

Review Article

PERFORMING SAFE GI ENDOSCOPY AMID COVID-19 PANDEMIC IN PAKISTAN

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ABSTRACT

Coronavirus disease (COVID-19) is being declared as a global pandemic by the World Health Organization after its emergence from China. Body secretions including respiratory aerosols and feces and environmental surfaces exposed to these secretions are listed as the main cause of human-to-human transmission. Previous reports have strongly suggested that a significant number (29%) of COVID-19 patients were healthcare workers in the medical facilities. It is inevitable to avoid exposure to either respiratory or gastrointestinal fluids from patients during endoscopy. This presents a great risk of the infecting virus to skilled medical professionals. Various endoscopy societies and the leading organization has published a suite of recommendations based on the expert's opinion and experiences of handling the pandemic. However, each society has also greatly emphasized to develop appropriate contingency plan on management and preventive measures based on specific resources and COVID-19 patients at each endoscopic center. Since the COVID-19 cases are continuing to rise, we aim to review the literature and compile a set of recommendations implacable in Pakistan to limit the spread of COVID-19 in endoscopic facilities. Lack of awareness, poor compliance, socio-economic factors, limitations of national health resources, and lesser resilience in the health system are key challenges. However, designing a COVID-19 response management system, preparedness and use of appropriate Personal Protective Equipment (PPE) can ensure zero transmission of the contagious pathogen-associated outbreak and hygienic endoscopy services without subjecting patients and staff to undue health hazards.

Key Words: COVID-19, Pandemic, Endoscopy

INTRODUCTION

Coronavirus disease (COVID-19), caused by new coronavirus of SARS-CoV-2, initially emerged as an epidemic in Wuhan, China and rapidly spread all over Asia and the World Health Organization (WHO) declared COVID-19 as a global pandemic on 11 March 2020.¹ Human-to-human transmission appears to occur through secretions of respiratory systems including aerosols and feces, and contaminated environmental surfaces.^{2,3}

It has been suggested that both symptomatic and asymptomatic individuals can be a source of transmission.^{4,5} Likewise, SARS-CoV-2 can survive in confined public spaces i.e., toilets, elevators corridors, and doorknobs.⁶ A recent study revealed that the source of the vast majority of COVID-19 patients remained untraced primarily due to community transmission suggesting a higher number of cases than reported.⁷ Thus, the risk of contracting the infection is higher than anticipated particularly to healthcare workers. It is evident from the earliest reports from Wuhan province where a significant number (29%) of COVID-19 patients were healthcare workers in the medical facilities on the premises.⁸ The spread of the virus globally suggests that the earliest measures to contain the virus were insufficient regionally as well as globally. Lack of coordinated systems, misapprehension of the mode of transmission of the virus and poor resilience

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in the medical system against infectious diseases particularly in developing countries are key bottlenecks to contain the virus. It is well anticipated that an asymptomatic individual visiting a medical facility could potentially be a source of infection to healthcare workers. Therefore, it remains uncertain whether the spread of the virus in healthcare workers was due to direct contact with the patients or associated with exposure to fomites due to inadequate use of Personal Protective Equipment (PPE).

Medical procedures such as endoscopy where exposure to fluids/droplets either from the respiratory or gastrointestinal system of patients is inevitable present a great risk of the contracting virus to skilled medical professionals. Although, no evidence has suggested so far positive insufflation during routine endoscopic procedures could present a risk of generating aerosol, thus higher risk of SARS-CoV-2 transmission. Healthcare workers involved in endoscopic procedures, therefore, are facing immense hazards during the COVID-19 pandemic as it disseminates mainly through direct contact or aerosol droplets.¹ Thus, adequate protection of healthcare workers is critical amid the COVID-19 pandemic.

There has also been a great deal of literature published on safe work procedures in healthcare facilities. The World Endoscopy Organization has recently published a series of recommendations to prevent infection and control in digestive endoscopy procedures after reviewing cases in China.⁹ In addition, the American College of Gastroenterology and the British Society of Gastroenterology, and the Asian Pacific Society for Digestive Endoscopy (APSDE) developed their position papers based on expert's opinions and current experiences in handling the pandemic under specific conditions and resources. On the contrary, each society has emphasized that endoscopic centers are required to develop their own contingency plan on management and preventive measures based on specific resources and the number of in-coming COVID-19 patients. This will help to contain the virus from the

spread and ensure safe and high-quality endoscopy services without putting patients and staff to undue health hazards. Since the number of COVID-19 cases continuing to rise, we aim to review the literature published for safe work procedures during endoscopic procedures and compile a set of recommendations presenting practical aspects implacable in Pakistan to limit the transmission of COVID-19 in the endoscopy units.

Risk Assessment

Each healthcare facility should delineate resources to investigate the risk of a patient with suspect or confirmed cases of COVID-19 for screening and risk-stratified before the arrangement of an endoscopic procedure.

The WHO characterized COVID-19 confirmed patients with laboratory investigations of infection, irrespective of clinical signs and symptoms¹⁰ while a suspected case, for whom testing is inclusive, based on three criteria: (1) patient having acute respiratory symptoms with no history of travel or residence in the country reporting community transmission of COVID-19 the past 14 days before the onset of symptom; (2) patients with acute respiratory symptoms having in contact with a confirmed or suspect case of COVID-19 in the past 14 days before the onset of symptoms and (3) patients required hospital admission with severe acute respiratory infection having no other clinical cause required for COVID-19.¹⁰

The APSDE has emphasized deferring elective endoscopic procedures (Table 1) until the COVID-19 pandemic is over. This will help to spare surgical facilities to handle an anticipated large number of suspected or confirmed cases of COVID-19 while limiting the risk of transmission to healthcare providers and between patients.^{11,12} It will also allow the time required for the necessary education and training of healthcare providers at endoscopic centers. A retrospective case study from Iran reported the death of three patients out of four after contracting COVID-19 infection at elective surgery.¹³

Transmissions modes of SARS-CoV-2 during endoscopy

The characteristics of the SARS-CoV-2 virus and the potential transmission method recognized to date make endoscopic procedures a risk of contracting infections. Nearly half of the patients diagnosed with COVID-19 exhibited GI symptoms including anorexia (83.8%), diarrhea (29.3%), and vomiting (0.8%) with an increasing trend of severity with the disease progression.¹⁴ In addition, reports from the SARS epidemics suggested the presence of coronavirus in stool samples and intestinal biopsy samples.¹⁵ Evidence has been provided recently that COVID-19 can be present in the oral cavity and fecal samples of infected patients.^{3,16-18} This suggests an association of the GI system as target incubation sites for the virus in the body and thus the source of infection. Potential modes of transmission of SARS-CoV-2 recognized include (I) person-to-person contact, (II) respiratory droplets, (III) aerosols, and (IV) body fluids and previously contaminated surfaces.^{2,14} The virus is detected in the blood and other secretions thus additional care is required in handling samples. The risk of fecal contamination is not known yet but SARS-CoV-2 has been detected in the faecal samples of patients regardless of the symptoms.^{9,17,18} Thus it remains plausible that the virus may sustain even with a negative result of respiratory tract sampling and present a risk through aerosolization and fecal-oral route of contamination.¹⁹ Evidence has been reported in a recent study demonstrating the persistence of viral RNA up to 47 days in faecal samples after the onset of the symptoms.²⁰ Endoscopes are often exposed to gut flora a vector of the infection, thus pose a risk to endoscopists, nurses, and other assisting staff. A study conducted in Hong Kong during the SARS outbreak reported that the risk of infection is highest for healthcare assistants (8%), followed by physicians (5%), and nurses (4%).²¹ This study and modeling work presented the Imperial College COVID-19 response team, which has emphasized the suppression policy

comprising of strict isolation, use of appropriate PPE, and other infection control measures can significantly reduce infection and mortality.^{11,21} The Centers for Disease Control and Prevention (CDC) has recommended the use of a separate bathroom for infected patients as the virus was detected in feces. Therefore, limiting oral-fecal transmission and adopting appropriate measures is critical to limit the spread of the virus through these routes. It is widely suggested that the individual with recent travel history to COVID-19-affected areas should isolate in self-quarantine for 14 days regardless of any apparent symptoms of the disease to eliminate the risk of transmission.

Our Challenge

Lack of awareness, poor compliance to control measures, and various other socio-economic factors possibly contribute to the increasing number of cases in developing countries like Pakistan. On the other hand, an efficient health system aims to achieve zero viral transmission among healthcare workers providing essential services to the patients. This becomes more important for a health system with less resilience and overwhelming burden and lack of sufficient skilled human resources. GI community in Pakistan presents such skilled human resources at risk and there is a dearth to prevent exposure during any endoscopic procedure. Henceforth, it requires to develop a checklist of standard operating procedures based on available resources at the medical facility. The use of appropriate quality PPE and their disposal remain paramount to prevent the spread of the virus. We present some general measures required to be considered while formulating an inventory of the standard operating procedures.

Standard Operating Procedures: Management

1. Training of the essential personals associated with endoscopy i.e., endoscopists and other healthcare providers on the use of PPE to ensure the limited risk of viral spread during endoscopy is key to effective and

resilient institutional strategy to prevent the spread of the virus.²²⁻²⁴ It warrants that staff understand their responsibilities and are held accountable in case of any unanticipated circumstances. Following a standard hand hygiene protocol before and after each procedure with appropriate disinfectant (62-71 % ethanol, 2% glutaraldehyde, and 0.1–0.5% sodium hypochlorite) can significantly reduce virus load within 1 min of exposure time.²⁵ We suggest the risk stratification derived decision making of the use of PPE according to (Table 1).

2. Preparedness and a robust system of managing staff is an important part of performing endoscopic procedures during the COVID-19 to attain zero transmission during the pandemic. The procedure should be ideally conducted in a negatively pressured room if available.²⁶

3. Establishment of a rapid communication mechanism using various information technology tools is important, so updated information of patients and equipment is available for staff across the entire facility.

4. Encouraging regular feedback on the delivery of the response system and updates on the recent development of research outcomes among administrators, infectious control team, doctors, and paramedics to ensure unified efforts exerted to prevent the transmission.

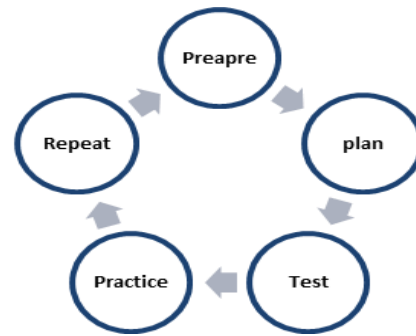


Figure 1. Presents essential elements of standard operating procedures for effective virus transmission control strategy

Preparation

1. Pandemic requires establishing a separate reception area to collect initial history and assess the risk of COVID-19 infection. This could follow directing the patient to the appropriate section of the facility ensuring a sitting plan of 6ft distance between patients and hygienic procedures to warrant zero contamination risk in the waiting area. Establish a separate food area in the facility to ensure maximum hygiene.

2. Preventing staff to staff transmission is very critical and requires safe workflows including individual stations with minimum sharing of the equipment such as a computer, phone, and stationery. It also involves wearing appropriate PPE, disinfecting workstations, and associated equipment during the transition of the staff after work hours with recommended viricides using the correct dosage.



Figure 2. Visual presentation of the use of PPE for general patients and handling of suspected/confirmed cases of COVID-19

3. Developing and disseminating self-explanatory pandemic workflow enlisting clear tiers of job descriptions. For instance, effectively dividing clinical personnel into multiple teams at well-defined intervals of service delivery with the flexibility of a backup plan, in case a member of the team is unavailable or requires quarantine.

Indications for procedures

Indications for critical GI procedures include managing upper GI bleeding, acute cholangitis, obstructions associated with a foreign body.⁹ Cancer patients that require preliminary diagnosis, biopsy, staging, palliation of biliary and luminal obstruction could be considered urgent depending upon

clinical evaluations. Other non-essential procedure (Table 2) could be rescheduled depending upon the availability of resources and allowing the provision of medical attention and institutional resources for the terminally ill patients. This could additionally prevent the potential risk of contamination, particularly from asymptomatic patients.

Endoscopic procedures require a short physical distance between patients and healthcare providers. It has been previously suggested in 2003 during the SARS outbreak that aerosol droplets from infected patients could reach two meters or more from the source.²⁷

Table-1: Type of endoscopy procedures and appropriate PPE¹ required (regular or specialised), manpower and frequency of gown down²⁶

Procedure	AGP ²	Regular PPE for non-suspected/test negative cases	Specialled PPE for high risk/confirmed patients	Endoscopist manpower	Endoscopy nurses manpower	Frequency of gown down
Colonoscopy	To be determined	Regular mask or N95, Gloves, Isolation gown, regular procedural facility	N95, gloves, gown, safety goggles or face shield, negatively pressurised room	1 (at specialist level)	2	Gloves and mask: Use new for each procedure, gown as required after contamination
ERC³	To be determined	Gloves Surgical mask or N95, Blue isolation gown, and gloves.	N95, gloves, gown, safety goggles or face shield, negatively pressurised room with ample space and X-ray shielding	1 (at specialist level)	2	Gloves and mask: Use new for each procedure, gown as required after contamination
Bronchoscopy	Yes	Gloves, N95 mask, safety gown, safety glasses of the face shield, negatively pressurised room	N95, Blue isolation gown gloves. Safety glasses or face shield, negatively pressurised room		2	Gloves and mask: Use new for each procedure, gown as required after contamination

¹Personal Protective Equipment. ²Aerosol Generating Procedure; ³Endoscopic Retrograde Cholangiopancreatography²⁶

Table 2 enlists the classification of urgent, semi-urgent, and elective endoscopic procedures. Elective procedures could be deferred in case of an outbreak based on cases to case need and indications of patients and decision made by clinicians.²⁶

Urgent endoscopy	Semi-urgent endoscopy (to be discussed on a case by case basis)	Elective endoscopy (deferred until further notice)
Assessing GI bleeding caused by acute gastrointestinal and ulcers, biliary sepsis, stent due to foreign body and other obstruction, GI access for urgent feeding	Treatment of GI neoplasia (EMR ¹ /ESD ²), assessing possible cancer, bleeding, small bowel enteroscopy for the occult, ERCP ³ for hepatobiliary pancreatic cancers	Regular endoscopic procedures for diagnosis and follow-ups, ERCP or other treatments of non-cancerous conditions, asymptomatic stones; chronic pancreatitis; insertion/replacing metal stent, check-ups for ampullectomy, diagnostic procedure for benign cancer, bariatric, GORD ⁴ ,
¹ Endoscopic Mucosal Resection, ² Endoscopic Submucosal Dissection, ³ Endoscopic Retrograde Cholangiopancreatography, ⁴ Gastro-Oesophageal Reflux Disease		

Recommended practices in case of marked community spread of COVID-19

1. Establish a screening station at the entrance of the facility and require every individual including staff to get screened for body temperature before commencing their work. The vulnerable staff member with impending conditions shall be prevented from work.
2. CDC mitigation strategies in case of substantial community transmission require all staff to wear PPE while in the facility.²⁸ A high viral load in the upper respiratory tract poses an important risk of viral transmission particularly from asymptomatic persons.²⁹ Persistence of viable viral load on the contaminated surfaces for a prolonged period suggests that all staff must wear PPE at all times at work.⁵
3. Staff require social distancing while working at individual workstations with minimum risk of cross-contamination. Restrict the use of shared facilities, equipment, and encourage regular disinfection of the area.
4. Reduce the number of staff and paramedics in the endoscopy suite to the essential numbers while off-duty staff can stay home

as much as possible. Limit/restrict the movement of support personnel of patients in the facility.

5. Use the data lodger to record the visitor and healthcare workers in the facility with their contact numbers. This record may facilitate to advise self-quarantine in case of exposure to the COVID-19 patient.
6. Staff required for endoscopy must use scrubs provided at the facility and use endoscopy shoes and gear should remain in the hospital in the preparation room. Regular disinfection of gear and disposal of used material should be performed and recorded with the mention of the date, time, and disinfectant.
7. The COVID-19 screening guidelines continue to evolve but symptoms resembling such as fever and/or symptoms of acute respiratory illness should be assessed at the time of admission. Potential contact of healthcare workers with a suspected or laboratory-confirmed COVID-19 should be quarantined.
8. The availability of testing kits for COVID-19 at the endoscopy facility may facilitate a more accurate stratification of the potential risk of contamination.

Before the procedure:**Outpatients**

1. Risk assessment by screening the patient with symptoms, signs, and exposure to COVID-19 positive case or travel history to effect area. Monitor their temperature at the facility to risk stratify.
2. In case of a pandemic, it is imperative to test suspected patients for COVID-19 using RT-PCR³⁰ and decide appropriate at the receipt of the results if possible.
3. Restrict the movement of the patient in the facility while waiting for the procedure to minimize facility contamination.

In-patients

1. Inquire about symptoms for any suspected COVID-19 coming to endoscopy units and triage appropriately.
2. Prior to endoscopic procedures, all patients should be subjected to COVID-19 testing using real time-PCR³⁰ and wait until results are received if possible.
3. All patients should receive PCR-based testing for active COVID-19 infection at least 48 hours prior to the procedure.

Disinfection protocol

Disinfect the reusable medical equipment (RME) as no evidence has been suggested otherwise. It is important to note that the highest risk of contamination is accounted for pre-clearing of the endoscope due to air and water splashes. Thus, it remains imperative to switch off the processor while replacing the credit card button from the air/water button. SARS-CoV-2 is sensitive to all frequently employed disinfectants for example; organic solvents and chlorine-based solutions. The CDC provides a comprehensive list of standard operating procedures for cleaning and disinfection. Strict compliance with personnel hygiene in the unit remains fundamental that could be achieved after appropriate training, practices, and maintaining a regular record of proficient quality control. Staff must adhere to the adopted protocols and collaborate across the facility so all mechanisms of containing the virus are functioning in synergy. In

conclusion, guidance and key recommendation provided here are based on rationally developed practical experience, careful observations, and literature published previously. However, it is subjected to the realization that our understanding of SARS-CoV-2 is rapidly evolving in the light of recent research.

Conflict of Interest

The authors declare no conflict of interest.

AUTHOR'S CONTRIBUTION

SL: Conception of idea and study design
 HBS: Data collection
 RO: Drafting article
 WQ: Data collection
 TW: Critically review

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