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Endoscopy (P Siersema, Section Editor)

Endoscopy After the COVID-19 Pandemic—What Will Be Different?

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Abstract

Purpose of Review This paper reviews the latest literature regarding the impact of COVID on endoscopy service provision.

Recent Findings Endoscopy has been shown to be largely safe when appropriate infection prevention and control measures are in place. Endoscopy training and education has been profoundly affected though novel training models to overcome this have been developed. Proper handling of delayed or cancelled procedures is of utmost importance to minimize delays in diagnosis and treatment of diseases such as cancer. Adoption of new technologies such as non-endoscopy alternatives and telehealth may be a viable alternative to minimize infection risks.

Summary This pandemic has led to tangible differences in how we provide endoscopy service in the future. Future research focusing on better risk stratification of patients who need endoscopy, validating novel endoscopy training models, and adopting new technologies are urgently needed to support these changes in the post-pandemic world.

Introduction

The COVID (coronavirus disease) pandemic is still ravaging in many parts of the world and has led to an unprecedented impact on healthcare systems globally. Initially, many parts of the world had to stop elective endoscopies due to the risk of potential infections, lack of personal protective equipment (PPE), and redeployment of healthcare professionals (HCPs) to COVID-related patient services. [1•, 2•, 3•, 4–10] After the initial phase, many centers resumed limited endoscopy services with the implementation of stringent infection prevention and control (IPC) policies such as universal masking for patients, pre-endoscopy symptoms screening and COVID testing, and using high-level personal protective equipment for upper endoscopies as they are potentially aerosol-generating. [11, 12] Thankfully, with widespread implementation of these measures, no large nosocomial outbreak of the virus has been reported so far. As the pandemic waxed and waned, many authorities issued guidance on how to safely and effectively restart routine clinical services. [13, 14, 15•, 16–18] The rapid development of vaccines and the widespread implementation of vaccination programs worldwide was originally seen as a game changer, [19–23] but this has led to the surges of highly infectious COVID variants. [24•, 25] Hopefully, with efforts to strengthen containment and to further increase the vaccination uptake rates, even in younger individuals and children, [26] the pandemic can be controlled to a certain degree. Regardless of when this pandemic will really end, it is evident that COVID has profoundly impacted healthcare systems worldwide, including the delivery of endoscopy services. It is evident that some of the changes adopted will likely be staying with us in perpetuity. In this review, we provide a summary of the literature and some of our insights on the future of endoscopy in the post-COVID era (Table 1).

Procedural Workflow for Endoscopy

Pre-endoscopy

Infection-Minimized Pathways

Hayee et al. [27] have suggested separating hospitals into "hot" and "cold" aka COVID-minimized sites to stratify the risk of endoscopy to patients, taking into consideration individual patient risks such as those with cancer, on immunosuppression etc. A study of more than 6200 patients by the SCOTS project group from the UK showed that providing such a COVID-minimized environment can offer a clear road map for performing safe endoscopy during the recovery phase of the pandemic. [28•] In the future even after the COVID pandemic has settled, these infection-minimized pathways may still have a role to reduce the risk of nosocomial outbreaks and provide better protection to patients at high risk of acquiring infections.

Universal Screening and Testing

Regardless of the infectious agent, routine screening of patients for FTOCC (fever, travel history, occupational history, clustering history, and contact history) will likely be here to stay as a simple and easily implementable safeguard to protect other patients and HCPs.

Table 1 Changes regarding endoscopy service provision after the COVID pandemic

Procedural workflow for endoscopy	
Pre-endoscopy	**- Infection minimized pathways** **- Universal screening and testing** **- Patient PPE**
Endoscopy	- Adequate PPE for endoscopists (N95 respirators or equivalent for upper gastrointestinal endoscopies)
Post-endoscopy	- Segregation of recovery areas - Phone follow-up of patients
Lasting impact	
Endoscopy training and education	- Web-based lectures - Video-based education - National and international webinars - Simulation-based training - Objective skill assessment tools - Leveraging social media platforms for alternative means of education and training
Endoscopist well-being	- Enhance mental health support for endoscopists - Identify structural causes of burnout and anxiety in clinical programs
Proper handling of delayed or cancelled procedures	- Resume endoscopy services such as CRC screening - Logbook of all subjects who had endoscopy delayed or cancelled due to the pandemic - Alternative risk stratification tools such as incorporating FIT
Adoption of non-endoscopy alternatives	- Adopt new technologies such as capsule endoscopy, CT colonography - Telehealth
Aftermath	
Preparedness for future pandemics	- Stockpile PPE, medical equipment, and crucial medications - Develop surge capacity within healthcare systems - Establish pandemic preparedness committees to develop clinical frameworks for future outbreaks - Strengthen collaboration and liaison with local public health officials - Develop better predictive models

Abbreviations: *PPE* personal protective equipment; *CRC* colorectal cancer; *FIT* fecal immunochemical test; *CT* computed tomography

In the future, if another pandemic arises, universal testing for the detection of this hypothetical pathogen will likely be implemented. A trend to move from laboratory-based tests to point-of-care tests will also likely be present, thus allowing for the development of decentralized, rapid, sensitive, and low-cost diagnostics which can be widely implemented as screening tests. [29] With the widespread vaccination of HCPs and the general population, stringent screening measures that were required prior to elective endoscopy will likely be relaxed similar to the current pandemic. For example, the American Gastroenterological Association updated their guidance recently with recommendations against the routine pre-procedure testing for SARS-CoV-2 in patients scheduled to undergo endoscopy. [30]

Patient PPE

It is highly likely that standard IPC measures will be fundamentally changed after the pandemic. Asking patients to wear facemasks at all times and adhere to social distancing policies where appropriate, especially for patients that are potentially infectious sources, will likely be continued in the near future.

Endoscopy

Aerosol-Generating Procedures

Our understanding of which procedures are considered aerosol-generating procedures (AGPs) has enhanced significantly during this pandemic. There is mounting evidence that upper GI (gastrointestinal) endoscopy including esophagogastroduodenoscopy (EGD), endoscopic retrograde cholangiopancreatography (ERCP), and endoscopic ultrasound should be considered as AGPs, and endoscopists should wear enhanced PPE with N95/FFP3 respirators or equivalent. [11, 31] In our center, the routine use of a continuous dental sucker has already been widely implemented for all upper GI endoscopies which has been shown to significantly reduce the amount of aerosols, [11] with this practice likely to be continued in the future in the post-COVID era.

The risk for lower GI endoscopy is less conclusive. Although viral RNA has been detected in stool samples of COVID patients, whether this confers a risk for fecal–oral transmission similar to prior outbreaks related to toilet fumes during the SARS (severe acute respiratory syndrome) pandemic has not been well established, [32] though theoretically the risk of transmission via aerosols or fomites is largely similar between SARS-CoV-1 and SARS-CoV-2. [33] Regardless, many authorities consider lower GI endoscopy as potentially AGP as the procedure usually lasts longer than other endoscopies thus increasing exposure time to the endoscopist, requiring air insufflation, with the risk of the patient passing flatus.

Availability of Negative-Pressure Facilities and Appropriate Building Engineering Controls

Endoscopy for patients with suspected or confirmed COVID should be performed in negative pressure facilities for further protection of endoscopy HCPs and other patients. In the future, if another respiratory pathogen causes large-scale infections, these policies will likely be re-enacted. Hospitals where the aforementioned negative pressure rooms are not available should consider adding these facilities during redevelopment as part of a preparedness plan for future pandemics.

The COVID pandemic has led to renewed interest in the potential role of air change rates as an infection control strategy. [34] Appropriate building engineering controls including sufficient and effective ventilation, particle filtration and air disinfection, avoiding air recirculation, and avoiding overcrowding have all been suggested. [35]

For better or for worse, the days of endoscopists performing procedures without facemasks will likely be over. Despite evidence from Johnston et al. [36] showing that endoscopy poses a clear risk for transmission of potentially infectious biologic samples, it took a global pandemic to truly increase the uptake rate of basic IPC measures. Thankfully, the risk of COVID transmission is considered low if adherence to strict preventive measures is in place. [37]

Post-endoscopy

Segregation of Recovery Areas

Many centers have implemented workflows where patients with suspected or confirmed COVID are cohorted in separate locations throughout their patient journey, including a segregation of recovery areas. [4] In the future, facing a theoretical new pathogen, these specific workflows can and should be re-implemented to minimize the risk of cross-infection and allow for easier contact tracing.

Phone Follow-Up

Some authorities have suggested conducting a routine phone follow-up in 7 to 14 days after endoscopy to enquire if there are any new symptoms or new diagnoses of COVID. [7]. Studies have shown that client satisfaction is improved and failure-to-attend rates are lowered with phone consultations, and that it can effectively minimize in-person consultations [38] Regardless of the infectious agent, this will likely be considered good clinical practice and may become commonplace in the future.

At the end of the day, the safety of endoscopy for both patients and HCPs is of utmost importance. Stringent measures that are carefully adhered to before, during, and after endoscopy can mitigate the risk of infection. The silver lining is that this is an opportunity to introduce new care models and enhance our preparedness for future pandemics. [39]

Lasting Impact and Aftermath

Endoscopy Training and Education

The COVID pandemic has had a profound impact on endoscopy procedure volumes [40] and endoscopy training. [41•, 42–45] Concerns have been raised regarding difficulties encountered by trainees to meet pre-COVID

training targets given the many restrictions to endoscopy at the height of the pandemic. Some authors have suggested that a new multimodal educational model should be adopted, encompassing web-based didactic learning, simulation-based training, and skill-based goal setting for competency assessment. [46]

Distance learning including local web-based lectures, video-based education with interaction, and national and international webinars or lectures, primarily via gastrointestinal societies, has become an important educational resource. [47] These measures will likely continue in the long term and provide the essential basics of endoscopy to trainees in a safe manner, with minimal utilization of scarce PPE resources, and will likely enhance patient safety.

Simulation-based training has improved substantially in recent years. More sophisticated endoscopy simulators may incorporate elements of both mechanical simulation and augmented reality [46]/virtual reality. [48] In more resource-limited regions, low-cost training models have also been developed [49]

Future endoscopy training may focus less on the number of procedures performed, and shift to the use of objective skill assessment tools in the clinical setting to monitor the learning curves of trainees or fellows. [46] Though there may be pros and cons of such a competency-based curriculum, it offers a unique hybrid learning opportunity for continued training during pandemics.

Increasingly, social media platforms such as Twitter offer an alternative means of education and training. Although in the past these channels were considered unstructured, an increasing rigor to such education modalities has been seen [50] with some resources such as #MondayNightIBD offering continuing medical education credits to participants. [51]

The pandemic likely accelerated the uptake of many of these educational measures. Whether these innovations can stand the test of time would depend on whether changes in policy, training requirements, monetary investment, trainer buy-in and time are present. [52] It is also encouraging to note that with adaptive mechanisms, procedure volumes for trainees and/or fellows have returned near to baseline without an ongoing impact on endoscopy training. [53] Time will tell whether these new educational and training models are on par with traditional methods that are mainly based on procedure numbers.

Endoscopist Well-Being

The well-being has been an issue for further study during this pandemic. In one multinational survey by Pawlak et al. [41•], more than 70% of endoscopy trainees reported concerns that the COVID could prolong their training, with more than 50% reporting symptoms of anxiety and approximately

18% reporting symptoms of burnout. In a more recent study of Southeast Asian gastroenterologists, more than 70% were still significantly affected by the pandemic and burnout was also common. Safeguards for mental health were found to be suboptimal with more than 50% of gastroenterologists being unaware of or did not have access to mental health support. [54] The pandemic has laid bare the lack of psychosocial and mental health support in many regions worldwide and renewed efforts to make workplace improvements for these important issues for endoscopists are urgently needed.

Proper Handling of Delayed or Cancelled Procedures

In a large retrospective study from Hong Kong, despite a drastic decrease in hospitalizations for gastrointestinal ailments and reduction in endoscopy volumes, data seems to suggest that this did not affect emergency endoscopy or surgeries, nor lead to excessive mortality. [55] However, emerging data suggests that there are tangible, detrimental effects of the pandemic on diagnosing new cancers such as gastric and colorectal cancers (CRCs), and that delays in endoscopy may potentially lead to upstaging of cancer staging. [56] In the USA, it is estimated that there is a screening deficit for 9.4 million individuals that is [57•] associated with the pandemic. In another study, an estimated increase of more than 15% of avoidable CRC deaths in England was to be expected as a result of these diagnostic delays. [58] Encouragingly, although the COVID pandemic did lead to a sustained reduction in the number of people referred, diagnosed, and treated for CRC in England, by October 2020, care pathway targets had returned to 2019 levels suggesting that screening can be re-implemented with modifications to usual practice. [59] Restarting cancer screening activities in the post-COVID era will be difficult and will likely require a well-coordinated effort to more proactively engage the community, encourage apparently healthy individuals to return to routine health care, and reorganize clinical services to minimize backlogs. A logbook for subjects who should have been previously but had their procedures delayed or cancelled should be made available in all endoscopy centers to ensure that these patients are followed up and offered timely endoscopy. Using CRC screening programs as an example, Basu et al. [60] discussed the possibility of allowing flexibility in screening programs such as switching to fecal immunochemical testing (FIT) in place of endoscopy-based screening. The application of a FIT test would allow the use of the mail system to send and return test kits to make it more convenient for subjects and to maintain a reasonably high participation rate. The authors also opined that the opportunity should be taken to replace qualitative FIT with quantitative FIT as an example of de-implementation of existing non-evidence-based

practices. [60] Facing an unprecedented outbreak with a global shortage of PPE, it was understandable that elective endoscopies were delayed or cancelled initially. However, this may also serve as a lesson if future pandemics arise where the real-world consequences of delaying diagnoses of time-dependent diseases such as malignancy need to be balanced carefully with infection prevention and control policies.

Adoption of Non-Endoscopy Alternatives

Capsule endoscopy possesses unique advantages such as single use, low risk of cross-infection, excellent tolerance with low risk of aerosol generation, minimal medical staff requirement, and separation of examination and reading/reporting which are particularly advantageous during the COVID pandemic. [61] These advantages will likely persist after the pandemic, and with wider availability and increased experience by clinicians, this may become a viable screening option for selected gastrointestinal conditions.

Another non-endoscopy modality that is non-invasive with negligible risk of aerosol generation and hence infective risk would be computed tomography (CT) colonography. These technologies are not new, but the previous uptake has been slow and they have yet to be fully integrated into current diagnostic algorithms. In light of the pandemic, utilizing these alternative methods may be a safe and effective way to offer suitable diagnostic tests and risk stratify patients, reserving invasive endoscopy which bears a higher infective risk for selected patients.

Telehealth

The pandemic has catalyzed the emergence of telehealth as a viable alternative to in-person clinic visits has been adopted in many clinical practices. [62] There is potential that current healthcare provision can be restructured to incorporate telehealth for improved patient convenience, satisfaction, and clinical efficacy. Patients with stable disease, and those who prefer to continue to use this modality should continue to have telehealth consultations arranged. In the future, it is possible that a certain proportion of clinical services and dedicated sessions are repurposed as telehealth visits. Though short-term data is encouraging, whether adopting telehealth is equally safe and effective in the long run requires further research.

Fig. 1 Full gear of personal protection equipment (including hair net, face shield/goggles, N95 respirators or equivalent, water)

Preparedness for Future Pandemics

Other measures to enhance preparedness for future outbreaks include a formal policy of stockpiling PPE, medical equipment, and crucial medications, developing surge capacity within healthcare systems, improving access to telehealth services, establishing pandemic preparedness committees to develop clinical frameworks for future outbreaks, strengthening collaboration and liaison with local public health officials, and developing better predictive models to enhance resource allocation [63] (Figs. 1 and 2).

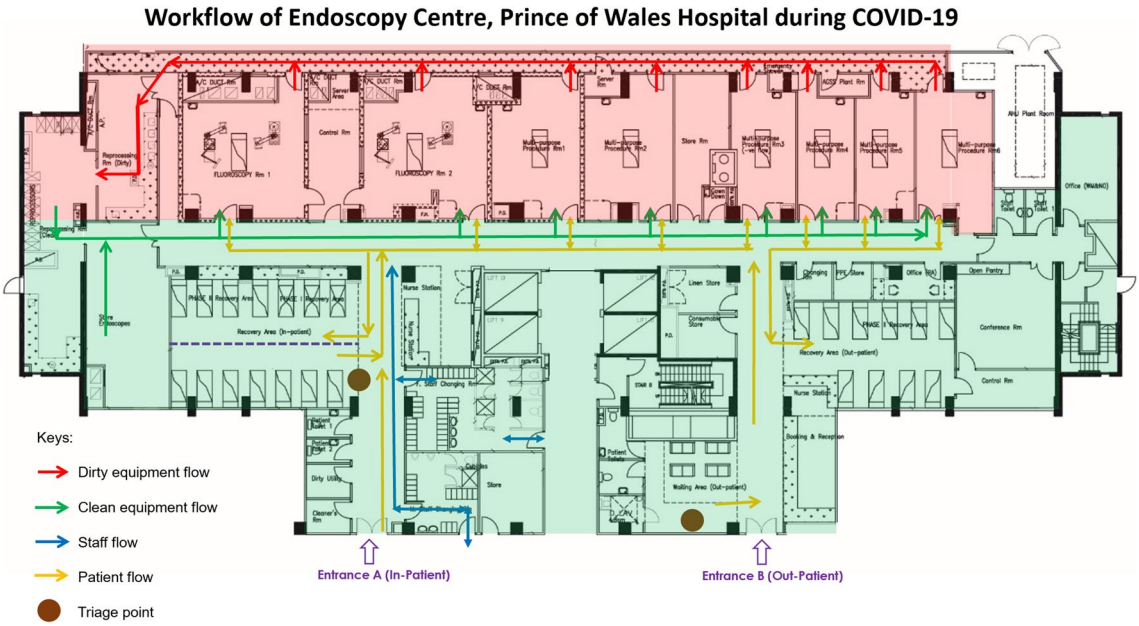

Fig. 2 Workflow at Endoscopy Center during the COVID pandemic

Conclusion

Though far from over, the COVID pandemic will not be the only infectious disease facing humanity and endoscopists in the near future. The challenges we have faced have provided a litmus test on how endoscopy services can be safely and effectively delivered during pandemics. The experience gained and lessons learned from COVID will be crucial when we encounter inevitable challenges in the future.

Declarations

Conflict of Interest

Rashid N. Lui declares that he has no conflict of interest. Raymond S. Y. Tang declares that he has no conflict of interest. Philip W. Y. Chiu declares that he has no conflict of interest.

Human and Animal Rights and Informed Consent

This article does not contain any studies with human or animal subjects performed by any of the authors.

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