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The effect of COVID-19 on Gastrointestinal Endoscopy Training Worldwide

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Abstract

Back ground: The COVID-19 pandemic is a unique challenge that has disrupted endoscopy training. Initial infection control measures aimed at protecting patients and staff meant nonessential endoscopic activity was suspended in many countries. The decrease in elective caseload from the pandemic also reduced training numbers during this period.

Objective: The aim of this review to highlight the global impact of COVID-19 on gastrointestinal endoscopy training, the factors affecting the quality of endoscopy training.

Conclusion: COVID-19 has negatively impacted on multiple domains of gastroenterology training, particularly in relation to endoscopy, while the long-term consequences remain unclear. Use of new technologies are perhaps the key changes that should be pursued made in response to the ongoing pandemic.

Keywords: COVID-19, Gastrointestinal, Endoscopy Training.

Introduction:

anxiety (52.4%) and burnout (18.8%). Major societies and groups from the United States, Europe, the United Kingdom, Asia, and Japan issued various guidance and guidelines[1], of which four had explicit limitations on trainee involvement in endoscopy[2]. Nonessential endoscopic activity was suspended, trainees were redeployed to support critical services of the hospital, and trainee participation in endoscopies that were still being performed was also limited[3].

These initial measures were disruptive, but effective. New COVID-19 cases decreased, we appeared to have crested the peak, and plans for gradual resumption of endoscopy services were being rolled out[4]. However, easing of restrictions and reopening led to the arrival of second waves in Europe, the United States, and many other countries, triggering the reimplementation of restrictions and even full lockdowns in some areas[5]. Despite the herculean effort from researchers to develop vaccines, it is clear that we will have to continue living with COVID-19 for at least the near future[6].

What was initially a short-term fix has stretched into longer term measures, and these continued restrictions have created a significant gap in learning opportunities for gastroenterology trainees. Endoscopy is a key

The coronavirus disease 2019 (COVID-19) outbreak, caused by infection from the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is an ongoing pandemic that, in just a few months, has dramatically changed many aspects of our lifestyles, including education. It was immediately clear to the entire scientific community that it was necessary to reorient study and research priorities towards the COVID-19 outbreak, so as to make vital information and knowledge available. For the longer term, however, the future of medical education at all levels is unclear. Indeed, the beginning of this health crisis has interrupted and distorted the learning and training routines in hospitals and universities[1].

The coronavirus disease 2019 (COVID-19) pandemic continues to rampage the world. Many countries responded quickly with institution of lockdowns to slow down the spread of the virus, prevent health-care services from being overwhelmed, and reduce mortality. This significantly impacted gastroenterology and endoscopy training globally, with European trainees reporting reductions of activities up to 90% and 66.4% reporting interruption of trainee involvement. An international survey involving 67 countries and 770 respondents reported high levels of

teaching faculty globally has not yet been reported. This study hypothesized that the pandemic has negatively impacted endoscopy training and that there have been geographic variations in the extent of that impact. Furthermore, this study hypothesized that the responses initiated by training programs to mitigate the impact vary between regions[13].

COVID-19 effect on gastroenterology training:

Pawlak et al. [14], undertook an international survey regarding the COVID-19 outbreak recruiting 770 gastroenterology trainees from 63 countries. The primary outcome was the reduction in monthly procedure volume before and during COVID-19. The vast majority of participants (93.8%) reported a significant reduction in endoscopic procedures of all types. Moreover, the median percentage reduction in procedural volume was 99%, a finding that varied by procedure type, but not by trainee specialty or whether procedures were performed under supervision or independently. Colonoscopy was the endoscopic procedure with the higher percentage reductions (88%-100%) vs. endoscopic retro-gradecholangiopancreato graphy (ERCP) (60%-100%) and upper GI bleeding procedures (50%-100%). Of interest, 73.5% and 3.6% of the trainees reported a ≥50% decrease or cancellation of all endoscopic activities, respectively. The most important reductions were seen in Europe and North America compared to Asia and South America.

Among trainees who still had access to endoscopic procedures, 36.1% could perform endoscopy on patients at low risk or negative for COVID-19, whereas only 6.2% reported no endoscopic restrictions. Key barriers to endoscopic training included institutional policy changes (79.9%), a reduced number of patients (58.3%) and limited availability of personal protection equipment (PPE) (28.8%). These results were confirmed in a national level when the aforementioned survey was distributed among UK trainees (132 responders). Among different endoscopic procedures, the most significant difference was noted between upper GI bleeding procedures (mean reduction 78%) and ileocolonoscopy (mean reduction 97.2%). Once again, these differences reported were attributed to institutional policies that excluded trainees component of the syllabus, and trainees are expected to become proficient in a wide range of diagnostic and therapeutic modalities. However, there has been a uniform reduction in procedure numbers globally, and there is growing concern as to whether sufficient competency can be attained within the finite training period[7]. Even when services do resume, it appears unlikely that training will recommence in the same capacity as it did beforehand. It is imperative that we adapt to this "new normal," and come up with alternative strategies to ensure trainees still remain competent[8].

Definition:

The coronavirus disease of 2019 (COVID-19) pandemic has impacted not only the health of people but also the learning experience of medical trainees worldwide. The virus responsible for the COVID-19 pandemic, SARS-CoV-2, spreads primarily through respiratory droplets and close contact with infected individuals [9]. The highly infectious nature of SARS-CoV-2 and morbidity and mortality associated with COVID-19 have made it necessary to revise the approach to physician-patient encounters as well as trainee education [10]. Medical centers have had to redesign their clinical, procedural, and scheduling practices to achieve physical distancing between patients and other personnel. These measures have disproportionately affected procedural specialties, such as gastroenterology (GI), due to the suspension of elective procedures as well as concerns of spreading SARS-CoV-2 during aerosol-generating endoscopic procedures [11].

Given that endoscopy training requires close proximity between the trainee, trainer, patient, and assisting staff, attitudes and approaches to training have been substantially impacted by the COVID-19 pandemic. An international survey of GI trainees reported multiple barriers to training and variable access to training [12]. A recent North American survey found that almost half of interventional endoscopy training programs had suspended endoscopic training due to the pandemic, with trainees excluded from participating in procedures in approximately half of all endoscopy units. The global impact of COVID-19 on endoscopy training from the perspective of GI fellowship directors and

didactic training in the cognitive aspects of gastroenterology, for example, procedural indications, complications, and limitations. The traditional classroom model of teaching is now unfeasible due to the social restrictions that have to be imposed. An alternative method is the "flipped classroom" strategy, whereby trainees are provided with educational material that they can peruse at their own leisure prior to the teaching session. The aim of the session then shifts to synthesis and application of the provided material[18]. This has been shown to improve knowledge acquisition and is widely preferred by trainees[19].

Gastrointestinal societies have been at the forefront in the curation and generation of endoscopy learning material. All major American gastrointestinal societies have online platforms such as the GI Leap portal from the American Society of Gastrointestinal Endoscopy (ASGE) and the American College of Gastroenterology (ACG) Education Universe that contain high-quality, expert-led endoscopy training videos[20].

There are also online educational programs such as the American Gastroenterological Association (AGA) GI Distance Learning portal and the ACG weekly Virtual Grand Rounds[21]. European societies such as the European Society of Gastrointestinal Endoscopy (ESGE) also offer similar programs such as the ESGE Webinar Series, which gives trainees the chance to view and participate in presentations made by world leaders in endoscopy[22].

Virtual conferences and live endoscopy sessions that are organized via international collaboration also allow trainees to access expert faculty while bypassing the usual limitations of cost, travel time, and jet lag, increasing exposure and educational opportunities in a nonstressful environment. The cost of many of these virtual conferences is often a fraction of the in-person meetings, although networking and social interaction is much attenuated.Many training programs have also moved their traditional conferences and teaching sessions to a teleconference format. This can be performed via applications that transmit live video feeds, allowing trainees to participate by asking questions directly. Endoscopy video rounds can also be carried out in this virtual style as well. Fellows and their mentors can discuss key aspects of the from procedures (75.8%), lack of cases (56.8%), and reassignment to other clinical areas (47.7%). All participants reported a reduction in the endoscopy case volume with 96.0% of them reporting a >50% reductions[15].

COVID-19 effect on trainee well-being:

Burnout, a psychological syndrome characterized by exhaustion, cynicism, and inefficiency is a chronic progressive medical entity that can ultimately lead to real life morbidity and even mortality. A plethora of risk factors that can possibly lead to a burnout, among them younger physician's age (trainees/residents), procedure complexity, procedure-related adverse events, work-life imbalance, have been destabilized in the COVID-19 era. Three major components of burnout searched in clinical studies include emotional exhaustion, depersonalization, and low sense of personal accomplishment [16].

A worldwide,web-based survey that was undertaken in midst of the COVID-19 pandemic among 319 fellows (85 GI trainees) revealed that trainees taking care of COVID-19 patients were increasingly more likely to report burnout compared with trainees who did not take care of patients with COVID-19 [17].

In the international survey by **Pawlak et al.[14],** trainees expressed their concerns about the impact of COVID-19 on their physical health. In details, 79.3% were concerned with being infected with the virus, while 23.9% reported taking time off work for COVID-19-related reasons, 76.8% for themselves and the remaining 23.4% for a member of their family. Of interest, more than half of the trainees (52.4%) reported mild, moderate or severe anxiety, that was independently associatedwith female gender, PPE adequacy, lack of institutional support for emotional health, and training prolongation concerns.Finally, up to 18.8% of trainees met the criteria for burnout. Similarly, in the UK study half of the trainees reporting experiencing significant anxiety, while 10.8% officially met the criteria for burnout. What is comforting though was that institutional emotional support strategies were available to 90.8% of trainees [15].

Addressing training challenges in COVID-19:

Online Training:

The pandemic has accelerated the uptake of many innovations by both gastrointestinal societies and individual programs to aid in

almost universal adoption of telehealth from healthcare workers, with 87.9% of physicians reporting >75% utilization in their centers (40). Notably, this percentage was even higher in gastroenterology fellows' clinics (90%), while it has increased considerably compared to that previously reported (47% of centers implemented >75% telehealth) [28], highlighting the method`s growing popularity. Similar results were obtained from two other surveys from USA and Australia, respectively.

Mallon et al. [29], documented a major shift in telehealth with the median number of telehealth visits per week per fellow being 5 (range 1-25); 76% of programs reported having fellows use telehealth in contrast to the 98% not using telehealth in the pre-COVID19. Didactics were moved to virtual conferences in 94% of the programs with fellows utilizing various online resources. Regarding bench laboratory research, 27% of the programs reported no fellows involved, while 89% reported fellows working from home. As far as clinical research was concerned, 25% of the programs reported no changes with most 61% reported institutional restrictions. The latter documented fellow involvement in almost all telehealth consultations sessions (99%), following the pandemic crisis. Aside the outpatient clinic, telemedicine could be also incorporated in the management of hospitalized patients in the form of virtual clinical and imaging case review to determine subsequent diagnostic and treatment plans[30].

Simulation Training:

Endoscopy has traditionally been taught using an apprenticeship model encapsulated by the dictum "see one, do one, teach one" method, where the trainee learns primarily through direct patient encounters under the guidance of an experienced teacher. However, this approach has several limitations. Trainees routinely learn the most basic endoscopic maneuvers for the first time on patients, which can be risky. Such a system usually leads to the trainee endoscopist focusing on gaining technical competence first before learning how to make appropriate diagnoses, which may lead to inappropriate interpretation of endoscopic findings[31]. Feedback directly tailored to the trainee is critical to learning, but this can be challenging to provide on-site in a hectic clinical setting. Furthermore, the level of training and advice that is provided can vary endoscopic procedure, while taking advantage of the wide range of educational material available online for education on case-related topics. In addition, this format allows for other faculty members (e.g. surgery, pathology, and radiology) to contribute to teaching, broadening the trainees learning experiences[23].

Tele-endoscopy has also been used as an alternative training method in view of reduced endoscopy volumes. This involves trainees observing real-time endoscopic procedures being performed by experienced seniors, letting trainees continue to be involved in the decision-making process for procedures, as well as the live interpretation of endoscopic findings[24]. These recordings can be archived and viewed on-demand in the future.Social media has also risen as an invaluable tool for augmenting individual learning. YouTube, Twitter, and LinkedIn have all been used as platforms to post educational infographics or clips of endoscopic procedures with commentary. These are unique methods for engaging a large number of participants in interactive discussions and are valued for both their flexibility, speed, and reach[25]. Real-time changes and new scientific knowledge can be shared and discussed even in this COVID-19 environment. Traditional criticisms have been towards the accuracy of the content provided. However, there has been a steady movement towards increasing rigor and authenticity, with experts leading regular structured conversations about difficult clinical cases and impactful journal articles[26].

Clinical Training:

During the COVID-19 pandemic the shortage of PPE and struggle to limit exposure of medical personnel, led "traditional" visits to diminish both in duration and team size, while in a similar manner outpatient clinics drastically decreased [27]. In this regard, tele-health (via online video sessions) and telemedicine (via phone) consultations, feature as a sustainable solution for outpatients seeking initial evaluation or follow-up due to presence of chronic diseases, solution that is also favored by a large proportion (74%) of physicians (74%) in a recent survey, as well[3]. Results from a large web-based survey among US gastroenterology and hepatology providers (attending physicians, fellows, nurse practitioners, and physician assistants), showed

medical education showed superiority in achieving specific clinical skill acquisition goals[36, 37]. SBML has been used to effectively teach upper endoscopy endoscopic skills to novices and also used to successfully train practicing endoscopists in the acquisition of the clipping over the scope technique[38]. The Accreditation Council for Graduate Medical Education in the United States and the ASGE reflect this by encouraging the use of simulators for endoscopy training[39].

Finally:

The COVID-19 pandemic is a unique challenge that has arrested gastroenterology and endoscopy training but has also become a driving force spurring fundamental and structural changes in endoscopy training. Many techniques and pedagogies described in the literature were developed prior to the pandemic, and their efficacy in the pandemic setting has not been studied specifically. Furthermore, the heterogeneity of the outbreak means some of these factors are not universally applicable in all care settings. For example, in countries such as Singapore and Korea where the pandemic is under relative control, face-to-face training has already resumed with the addition of precautions such as masks and limited group sizes.

These developments are not all positive. Although low-cost simulators in response to the COVID-19 situation have been described, simulators in general are costly and not always available, and no amount of simulation can replicate the tactile response of live endoscopy. Remote learning methods are often impersonal, and overall reduced training numbers will certainly impact training adversely.

Even though the pre-COVID-19 landscape offered a richer training experience, successful training programs will need to evolve and make the most of a difficult situation by incorporating new teaching paradigms into their endoscopic curricula.

Conclusion:

COVID-19 has negatively impacted on multiple domains of gastroenterology training, particularly in relation to endoscopy, while the long-term consequences remain unclear.Use of new technologies are perhaps the key changes that should be pursued made in response to the ongoing pandemic.

widely—being an experienced endoscopist does not make one a good teacher[32].

In general, the gastrointestinal community has limited adoption of simulation-based learning, compared with other disciplines such as surgery, critical care, and interventional radiology. However, the ongoing restrictions on endoscopy volume and trainee participation make this an ideal time for programs to evolve and incorporate simulation into their teaching syllabi. Simulation-based mastery learning (SBML) is a well-structured form of competency-based education that allows for the acquisition of procedural skills quickly and safely through repeated practice[33]. Task complexity is progressively increased to align with trainee competence, and a minimum level of knowledge and skill has to be demonstrated before being allowed to advance on to the next stage, ensuring all trainees learn uniformly. SBML helps with acquisition of endoscopy-related skills through a process of repetition and feedback. This allows trainees to build a basic framework of skills and techniques, and competency to be achieved at one's own pace[34].

Simulators exist for all major domains of gastrointestinal endoscopy and can be used for novice and advanced endoscopists alike. Practice of basic endoscopy skills such as endoscopic handing, tip deflection, and torque steering can accelerate the time needed to achieve minimum competence. Becoming familiar with endoscopic techniques lets the trainees focus on image recognition and interpretation when performing endoscopies on real patients. It is also particularly useful for training in uncommonly encountered scenarios, such as low-frequency lesions like large polyps requiring endoscopic mucosal dissection or submucosal resection, esophageal nodules in Barrett's esophagus, or early gastric cancer. Modules that focus on lesion recognition, classification, and decision-making skills will help to facilitate skill acquisition, reinforce skill maintenance, and shorten the learning curve for training of new techniques[35].

A growing body of evidence shows that clinical skills acquired in simulation settings transfer directly to improved patient care practices and better patient outcomes. A meta-analysis of 14 studies comparing simulation based learning compared traditional clinical

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