One study showed following positive FIT testing, delaying colonoscopy up to 6 months does not adversely affect cancer diagnosis or advanced stage of cancer at diagnosis.¹¹ In contrast, we found no studies to address how long one could delay an EGD following an imaging study showing a gastric wall thickening. The absence of outcomes data balanced with the need for urgent recommendations to guide decisions make using a Delphi method ideally suited for this process. The Delphi method uses a structured process to help achieve consensus among experts. It is assumed that the collective knowledge and experience of multiple experts is likely to be superior that a single expert.

The panel chose to first achieve consensus for critical PIOs for all the procedural indications. PIOs are outcomes that have significant impact such as mortality, therapeutic decisions, impact of function and quality of life.^{7,8} These are outcomes that patients' value. We asked the panel to consider the critical patient important outcomes as "the main motivation for patients undergo the procedure", while accepting risks and complications associated with the procedure. Medical decision-making has

often been criticized for prioritizing that which is "clinically relevant" over what is "patient important".⁷ To avoid this pitfall, we asked the panelists to vote regarding timing of each procedure while strongly prioritizing the critical PIO. For example, in patients with dysplastic Barrett's esophagus, the consensus PIO was avoidance of death from esophageal cancer. During the discussion panelists recognized that the likelihood of esophageal cancer death in patients with low-grade dysplasia was substantially lower than that in patients with high-grade dysplasia.¹² Even though, the presence of any dysplasia may be cause for concern, focusing on the critical PIO and the likelihood of that outcome in each procedural setting helps gastroenterologists in determining the appropriateness of the time interval. Similarly, in patients with gastric intestinal metaplasia, the critical PIO was also avoidance of gastric cancer, but the likelihood of progression of gastric intestinal metaplasia into gastric cancer over a period of few months is very low, hence, the procedure was voted as non-time sensitive.¹⁴

The panel was able to achieve consensus on 2 critical points when considering re-opening endoscopy suites. These were 1) availability of adequate PPE and 2) adequate training of staff to screen for COVID-19 and manage suspected COVID-19 patients. These consensus recommendations provide some general guidance regarding the key considerations for resuming normal endoscopic practice in the post-pandemic era. However, final recommendations on this are beyond the scope of this panel's goals since this is an ongoing and rapidly evolving situation, with significant lack of clarity regarding the availability, feasibility, and accuracy of various testing approaches for COVID-19.

Table 4. Best practices recommendations regarding time intervals for various procedural indications.

	EGD indications	Colonoscopy indications	Flexible Sigmoidoscopy indications
Time-sensitive Emergent (within 1 week)	<ul style="list-style-type: none"> - Duodenal stenting for duodenal / pancreatic cancer - Esophageal food impaction - Foreign body removal - GI bleeding / hematemesis/ melena - Esophageal cancer stent placement* 	<ul style="list-style-type: none"> - Obstruction / needing colon stent - Pseudo-obstruction - Sigmoid volvulus 	<ul style="list-style-type: none"> - Colonic pseudo-obstruction*
Time-sensitive Urgent (within 8 weeks)	<ul style="list-style-type: none"> - Acute iron deficiency anemia needing hospitalizations of transfusions* - Early satiety - Esophageal narrowing / stenosis needing treatment* - Nausea and vomiting (daily/persistent) - Unexplained weight loss - Barrett's esophagus with HGD* - Duodenal adenoma with high grade dysplasia of intra-mucosal cancer - Esophageal varices for secondary prophylaxis - PEG tube placement* 	<ul style="list-style-type: none"> - Abnormal imaging suggestive of malignancy* - Bloody diarrhea / bright red blood per - rectum - Colon stricture dilation* - Iron def anemia / symptomatic anemia - Lower gastrointestinal bleeding* 	<ul style="list-style-type: none"> - Abnormal CT scan / imaging concerning for malignancy - Colitis flare - Rectal bleeding* - Pouchitis*
Can defer to > 8 weeks (Not time-sensitive)	<ul style="list-style-type: none"> - Bravo pH probe placement - Chest pain - Chronic anemia / Iron def anemia* - Diarrhea - Dyspepsia / Epigastric pain - Gastric polyp - GERD - Nausea and vomiting (intermittent) - Barrett's esophagus surveillance (non-dysplastic) - Barrett's esophagus with low-grade dysplasia - Celiac disease - Duodenal adenoma without high grade dysplasia - Eosinophilic Esophagitis surveillance - Esophageal varices (primary prophylaxis) - Follow-up of gastric ulcer - Gastric intestinal metaplasia - Helicobacter pylori 	<ul style="list-style-type: none"> - Abdominal pain - Change In bowel habits* - Constipation - Diarrhea (chronic) - Endoscopic mucosal resection (EMR) of colon polyp* - Follow up of diverticulitis - Heme positive stool - Colitis / IBD surveillance - Colorectal cancer screening - Colorectal cancer Surveillance, history of colon polyps, and post endoscopic mucosal resection surveillance - Fecal immunohistochemical testing/Positive Cologuard* - Unexplained weight loss * 	<ul style="list-style-type: none"> - Anorectal symptoms - Diarrhea - Rectal cuff surveillance

*Procedural indications in which final consensus was not achieved

Table 5. Steps needed to re-open the endoscopy suites.

	Critical (%)	Important (%)	Helpful but not important (%)	Not needed (%)
Presence of adequate PPE	100	0	0	0
Point of care testing with rapid results for patients coming in for endoscopy	66.7	25	8.3	0
Point of care testing with rapid results to check physicians and endoscopy healthcare workers on a daily basis in endoscopy	38.5	38.5	23	0
Point of care test that indicates if antibodies are present or not	23.1	30.8	46.1	0
Regional decrease in total number of new COVID-19 positive cases	61.5	38.5	0	0
Adequate training of staff to screen for COVID-19 and manage suspected COVID-19 patients	84.6	7.7	7.7	0

Our group conducted another study using similar methodology that focused on triaging advanced endoscopy procedures.¹⁴ Some procedural indications were common between these 2 studies. In 2 of those indications, different timing recommendations were made by the different expert panels. For Barrett's esophagus with high-grade dysplasia and duodenal adenoma with high-grade dysplasia, the majority of the panel that consisted mostly of general GI endoscopy experts recommended that the procedure be done in 1-8 weeks, while the advanced endoscopy expert panel recommended that the procedure could be safely delayed by 8 weeks. While neither study specifically evaluated the basis for this difference, it is conceivable that the general GI endoscopy experts might be more concerned about delaying more definitive procedures to resect these lesions since they might not be performing the procedures. In contrast, advanced endoscopists who perform these procedures, might have been more comfortable with the risks of delaying the procedure further resulting in their decision to delay the procedure further. Ultimately, this highlights that expert opinion may not be a substitute for hard outcomes data. However, in a pandemic setting, the Delphi method is an extremely useful and well-validated tool that can provide timely guidance.

In conclusion, we used a structured voting process to develop consensus recommendations for triaging a comprehensive list of general endoscopic procedures as operations resume in the endoscopy suite during the current phase of the COVID-19 pandemic. While each patient's symptoms must be interpreted in a case-by-case context, this manuscript will provide valuable guidance to practicing gastroenterologists who are triaging procedures in the setting of the ongoing pandemic.

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Correspondence

Address correspondence to: Joseph D. Feuerstein, MD, Associate Clinical Chief, Gastroenterology Assistant Professor of Medicine, Harvard Medical School, 110 Francis Street, Boston, MA 02215; e-mail: jfeuerst@bidmc.harvard.edu

Conflicts of Interest

Tyler Berzin: Consultant for Wision AI, Fujifilm, Boston Scientific and Medtronic. Douglas K. Pleskow: Consultant for Boston Scientific, Medtronic, Olympus and Fujifilm. Daniel Mishkin: Ownership and consulting for GI Reviewers, LLC. The remainder of the authors have no conflicts of interests or financial disclosures relevant to the manuscript.

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