ORIGINAL ARTICLE

Endoscopy in a COVID-19 Referral National University Hospital: A Single-center Experience and Recommendations

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ABSTRACT

Rationale. COVID-19 pandemic disease, can be transmitted during gastrointestinal procedures, via aerosolized droplets, and via fecal shedding. Both international and local endoscopy societies have issued strategies to alleviate the risk to endoscopy personnel. However, several barriers against the implementation of these recommendations exist thus individual center's policies are employed whenever applicable.

Objectives. This narrative study aims to describe the current experience and set-up in the endoscopy unit of a COVID referral center, discuss the stratification of patients for endoscopy, the operational management of the personnel and endoscopy unit in line with the adapted local and international guidelines and offer endoscopists a quick reference guide to adapt endoscopy practice during the pandemic in a resource-limited setting.

Methodology. This paper reviews and consolidates current endoscopy guidelines and describes the single-center experience of Philippine General Hospital.

Results. In resource-limited settings, with uncertainties of prolonged COVID-19 impact to healthcare, modification of practice, adherence to strategies and recommendations, empowerment of workforce, establishing the sustainability of resources, training, and service to patients, are essential components to combat current dilemma brought about by this pandemic.

Conclusion. Integration of current local and international guidelines encompass all aspects of endoscopy practice during the pandemic. The recommendations cited are aimed to guide other resource-limited endoscopy units for potential changes and guidance in the overall practice.

Key Words: endoscopy, COVID-19, single-center experience

INTRODUCTION

With an alarming spread and increasing severity, the World Health Organization has declared the Coronavirus Disease 2019 (COVID-19) as a public health emergency of international concern last January 30, 2020. The heightened alert among its constituent countries became more evident when it was characterized as a pandemic on March 11, 2020.[1] The Philippines had its first local transmission case in the first week of March and has since then increasing trends.[2] As of July 27, 2020, a total of 82,040 cases were confirmed locally. And with an intensified national action plan, the Department of Health (DOH) designated the Philippine General Hospital[3] as one of the COVID-19 referral centers in the country. This has led to scaled-up selective admission

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of patients limited at most to COVID-19 cases at high risk for deterioration and non-COVID emergencies from various subspecialties.

Clinical departments performing endoscopy and other aerosol-generating procedures are primarily affected by the current situation. Since the initially thought of as a respiratory tract infection primarily transmitted by direct contact and droplets is evolving, there has been emerging evidence proposing possible fecal-oral spread as well. The gastrointestinal tract epithelial layer has been shown to have ample angiotensin-converting enzyme 2 protein receptors that are essential for SARS-CoV-2 cell entry. Furthermore, there have been reports of asymptomatic carriers naively disseminating the virus to close contacts with detectable viral loads.[4-7] This has posed challenges and threats to healthcare workers in endoscopy units. To date, international and local specialty societies in gastroenterology and endoscopy have recommended a myriad of strategies and recommendations in endoscopy practice.

While currently, no specific data has shown the frequency of endoscopy units healthcare providers infected with COVID, the outbreak has still led to a great number of confirmed cases among healthcare workers. In Italy for instance, up to 20% of healthcare workers were reported to be infected. In the Philippines, 18.23% of the country's cases are healthcare workers. To prevent further disease transmission, different institutions propose specific standards intending to enhance both patient and personnel safety, prevent nosocomial outbreaks, promote efficient workflow processes, and ensure rational use of limited personal protective equipment (PPE).

METHODOLOGY

This article aims to describe the current experience and set-up in the endoscopy unit of the largest hospital in the Philippines, discuss stratification of patients in need of endoscopic assessment, the operational management of the healthcare personnel and the endoscopy unit and to offer endoscopists of similar setting a reference guide to adapt their endoscopic activity during the pandemic. We also summarized both local and transnational policies in the practice of endoscopy during the pandemic.

ENDOSCOPY PRACTICE GUIDELINES REVIEW

Local and international endoscopy societies have released position statements from a variety of practices and accu-mulated experiences in approaching the challenges brought about by the pandemic. As shown in Table 1, both Western and Asian countries have developed recommendations across different aspects of endoscopy practice from patient selection, procedure stratification, the utility of personal protective equipment, ensuring patient safety and follow-up, and overall endoscopy practice. Concerning screening protocols, Asian societies appear to have more stringent measures observed likely from the increasing number of cases in these regions. For instance, clinical symptoms suggestive of COVID infection are indications for COVID test before endoscopy. Both Asian and Western counterparts on the other hand agree regarding postponement of nonurgent procedures until cases have subsided in respective areas of practice. There is a shared

Table 1. Summary of guidelines

	PSDE[8] Philippines	ASPDE[9] Asia-Pacific	WEO[13] Wuhan, China	GESA[14] Australia	ESGE/ ESGENA[15] Europe	Milan, Italy[16]	US Joint GI Society Message[17]	CAG[18] Canada
Screening for respiratory symptoms and FTOCC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Not specified
Screening for GI symptoms	Not specified	Not specified	Yes	Not specified	Yes	Yes	Not specified	Not specified
Preprocedural COVID-19 Testing	Yes	If FTOCC positive on history	Not specified	Not specified	Not specified	Not specified	Not specified	Not specified
Chest CT Scan	Not specified	Not specified	Yes	Not specified	Not specified	Not specified	Not specified	Not specified
Postponement of Nonurgent Procedures	Yes	Yes	Yes	Yes	Yes	Not specified	Yes	Yes
Defining Urgent vs Nonurgent Cases	Acute GIB, foreign body, biliary sepsis, obstruction, malignancy requiring diagnosis	Acute GIB, foreign body, biliary sepsis, obstruction and access for feeding	Acute GIB, foreign bodies and suppurative cholangitis	Urgent and Emergency	Depending on GI-related morbidity and mortality	Not specified	Urgent and Emergency	Individual institution decision

Table 1. Summary of guidelines *(continued)*

	PSDE[8] Philippines	ASPDE[9] Asia-Pacific	WEO[13] Wuhan, China	GESA[14] Australia	ESGE/ ESGENA[15] Europe	Milan, Italy[16]	US Joint GI Society Message[17]	CAG[18] Canada
Patient Screening/ Risk stratifications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patient safety measures	Not specified	Not specified	Surgical face mask	Surgical face mask	Surgical face mask and gloves	Surgical face mask and gloves	Not specified	Not specified
Waiting room rules	Yes	Not specified	Not specified	Not specified	No visiting/ accompany allowed	No visiting caregivers allowed	No visiting escorts/ caregivers	Not specified
Negative pressure room	Yes	High risk or positive for SARS CoV-19	Not specified	Not specified	Not specified	High risk or positive for SARS CoV-2	COIVD-19 confirmed or awaiting results	Not specified
Personal Protective Equipment	Enhanced PPE: Medical cap or hood, face shield or goggles, N95 mask, coveralls, impermeable gown on top of coveralls, booties and double gloves	N95 or equivalent, Blue isolation gown, Gloves, Goggles or face shield for high risk cases	Biosafety level 3 in suspected or confirmed COVID-19 patients Biosafety level 2 for staff in contact with patients	N95 or equivalent for all high-risk cases, otherwise surgical mask For all: eye protection, gloves, full-length waterproof gown	N95 or equivalent and two pairs of gloves for all high-risk cases, otherwise surgical mask and gloves	Different PPEs depending to risk. For all cases, goggles, hairnet, gown and pair of gloves	Hairnet, mask, eye shield/ goggles, gown and gloves	N95 or equivalent for all high-risk cases For all cases, gloves, gown, facial protection, and hairnet
Endoscopy Team	Only highly trained endoscopist, limit GI fellow involvement	Only specialist endoscopist and essential personnel	Not specified	Not specified	Only essential personnel must be present	Not specified	Only essential personnel must be present	Not specified
Patient Recovery	Post procedure at the recovery room	Not specified	Not specified	Not specified	Post procedure, mask is placed back to patient	Post procedure, mask is placed back to patient	Not specified	Not specified
Patient Follow up	Follow up after 14 days to ensure no COVID-19 infection	Not specified	Follow up via phone, 14 days after to check for infection	Not specified	Not specified	Follow up at 7th and 14th day post procedure	Not specified	Not specified
Endoscopy Training	For low-risk communities, semi-urgent and elective procedures may be performed by trainees (GI Fellow) provided that a highly trained endoscopist/ mentor is present to observe and assist	Not specified	Not specified	Not specified	Not specified	Follow standardized precautions of infection control	Redeployment of fellows who can't train or participate	Not specified

CAG, Canadian Association of Gastroenterology; COVID-19, coronavirus disease 2019; CT, computed tomography; ESGE, European Society of Gastrointestinal Endoscopy; ESGENA, European Society of Gastroenterology and Endoscopy Nurses and Associates; FTOCC, fever, travel, occupation, contact and clustering; FU, follow up; GESA, Gastroenterological Society of Australia; GI, gastrointestinal; GIB, gastrointestinal bleeding; JAG, Joint Advisory Group; PPE, personal protective equipment; SARS CoV-2, severe acute respiratory syndrome coronavirus 2; WEO, World Endoscopy Organization.

consensus for emergency cases across different guidelines. These include Upper gastrointestinal bleeding, foreign body extraction, and cholangitis among others. Regarding patient safety measures, the use of a surgical face mask is advocated. The endoscopy unit is encouraged to have a negative pressure room dedicated for confirmed cases. Unlike pre-pandemic times, visiting escorts and caregivers are no longer encouraged in the waiting room. In terms of personal protective equipment, it includes at least an N95 mask, overalls, booties, and gloves. To facilitate concise and efficient endoscopy, only essential personnel are advised to enter the suite. This includes the consultant gastroenterologist, anesthesiologist, nurse among others. To lessen the exposure and ensure safety among trainees, highly-trained endoscopists must be present in all procedures. For patient surveillance postprocedure, a follow up is encouraged at least 14 days after.

PHILIPPINE GENERAL HOSPITAL AND DIVISION OF GASTROENTEROLOGY

Philippine General Hospital (PGH), as a national university hospital and premier referral center of the country for tertiary care, caters to more than 600,000 patients annually consulting for specialty and subspecialty care. All its 19 clinical departments and associated units provide comprehensive services to both well and sick indigent Filipinos.

The Division of Gastroenterology under the Department of Medicine caters to endoscopic procedures of both charity and pay service patients at the Central Endoscopy Unit (CENDU). In 2019, a total of 2,623 esophagogastroduodenoscopy (EGD), 1,645 colonoscopies, 144 endoscopic ultrasonography (EUS), 144 choledochoscopy, 413 endoscopic retrograde pancreatography (ERCP), and other diagnostic and therapeutic procedures were performed. Usual cases and indications for endoscopy are primarily upper gastrointestinal bleeding and dyspepsia with alarm signs from inpatient and outpatient services, respectively.

In compliance with the societal proposed changes, CENDU has since then modified its system and workflow process. Since the COVID outbreak in the country and declaration of national emergency, endoscopic procedures in CENDU was limited to emergency procedures like gastrointestinal bleeding, foreign bodies, acute cholangitis, and feeding tube placement. Elective procedures were strongly recommended to be postponed. With the diversion of services of the hospital offered primarily for COVID confirmed cases, only a total of 523 underwent upper endoscopic procedures for the first half of 2020 compared to 1,131 cases from January to June 2019. A significant drop in the number of colonoscopic procedures was also observed in the past 6 months with only 287 cases compared to last year's 749 colonoscopies.

To attend to both ambulatory and inpatient cases, CENDU has a reception area and a waiting lounge for ambulatory patients and caregivers, 5 endoscopy suites, a recovery room, and a disinfection and decontamination section. It also has a documentation area, staff lounge, and conference room for the healthcare staff. With the current set-up, CENDU has allotted one endoscopy unit solely for COVID positive cases adjacent to the donning and doffing area. The prior reception room was converted to the latter. And for each procedure, stringent precautionary measures were observed to prevent disease transmission for every movement undertaken.

CENDU has 5 endoscopy nurses, 3 nursing attendants, 1 utility worker, 1 housekeeper staff, and 1 administrative aide. Regularly, everyone goes to the unit for a specific assignment and job delegations. During the pandemic, a skeletal scheduling system was employed in line with the hospital-wide policy. Staffs including fellows and consultants go to the hospital for 1 whole week straight and undergo 2 weeks of quarantine. This is designed to observe social distancing, monitor oneself for the development of symptoms, thereby circumventing risks of acquiring and spreading the virus. Endoscopy staff involved in handling the patient, performing the procedure and equipment and room disinfection, later on, are prescribed with full personal protective equipment (PPE) includes the coverall suit, face masks (N95) or a respirator, a face shield, 2 pairs of gloves (inner and outer layer), and shoe covers.

GASTROENTEROLOGY PROCEDURES / WORKFLOW PROCESS

Endoscopic Procedure Classification

Different endoscopy and gastroenterology societies have proposed strategies and guiding principles on endoscopy practice during the pandemic as summarized in Table 1. Endoscopic procedures are classified as emergency, urgent, semi-urgent, or elective based on indications and status of the patient. An expert panel consisting of the section chief, interventional gastroenterologist, and the training committee discuss the cases referred for procedure. The classification of procedures according to Philippine Society for Digestive Endoscopy (PSDE)[8] and Asian Pacific Society for Digestive Endoscopy (APSDE)[9] latest position statements (Table 2) and patient risk stratification in accordance to WHO[10] and Philippine Society for Microbiology and Infectious Disease[11] (Table 3) are the two most important considerations preprocedural.

Emergency cases are endoscopic procedures deemed life-threatening. Urgent cases, on the other hand, maybe performed within 24-48 hours from perceived increased morbidity and/or mortality. Procedures that need to be done in 1-2 weeks or else patients may have higher morbidity and/or mortality rates or increased stage or class of his disease ae classified under Semi-urgent cases. And lastly, Elective cases can be done within 3 months for asymptomatic patients with no immediate threats to health.

Table 2. Classification of Endoscopic Procedures

Emergency Cases
• Gastrointestinal bleeding with hemodynamic instability. • Bile duct obstruction, acute cholangitis and hemodynamic instability. • Endoscopic treatment of urgent post-operative complications such as leaks and perforations. • Food bolus impaction with respiratory compromise. • Foreign body ingestion with imminent threat of perforation or respiratory compromise. • Benign or malignant obstruction of the colon that needs urgent decompression. • Caustic Ingestion
Urgent Cases
• High suspicion and/or staging of gastrointestinal or pancreato-biliary malignancy (endoscopy with biopsy, EUS/FNA) • Pre-operative endoscopy wherein endoscopic results are needed for urgent treatment planning. • Gastrointestinal bleeding in stable patients with significant anemia and/or those who require blood transfusions. • Bile duct obstruction including stent occlusion without cholangitis. • Significant and symptomatic benign or malignant esophageal or gastrointestinal obstruction other than high-grade colon obstruction. • Clinically significant diarrhea i.e., acute graft versus host disease or inflammatory bowel disease, immune mediated colitis • Emergency endoscopic guided placement of feeding tube (if no other alternative access)
Semi-urgent cases
• ERCP for biliary stent exchange without signs of occlusion/cholangitis • Patients with any alarm symptoms such as: new onset abdominal pain, significant anemia, weight loss that cannot be explained by non-invasive testing • Acute need for enteral nutrition: placement or feeding tubes, PEG placement. • Infected peri-gastric fluid collections that can only be drained endoscopically (liver abscesses, Pseudocysts) • Endoscopic resection of gastrointestinal tumors (EMR, ESD), or large polyps. • Scheduled repeat rubber band ligation/ histoacryl injection for past variceal bleeding who currently are not bleeding • Evaluation of symptomatic IBD patients for scoring and treatment planning • Achalasia patients with minimal dysphagia for dilation or POEM not amenable to surgical intervention. • Surveillance of gastrointestinal or pancreaticobiliary cancers (possible management changes

EUS/FNA, Endoscopic ultrasound, fine needle aspiration; ERCP, Endoscopic retrograde cholangiopancreatography; EMR, Endoscopic mucosal resection; ESD, Endoscopic submucosal dissection

Table 3. Patient Classification based on COVID symptoms and SARS-CoV-19 Test[†‡]

Low risk		High risk	
	COVID suspect	**COVID probable**	**COVID confirmed**
(-) Symptoms (-) Exposure[§] AND (-) PCR based COVID 19 test when mass testing becomes available OR Non-COVID patient as cleared with Hospital Infection Control Unit (HICU) / Infectious Disease consultation	(+) Influenza-like illness / GI symptoms (+) Exposure[§] OR SARI[¶] patients with no other etiology, respiratory symptoms in patients >60, with comorbidities, high-risk pregnancy or health care worker	COVID suspect who had a negative test, inconclusive or pending results but clinically satisfies the picture of COVID-19	(+) SARS COVID rt PCR

[†] *Philippine Society for Microbiology and Infectious Disease Interim Guidelines on Clinical Management of Adult Patients with Suspected or Confirmed COVID-19 Infection*[11]
[‡] *COVID-19 Handbook, Division of Gastroenterology, Department of Medicine, Philippine General Hospital*[19]
[§] *Exposure: history of travel to an area with local transmission, 2) contact with COVID confirmed or probable patients*
[¶] *SARI: Severe acute respiratory infection*

Prioritization of procedures depends on the nature of urgency and patient classification. Low-risk patients with life-threatening indications undergo an endoscopy. High-risk patients, on the other hand, are deferred for at least 14 days, unless the expert panel and the anesthesiologist have ascertained emergent indication to proceed and that the patient will benefit from the endoscopy. Cases under urgent or semi-urgent indications are reviewed before scheduling. SARS-CoV-19 reverse transcriptase PCR (rt PCR) tests are utilized for nasopharyngeal swab samples to aid the decision process amongst the panel members. All screening and elective non-urgent procedures are deferred until the extended community quarantine set by the government are lifted and satisfactory PPE supply is secured.

Patient Screening

A patient who satisfies indications for procedure undergoes screening questions including the presence of COVID-associated symptoms (fever, cough, rhinorrhea, nasal congestion, diarrhea, vomiting, or abdominal discomfort),

Table 4. Summary of the Philippine General Hospital Endoscopy Practice during COVID-19 pandemic

Case Definitions/ Classification	**Nonurgent Cases**	Postponement of elective cases to at least 3 months or as deemed necessary when regular operations resume.
	Urgent/ Emergency Cases	Emergency cases are endoscopic procedures deemed life-threatening. Urgent cases may be performed within 24-48 hours from perceived increase morbidity and/or mortality. Procedures that need to be done in 1-2 weeks or else patients may have higher morbidity and/or mortality rates or increased stage or class of his disease are classified under Semi-urgent cases.
Patient Risk Stratification and Care		Low Risk: Asymptomatic with negative COVID-19 RT PCR nasopharyngeal swab.
		High Risk: Symptomatic with or pending COVID-19 RT PCR nasopharyngeal swab.
		For all cases, screening and consent process preprocedural are ensured. At the recovery room, a 1-2-meter distance is observed between patients and continuous monitoring is ensured until transported back to room
Endoscopy Unit		A Negative Pressure room or modified for suspected or confirmed cases is utilized. Aerosol chamber during intubation is also employed. Standard infection control practices at all times.
Endoscopy Staff		At an absolute minimum required for patient safety and care including 1 Anesthesiologist, 1 Senior endoscopist, 1 nurse, and 1 disinfection staff.
Procedural Workflow		As shown in Figure 2.
PPE and biosafety level		High risk: N95 or equivalent, and water-resistant coveralls Low risk: N95 or equivalent, and disposable gowns For both groups, surgical cap, goggles, face shield, double gloves, and dedicated shoes and shoe covers.
Donning and Doffing		A safety officer, usually first year fellow, is assigned to facilitate and direct orderly steps for proper donning and doffing. Designated rooms are adjacent to the assigned endoscopy unit for COVID confirmed cases.
Endoscopy Training (Fellows)		Training continues with available cases, teleconferences, interhospital and international collaboration, tripartite society activities, book club and lectures. Endoscopy skills is maximized with simulator exposure with models and possible cadaveric samples.
Patient Follow-up/ Continuity		Surveillance and follow-up of patients are made through telemedicine via online appointment, video conferencing or telephone calls. Emergency cases from home or interhospital transfers are facilitated by the hospital and/or local government units.

history of travel abroad, and recent exposure or contact to a confirmed/suspect case of SARS-CoV-19 or to anyone who has recently been to affected countries. Body temperature is checked twice (upon registration and immediately before admission to the endoscopy unit). A standardized form from the hospital infectious control unit is utilized to facilitate proper screening documentation. A temperature beyond 37.8 degrees is subjected to Infectious Disease specialist referral for guidance. No patient companions are permitted inside CENDU.

Endoscopy Unit

The American Gastroenterology Association has recommended that a negative pressure room must be used. It is maintained by a ventilation system that removes more air from the procedure room while allowing minimal air through a gap under the door to enter. Apart from this gap, the room should be kept as airtight as possible. Wall and window leakage, gaps from electrical outlets, and light fixtures may compromise negative pressure. In the absence of such, the endoscopy unit instead will procure a portable industrial-grade high-efficiency particulate air (HEPA) filters as an alternative to negative pressure rooms.[12]

Pre-Endoscopy

Preprocedural, all necessary devices, and equipment are checked and limited to some items to lessen contamination and decontamination time. All charts will be left at the nurse's station. The endoscopy staff involved will be screened correspondingly. Simultaneously, as the consent is being secured, routine hand hygiene, proper wearing of PPE, and reviewing of patient's data will be observed. A 1-meter distance is maintained at all times. A safety officer, usually the first-year fellow, is assigned to observe the stepwise donning and doffing of all members. These instructions are also posted on the walls of designated rooms. For every procedure, an assigned consultant gastroenterologist will perform the endoscopy while the senior fellow-in-training will act as the first assist, accompanied by a nurse for the duration. An anesthesiologist will enter the room first followed by the patient and the rest of the endoscopy team. Time out must still be done before every procedure.

During the procedure, all patients will be managed as COVID suspects until proven otherwise and a level 4 PPE will be employed (Figure 1). To minimize aerosol generation, procedures will be done under general anesthesia and an assigned anesthesiologist will do the intubation and extubation. If the patient will be sedated or inducted with intravenous anesthesia alone, the endoscopy team may stand inside the room or enter the unit once cleared by the anesthesiologist.

Post-Endoscopy

After the procedure, doffing may commence before extubation. Once cleared by the anesthesiologist, the patient may then be transported out of the unit and back to the room. A surgical mask will be placed back on the patient and allow recovery. The technician on duty, on level 4 PPE, must

remove the outer gloves. With the clean inner gloves, he will lay and submerge the scope and accessories in an airtight container with a disinfectant. The technician will then doff and don a new set of PPEs and proceed to the disinfection and washing room with the treated scope. Meanwhile, the nurse cleans and disinfects the endoscopy unit (tower, bed railings and surfaces, walls, and floors). The consultant endoscopist and senior fellow assist after doffing will put on a surgical mask and new gloves outside the procedure room to write the report. Once the room is vacated, the housekeeper assigned disinfects the endoscopy room. A minimum of 2 hours has been suggested in between two consecutive procedures to allow ample time for disinfection of the areas, irradiation with UV light or Ozonator.

Patient Follow-up

Discharged patients will be advised regarding telemedicine; an online or phone-based communication for follow-ups and surveillance during the outbreak. They will be followed up after 14 days from the day of the procedure to check for signs and symptoms of infection. This modified approach for outpatient clinics also accommodates non-urgent concerns from old patients who were not able to consult since the outpatient department was temporarily closed. Emergency and life-threatening conditions are counseled to proceed to the emergency room for admission.

Figure 1. Endoscopy unit staff after donning personal protection equipment. All staffs wear surgical cap, a pair of goggles, N95 facial masks, two layers of gloves (one pair of non-latex exam gloves and another pair of latex surgical gloves or rubber gloves outside), coverall gown and a pair of shoe covers over dedicated shoes.

CHALLENGES OF A COVID-REFERRAL TERTIARY CENTER

Triaging and Risk assessment

In a resource-limited setting, stringent adherence to strategies in triaging and patient risk assessment is an essential component to preserve and promote appropriate resource allocation, distribution of healthcare workers, and utilization

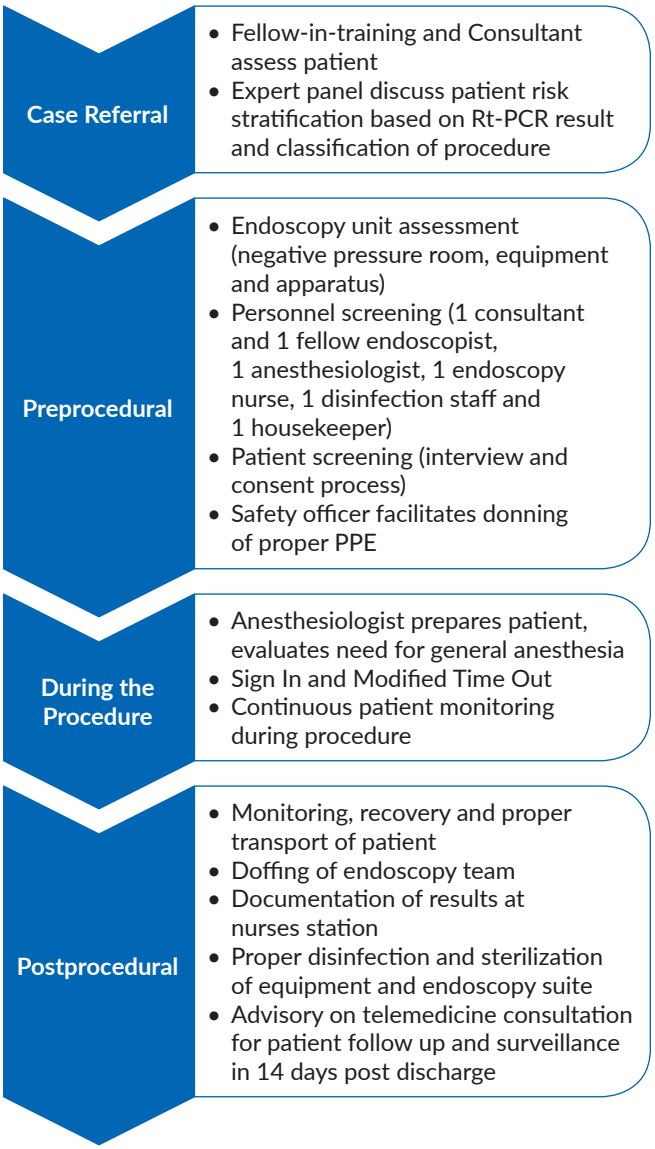

Figure 2. Workflow Process at the Central Endoscopy Unit, Division of Gastroenterology, Philippine General Hospital during COVID-19 pandemic.

of equipment. With the extended community quarantine still in place, limited cases of which highly emergent and life-threatening cases are admitted in the institution. As a tertiary referral center pre-COVID, old continuity patients were likely redirected to local hospitals instead. But once quarantine policies are lifted, the patient surge will yet be another concern. For all cases, stringent employment of screening and consent processes are employed, and ensuring patient and staff are of top priority.

Resource Availability and Sustainability

The challenges during an outbreak in the practice of endoscopy in our center include concerns of stocks and supplies of PPE, the safety of the staff, training of fellows among others. For the resources, an inventory of supplies is regularly monitored and updated. Since the availability of PPE is critical, only essential personnel will be allowed during the procedure. While trainees play an integral role in endoscopic procedures during pre-COVID times, it is highly recommended across different societies that only highly-trained endoscopists will perform procedures at the moment. Endoscopy staff also undergo daily orientation and reminders of the safety precautions and standard infection control practices.

Endoscopy Training

Like any other academic endoscopy unit, trainees are also essential manpower in maintaining the flow of procedures, ensuring continuity of at least charity cases, and now, as part of the COVID management workforce as graduates of Internal Medicine. With respect to training, consultants hold regular meetings with the fellows for updates on training, do regular patient teaching rounds, encourage research, and devise new means to learn including the utility of endoscopy simulator and models. Interhospital and international collaboration with different endoscopy centers and training institutions through video conferencing aids the trainees' exposure to different cases and techniques as well. Different webinars on radiologic, endoscopic, and pathologic correlation conferences are regularly scheduled designed for fellows-in-training as well. These initiatives are shared among different institutions both local and abroad.

POST-PANDEMIC CRISIS AND RESUMPTION OF ENDOSCOPY PROCEDURES

The nature of COVID-19 is evolving, and predictive models can't ascertain the extent of its spread given issues on community testing and strict measures of isolation. With the postponement of prior scheduled elective procedures, deferment of urgent cases, and the accumulation of new gastrointestinal consults during the whole course of this pandemic, an adaptive response must be well planned especially once the country transitions to a modified quarantine policy. Repercussions of delays in procedures and subsequent definitive diagnosis may include but are not limited to possible undetected disease progressions like in cancer treatment decisions, unregulated maintenance medications (immunosuppressants, diuretics, antibiotics), and apprehension among patients and healthcare providers.

Resumption of regular gastroenterology services (outpatient clinics and elective procedures like screening and surveillances) must consider the local pandemic status, healthcare workers, and resource availability. A surge of surveillance endoscopic procedures, IBD medications adjustment, cirrhotic complications, pre-employment clearance, dyspeptic patients with alarm symptoms among others are being expected once quarantine is lifted. As per PSDE guidelines, preparation on procedure resumption for semi-urgent cases includes sustained reduction in the rate of COVID 19 cases in the country as per mandate by the DOH, assurance of adequate reserve of PPE for at least 8 weeks and COVID-19 test kits and over-all hospital operations sustainability. Elective cases may be resumed at full measures if there have been no new cases for at least 2 weeks and good 12 weeks stocks of PPE. As a center, the division regularly communicates with the hospital administration for policy changes, patient concerns, and staff safety during its weekly teleconference updates. But until such time comes, overall healthcare service delivery must be modified and be adaptive.

CONCLUSION

In resource-limited settings, where there are uncertainties of prolonged COVID-19 impact to healthcare delivery, modification of practice as guided by local and international societies, stringent adherence to strategies and recommendations, empowerment of healthcare workforce, establishing the sustainability of available resources, and finding innovative ways to accommodate future changes in practice, training, and service to patients, are essential components to combat current dilemma brought about by this pandemic. While the current setup and experiences described here have not evaluated yet the effects of these strategies in terms of patients' and endoscopy unit staffs' safety outcomes, the efficiency of workflow and effects on infection rates of non-Covid patients, these recommendations cited and experiences described are aimed to guide other resource-limited endoscopy units for potential changes and guidance in the overall practice of endoscopy.

Ethical Considerations

Anonymity and Privacy

As a narrative paper of the workflow process in the endoscopy unit, no patient data were utilized in the report. No patient data and public involvement were included in the writing of this manuscript.

Possible Benefits, Risks, and Hazards

There are no foreseeable hazards to patients, to the clinical division and endoscopy unit, and healthcare staff. The output of this report aims to provide recommendations to resource-limited settings in the practice of endoscopy.

Statement of Authorship

Dr. John Mark K. Torres, as the primary author and fellow-in-training, conceptualized the whole paper, did a literature search, devised a flowchart, and finalized the paper

Dr. Eric B. Yasay, as a junior consultant helped in the thought process, recommended changes in outline and content, and reviewed the final output of the paper.

Dr. Ma. Lourdes O. Daez and Dr. Mark Anthony de Lusong, as Endoscopy Unit head and Past President of the Philippine Society of Digestive Endoscopy (PSDE) respectively, both helped in the workflow process of the unit, diagrammatic scheme, and overall paper review**.**

All authors approved the final version submitted.

Author Disclosure

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