



Endoscopy service – back on track between COVID-19 surges: a global evaluation

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Abstract

Introduction:

Introduction: An outbreak of coronavirus disease 19 (COVID-19) has altered the dynamic of endoscopic practices. Many guidelines, questionnaires have been published addressing service resumption during the pandemic. Curious about the situation in different endoscopic units across the globe, the study was designed to evaluate different aspects of practice resumption worldwide and their adherence to guidelines.

Methods:

An online questionnaire was created and distributed by national/regional representatives and societies. Redcap® platform was used as the interface; afterwards, Microsoft Excel 2016 and Prism 5 were utilized for data analysis.

Results:

From a total of 307 responses from 47 countries/regions was collected, 290 valid answers were analyzed. Almost half (47%) were in post-peak period by August, 2020. Many units were not designated to be COVID-oriented facility. About 15.5% of centers remained unrecovered, mainly in North and South America; those were recovered, training was still withheld significantly. Nevertheless, opened centers kept safety measurements strictly. Patient load was decreased by 37%, but waiting list was increased 0-25%. Among many surveillance methods, body temperature, PCR and chest CT were the most common. 74.8% increased post-procedural disinfection time and 68.2% increase in per-case inspection were noted. PPE usage was implemented highly and shortage of these posed as one of the resumption barriers. Post-procedural patient surveillance was not reinforced.

Conclusions:

Previously published barriers upon practice resumption remained. The implementation of uniform algorithms in the COVID-19 post-pandemic period is mandatory for resuming endoscopy unit practice and ensuring its continuity worldwide.

Introduction:

In December 2019, an outbreak of a new coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), an enveloped RNA-beta coronavirus resulted in the coronavirus disease 2019 (COVID-19).^{1,2} This situation was declared a pandemic by the World Health Organization (WHO) on March 11th, 2020.³ While direct contact, air droplets, and aerosols are the main routes of transmission of coronaviruses, especially if within one meter of distance, other potential routes of transmission have been suggested. For instance, contact with feces or contaminated inanimate objects is another potential route of transmission. These objects could be doorknobs, elevator buttons, and public restrooms.^{2,4,5} Clinical presentation ranges from asymptomatic or mild disease, fever, fatigue, gustatory and/or olfactory loss, nausea, vomiting, diarrhea, sore throat, shortness of breath, cough, to severe respiratory illness, respiratory failure, multiorgan failure, and death.¹⁻⁶ Being highly infective, the virus put healthcare workers (HCWs) at the more susceptible front while dealing with patients (especially in infected cases), through direct contact or due to the lack or improper use of personal protective equipment (PPE).⁷ Routinely performing procedures in close proximity to the upper body outlets such as Gastrointestinal (GI) endoscopies, HCWs are in direct exposure to gastrointestinal or respiratory (oropharyngeal) secretions.⁸

While the Risk of COVID-19 transmission by endoscopes is still unclear, the instruments are in direct contact with GI secretions and mucus membranes. Hence, whilst several studies had discussed the precautions of performing gastrointestinal endoscopies during the COVID-19 outbreak,^{7,8} a number of GI society guidelines recommended stopping elective procedures during the pandemic to decrease infection and to conserve the available resources during this pandemic.⁹ This result in overwhelmed waiting lists of elective procedures over time, mandating customized strategic planning by endoscopy unit directors.¹⁰ Moreover, different recommendations/ guidelines have been recently released to ensure the smooth reopening of endoscopy units and resuming elective procedures.^{11,12} This mainly depends on multiple factors such as the number of total cases, the number of the postponed cases during the pandemic including cases requiring cancer assessment or assessment of other symptoms, the abundance of protective equipment and the availability of a well-ventilated room if negative pressure rooms are not available.¹³ Precautions starting from patient triage, specific track for suspected or infected patients, proper use of PPE, and the presence of dedicated endoscopy rooms and endoscopes had to be considered in resuming a strategic service plan.¹⁴

Due to uncertainty whether endoscopy units in different parts of the world are ready to resume service based on these recommendations, we designed this survey to evaluate endoscopy units' readiness as well as adherence to guidelines in different parts of the world to resume services in the current time.

Methods:

Survey design and distribution

The study was based on a questionnaire, written in English, consisting of questions considering the way of endoscopic procedures being resumed, including the challenges and the way of work organizing with the infection control assessment and its prevention. Both survey and detailed study design can be assessed in the supplementary materials.

Additionally, the general information about centers and current epidemiology status were collected. The survey was made available on the Redcap® platform from July 30th to August 19th, 2020 and was distributed via several gastroenterology societies and direct contacts (see supplementary methods). In total, 322 individual emails were sent, for which a reminding round was distributed to the same list of recipients two weeks after the initial invitation and no incentive was offered for participation. Only head of units were contacted and asked to fill out the survey. The study was approved by the Institutional Review Board of the National Liver Institute, Menoufia University, Egypt (NLI IRB 00003413) in June 2020, protocol number 00203/2020.

Outcomes

The primary aim of the study was to assess the resumption process of endoscopy procedures in the post-COVID-19 periods with the variation among continents. Together with similar previously published surveys, the study's secondary aim was to determine if existing barriers have been resolved, to evaluate infection control adherence by participating centers, and to emphasize which are still the remaining challenges for resumption.

Statistical analysis:

The analysis was conducted using Microsoft Excel 2016 and Prism 5. The full questionnaire can be viewed in the supplementary materials.

Results:

A total of 307 responses from 47 countries/regions were recorded, resulting in an overall response rate of 95.3% (N=307/322). After the excluding of incomplete responses, the 290 valid answers were inducted to further analysis. Because only Heads of Centers/Units were asked to fill out the survey, the number of respondents would be counted equal to the number of centers/units. Most of the responses came from Europe (113, 38.97%) followed by Asia (111, 38.28%), America (41, 14.14%), Africa (21, 7.24%), and Oceania (4,

1.38%). The data were distributed by region, country, types of performed endoscopic procedures, the principle of management in centers, as well as the procedures on COVID-19 positive patients (**Figure 1**).

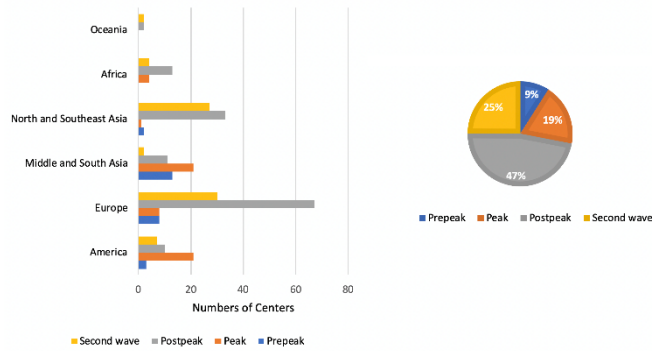


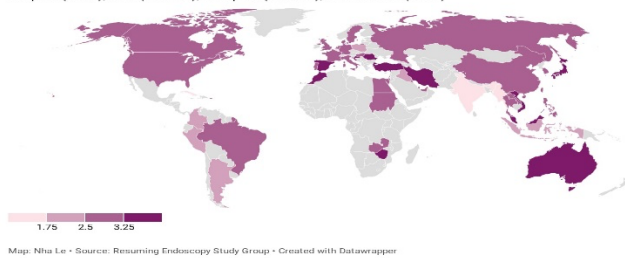
Figure 1: COVID's Revolution Throughout the Globe in August 2020

The current epidemiology status, type of centers, most commonly performed endoscopy procedures disrespect to COVID-19

In the time of the survey dissemination, the epidemiology status was varied among continents. In Asia, Europe, Oceania, and Africa, the post-peak phase was observed along with the second wave of the pandemic. The American continent and Middle East Asia, at the time, were still at the peak of the first wave. However, the global result illustrated that the post-peak phase was still experienced widely (47%); and, the second wave was more profound than the peak phase (25% vs. 19%). Pre-peak phase was not significant (9%).

Figure 2

COVID-19 World Revolution (July-August/2020)
 Pre-peak (<1.75); Peak (1.75-2.5); Post-peak (2.5-3.25); Second Wave (>3.25)



Map: Nha Le • Source: Resuming Endoscopy Study Group • Created with Datawrapper

Figure 2: COVID-19 World Revolution (July-August/2020)

demonstrated the global pattern of COVID-19's revolution, a range of scoring from 1 to 4, where the pandemic's 4 unique entries were assigned to each value (1-prepeak, 2-peak, 3-postpeak, and 4-second wave). Then an average scoring was calculated for each participating country to generate the cut-off points as shown in the map's legend. The Far East, where COVID-19 hit first already moved towards the second while the Far West was still at their first peak. Among the registered facilities, the ratio between COVID and non-COVID endoscopic units was relatively equal (129 vs. 159 or 44.8% vs. 55.2%, $p = 0.0024$).

More than half of the participating units were from university or teaching hospitals (153 [53%] of 290),

whilst there were few from private practice (10, 3.4%). Under normal circumstances, the most commonly performed procedures were the upper, and lower endoscopies (36% with 18% of each category). Emergency endoscopic examination and ERCP demonstrated close values (16% and 15%, respectively). EUS and capsular endoscopies were less commonly executed (13% and 1%, respectively). Some well-facilitated institutes also did other gastrointestinal procedures but were not accounted for significantly. Whether all procedures remained possible during the pandemic was not addressed by the survey.

Recovery of staff cadre and training situation across different regions of the world

Globally, 45 (16%) of 290 respondents indicated that their centers had not fully resumed services (assessed by whether units were back to full pre-pandemic staffing levels). The highest proportion of units that had yet to resume pre-pandemic services was in North and South America (seven [24%] of 29 participating centers from this respective region). Among the centers that had only parts of their staff cadre recovered; trainees were the least likely to be called back (only 8 centers [17.8%] out of 45). Also, in the case of endoscopy training restoration, most participating centers confirmed the limited opportunities for trainees (57.9% vs. 42.1%). In the case of restarting the training, mostly the offer was aimed towards both fellows and residents (52.1%).

Changes in the work of the endoscopy unit

More than half (N=161, 55.5%) of the participating units/centers were not dedicated to COVID-19-related treatment, reflecting the factual decrease in all types of procedures during the COVID-19 period. 81% (N=235/290) of centers indicated that safe social distancing was maintained between patients in the waiting area (other measurements such as adequate post-procedural recovery rooms, per case expert selection, etc. can be seen in **Figure 3**).

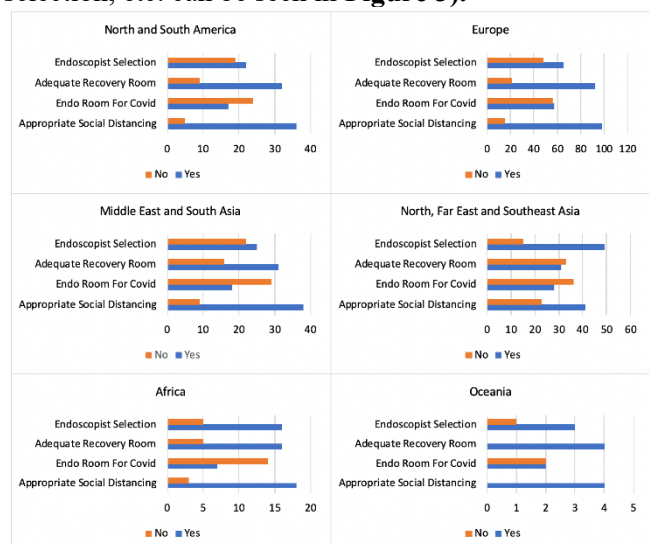


Figure 3 : Endoscopic Facility in Perspective of COVID from World's Different Regions (X-axes: Numbers of centers/units)

Nevertheless, while the participated endoscopic units/centers were set up more for COVID-19-related situations in North and

South America, Asia, and Africa, this was not encouraged in Europe and Oceania.

Case volume

Endoscopic procedures volume was reduced in most centers by about 37%. Figure 4 illustrated the percentage increase in the waiting list due to COVID-19 across the globe. Almost half of the responsive centers experienced a 0-25% increase in volume (43%), while about one quarter observed an increase of 26-50%. An increase of 0-25% and 26-50% were experienced more or less the same across Europe and the Middle East and South Asia. In North and South America as well as North, Far East, and Southeast Asia the increase of the waiting list was the lowest as more answers were observed in the 0-25% category. This was a contrast in Africa and Oceania, where an increase of 26-50% was emphasized. Moreover, when it comes to incrementing the working hour, all centers in Europe have not experienced prolonged working hours while the situation was more or less half and half in North, Far East, and Southeast Asia (data not shown).

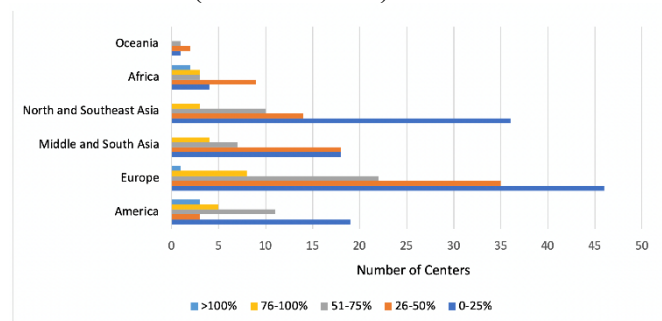


Figure 4 : Percentage of Increase in Waiting List Across the Globe

Approach to pre-procedural patient's testing

Based on the answers given, the majority of participants opted to classify patients according to the risk of infection prior to any endoscopic intervention. That is, 274 (95%) of units indicated that patients were stratified according to COVID-19 risk before any endoscopic procedure; the most frequently used methods for assessment of a patient's COVID-19 status were symptoms, change in body temperature and PCR test (29%, 31% and 24%, respectively); use of serological antibody testing and chest CT were less commonly reported (8% for both options) (Figure 5).

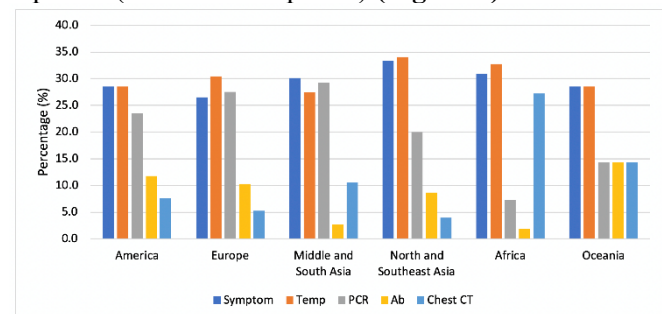


Figure 5 : Patient's Stratification Methods Worldwide

In Africa, chest CT was more preferred over PCR (7.3% vs. 27.3%, respectively), while serological antibodies testing was almost not considered (1.8%). Only 11.8% centers in the American continent, 10.2% centers in Europe, and 8.7% centers in North, Far East, and Southeast Asia applied serological testing in addition to the three preferred options; chest CT choice was even lower. Even though both serological testing and chest CT were also not preferred in the Middle East and South Asia, data has shown that physicians here would still prefer chest CT over testing IgG/IgM antibodies. As the only representative from Oceania, the trend of choice in Australia was still proportional to the global pattern.

The prolongation in post-procedural room disinfection

From the overall global response, 74.8% announced the increase in post-procedural disinfection time, within whose group the time required for inspection was elevated, too (68.2%) (Figure 6).

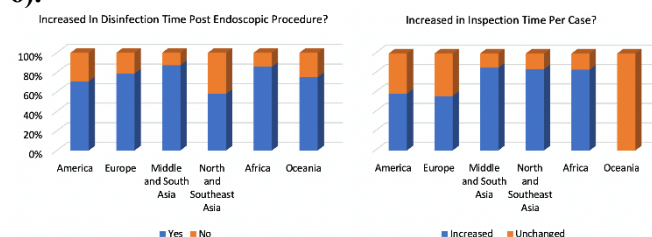


Figure 6: Varied Disinfection and Procedural Time of Endoscopic Intervention Among Global Different Regions

Concerning individual regions, time for disinfection after endoscopic intervention remained unchanged in almost half of the responses from North, Far East, and Southeast Asia (42.2 %). The inspection time stayed unchanged in almost half of the responding centers from North and South America and Europe (41.4% and 43.8%, respectively). The inspection time remained totally unchanged in Oceania while the disinfection time was admittedly increased.

Pre-pandemic intention of endoscopic service resumption and barrier from PPE shortage

The majority of participating units/centers indicated the intention in resuming pre-pandemic endoscopic services, except in the Middle and South Asia, where the number of responses showed mixed opinions (Yes N=26 [55.3%], No N=21 [44.7%]). The PPE usage was reinforced for all cases in most centers located in North and South America (Figure 7A and 7B). Nevertheless, this was less complied in other areas. Undoubtedly, the use of PPE was found highest in suspected and confirmed cases ubiquitously across the globe (59.7%). The usage of PPE for specified cases was the minority (13.4%).

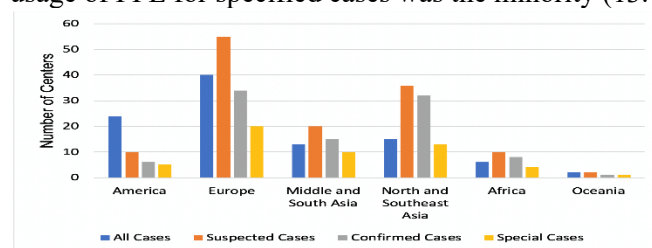


Figure 7A: PPE Indications Across Different Regions of the World

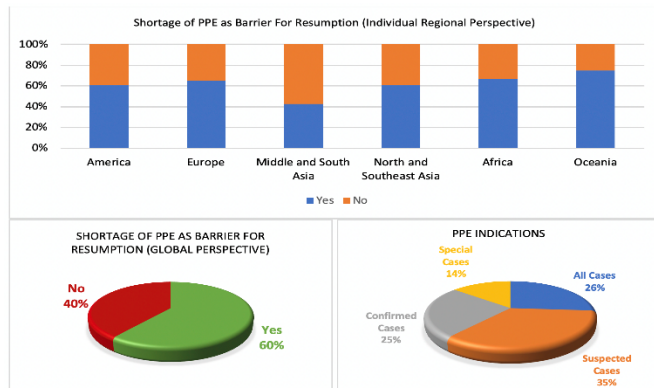


Figure 7B: Shortage of PPE as a Barrier of Endoscopic Procedure Resumption and PPE Indications

Special track for confirmed COVID cases and 14 days post-procedural surveillance

The special track for COVID-19 cases was highly agreeable (75.5%) worldwide. However, 14 days of post-procedural surveillance was not implemented widely where such a process was not confirmed in the majority of participating units/centers (68.6%). In centers where surveillance was reinforced, endoscopic staff (32%) were the most frequently reported individuals to perform follow-up. Next in line, endoscopic nurses and administrative personnel were also responsible for calling patients 14 days after their endoscopic procedures.

DISCUSSION

During endoscopic procedures, SARS – CoV-2 transmission and aerosolization have altered practice patterns, resulting in unavoidable considerable negative impact.^{15,16} The COVID-19 pandemic has led to the curtail of diagnostic endoscopies and the complete disruption of endoscopy units worldwide.¹⁷

This strategic pause in endoscopic services forced rapid rethinking and adaptation, resulting in combining resources, increasing opportunities, and mitigating concerns regarding Covid-19 related risks.¹⁸⁻²⁰ As the pandemic evolved globally,^{21,22} along with the urgent need of safe resumption for endoscopic services, there is a need for modification of endoscopic units to be prepared with prioritized resources to handle COVID-19 related challenges encountered in daily practice,²³⁻²⁵ and also use this experience to be prepared for future's possible similar encounter. Worldwide endoscopy units have restarted or aim for resumption, despite the constrained time and resource.²⁶⁻³⁰ A post-COVID strategic resumption of endoscopy study and a multicenter prospective study of COVID-19 transmission following outpatient GI endoscopy were both done in the UK and published in GUT journal in June and September 2020, respectively.³¹⁻³² Coherently with our current study, these two groups also addressed similar challenges to

endoscopic service reopening. The safety of the HCWs, stratification of patients according guidelines and post-procedural follow-up were also emphasized.

With the same mindset, our survey took a step further by evaluating real-life experience of post-COVID endoscopic resumption over 47 countries/regions of the 5 continents. The COVID-19 pandemic consequences were visible as curtailed and reconfigured functioning of endoscopic centers that were greatly affected, especially those situated in private practices. The structured questionnaire focused on the impact on endoscopic procedures, emphasizing possible changes in working endoscopy units to reduce transmission, and ensure critical steps in limiting viral propagation. Follow closely to the Delphi consensus' recommendations,³³ intraprocedural considerations regarding the type of procedures (infected vs. non-infected patients), room's equipment, number of staff and timework, as well as time required for procedural inspection and post-procedural disinfection were assessed.

According to our results, risk stratification (94.5%) became the norm, followed by almost all centers. However, shortage in staff and PPE, prolonged in post-procedural disinfection as well as increased inspection time per case still remained as the primary challenges for resumption. This is reflected in our study that most of the centers (91.1%) fully admitted the above hindrances would, in fact, influence their decisions of post-COVID-19 reopening. Also, the fact that shortage in PPE was not considered as a barrier in the Middle and South Asia, where more than half of the centers answered "No" (57.4%) could relate to the delayed peak in these regions, providing them precious time to learn from European and American centers' cumulative experiences, ensuring policy changes to overcome PPE's urgent and unmet need. Another relevant result of our survey was the adversely affected endoscopic training of both fellows and residents as a collateral damage in the era of COVID-19.

One more pivotal result of our survey is the incapacity of centers to do post-endoscopy surveillance to track infection incidence, despite of the Delphi consensus' recommendations (Statement 27).³³ This might be owed to the intense workload after the expansion of waiting lists and a shortage of staff. In centers where post-procedural follow-up was done, endoscopic staff was the most frequently reported individuals who took this responsibility, increasing the burden on the overwhelmed endoscopy staff. Nevertheless, generally, little effort is spent on ensuring post endoscopy surveillance. It would be more appropriate if administrative personnel or members of the infection control team take over this task so many centers would be able to implement post-endoscopy surveillance. Thorough communications between these related working group should also be reinforced in order to achieve comprehensive patient management and infection control of high-risk medical procedures.

Our findings have limitations, but they generate robust data that can and must bring radical change to bring about exigent changes in endoscopy practice all over the world.

Hopefully, with the approaching of the second peak, this analysis will help to overcome this arduous moment in time and metamorphose into tomorrow's centers.

In conclusion, This he study represented real-time global endoscopic service's adaptation to COVID-19 pandemic. Previously published barriers upon practice resumption remained. Despite Delphi consensus' emphasis on post-procedural surveillance, application was not widely reinforced, raising concerns in disease control. In conclusion, the implementation of uniform algorithms in the COVID-19 post-pandemic period is mandatory for resuming endoscopy unit practice and ensuring its continuity worldwide.

Declarations: Nothing to declare

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