



The 9Ps of PAHPBS Post ECQ Preparedness in COVID-19 Pandemic Ver 2.0. 9 April 2020

Update to PAHPBS Recommendations Ver 1.0 dated 21 March 2020

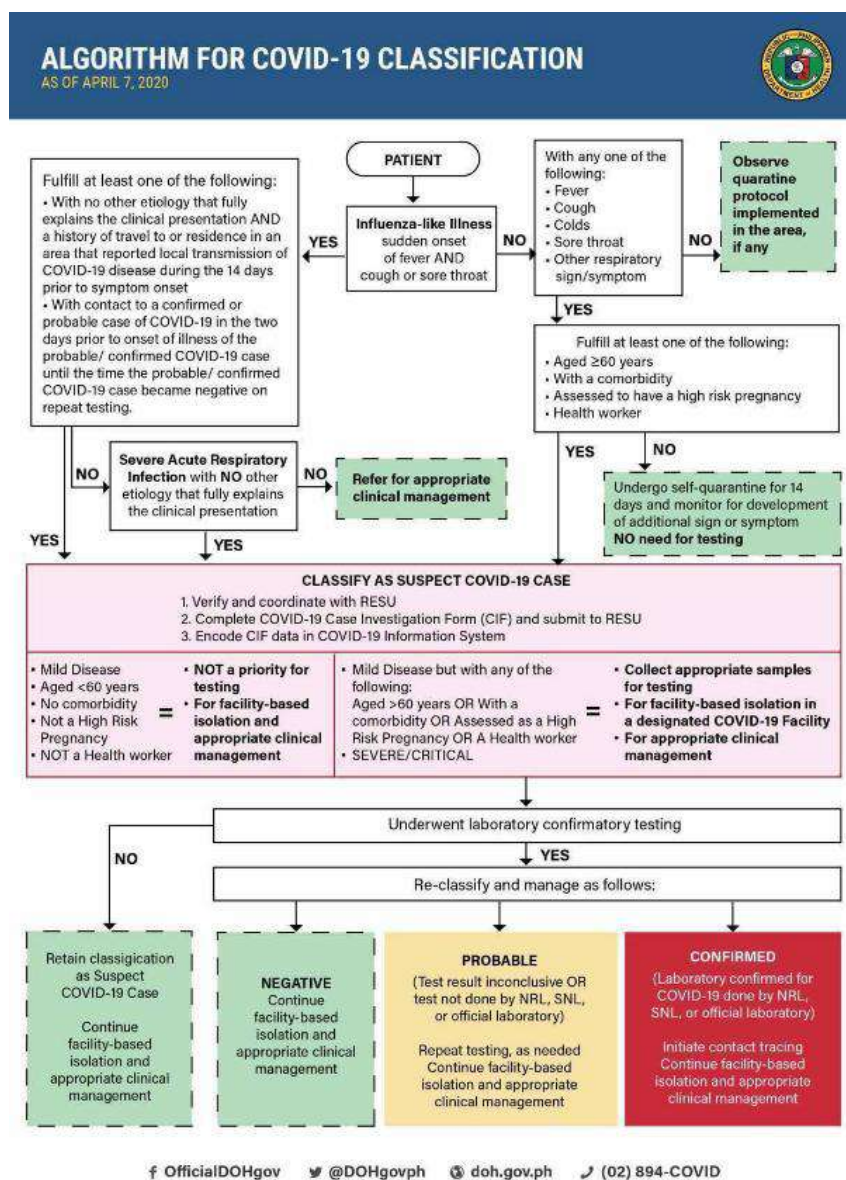
On March 21, we released the first bulletin stating recommendations of PAHPBS for HPB surgeries in COVID-19 Pandemic.¹

Since then, it has been three weeks of turmoil and uncertainty especially in LMIC like the Philippines². Most institutions worldwide have cancelled or minimised elective and non-emergent surgeries, cancer surgeries and other urgent ones were suggested to consider postponement or altering treatment plans for fear of COVID-19 infections during and after surgery.³⁻⁶ Though surgical data are limited and rapidly evolving, further to our own recommendations, the [Philippine College of Surgeons](#) and several international societies including the [American College of Surgeons](#), [Royal College of Surgeons](#), [SAGES](#) and many others have expressed succinct statements and recommendations that may or may not be applicable for our local setting. These are some general recommendations by leading experts issued at pandemic speed, many of which are learned experiences from past crises but may not hold a strong level of evidence based on recent data due to the rapid changes occurring daily. Thus patients are facing unprecedented cancellation of surgeries and delay in treatments due to the pressure we all face under the enhanced community quarantine (ECQ), lack of resources and preparedness for pandemic in our healthcare system and scarcity of information on a global perspective. Indeed, COVID-19 has changed the way we write surgery.

While there is no actual data yet nor a mathematical model to express the number of surgical cases that have been compromised, a surge of backlogs awaits as we pass the fourth week of ECQ. Hence we must brace ourselves and get ready for the post ECQ period as we slowly return to a new normal facing a different set of challenges. This pandemic necessitates us to adapt and innovate to be able to cope with the rapidly developing situation in our own areas of practice.⁷ Many of our cancer

patients needing surgical management will need to be reassessed and re-scheduled as the [safe postponement period](#) (SPP) is a reasonable consideration. This recent study of more than 4 million cases showed that a delay of 4 to 6 weeks for 76% of cancers is acceptable. While those who have received neoadjuvant treatment may tolerate a SPP of at least 8 weeks without major impact on resectability and survival.⁸ This timely data covering more than four million patients may help in the multidisciplinary triage system for cancer surgery during this critical period of pandemic.

Screening patients is the first step before resuming surgical activities. COVID-19 is here to stay and we will not see complete eradication for the time being. As such, for the sake of uniformity, the revised classification based on PSMID will be used in this recommendation.⁹ Patients will be classified as either confirmed, probable, suspect, possible or non-covid-19. Some patients may be truly asymptomatic while others maybe pre-symptomatic. This means that they are still in the incubation period at the time of assessment prior to surgery. We have to be very stringent in our screening process to avoid unnecessary risks¹⁰ both for the patient and healthcare workers.



Viral isolation has been found in body fluids including blood and stool¹¹ while ACE2 expression from the lungs, kidney and oral secretions are equally present in gastrointestinal tract and some studies have found its expression in 59.7% of cholangiocytes suggesting a direct impact of the novel corona virus on the biliary tree, manifested as liver injury clinically. Whether bile can generate a high amount of viral aerosolization is still under investigation¹² All these herald emergent GI surgery as high risk aerosol generating procedures (AGP). The best practice to prevent possible transmission of COVID-19 and other infections alike, is to use a multi-faceted approach that focuses on having a clean and well ventilated operating room, protecting the entire surgical team by wearing appropriate PPE and the use of safe surgical technique including smoke evacuation during surgery.

Ultimately, infection control relies on a combination of interventions using the [hierarchy of controls](#). (Fig 1) PPEs are the least effective but are necessary since totally

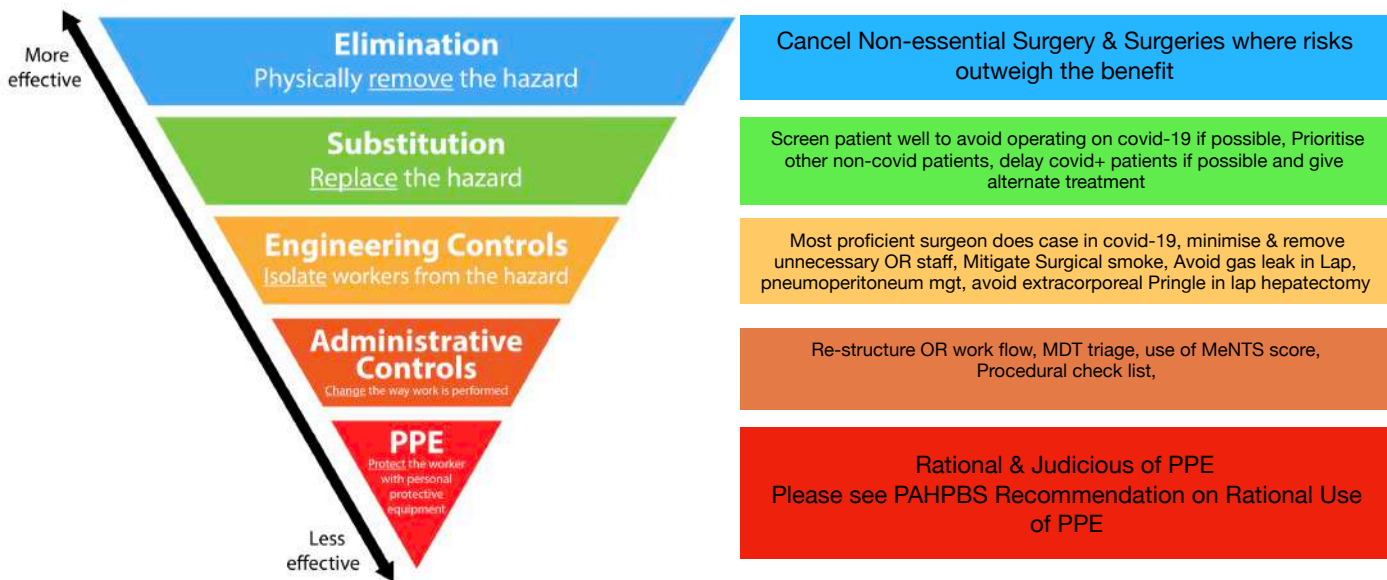


Fig. 1 PAHPBS NIOSH applied guide for Workplace Safety

eliminating the hazard such as cancelling surgeries are not possible especially for solid tumors of the HPB tract. Substituting high risk surgical procedures with alternative approaches such as chemotherapy or other less invasive approaches in hospitals with low resource for intensive care, blood, PPEs, including experienced healthcare staff may apply temporarily at the peak of the pandemic and when a patient is at high risk for Covid-19 exposure or a Covid-19 suspect, probable or confirmed patient. Eventually, definitive surgeries will have to be performed when prevailing circumstances allow and this will require a stringent set of measures to define eligibility for surgery in the interest of the patient and healthcare workers' safety.

This set of recommendation does not focus on specific HPB conditions due to the wide spectrum of clinical presentation, risk factors, available treatment strategies in each local unit of practice, availability of resources and expertise; and financial capability of our Filipino patients. Perhaps a resource stratified approach will be more acceptable especially for the financially challenged group of patients. It is presumed that experts in managing HPB conditions are well equipped with the fundamentals of common HPB diseases and cancers. Further, to augment this set of recommendation, some international societies such as [SAGES-AHPBA](#), [ACS](#), [SSO](#) have published recommendations in sweeping statements.

Based on the various available resources and reviews, we summarise these into a set of strategies forming the backbone of our recommendations in an effort to enhance leadership in local units and institutions. These will help create a COVID-19 command center in your respective units crucial in the practical management of unforeseen COVID-19 related issues during and after this pandemic. ⁷,

9Ps of PAHPBS Preparedness in Post ECQ to Push aside COVID-19 Pandemic

1. **Prepare** Work Flows in the operating room. Significant restructuring and re-organizational of processes and workflows await. ¹³⁻¹⁶
 - a. Create separate access to and from OR COVID-19 confirmed, probable and suspected patients.

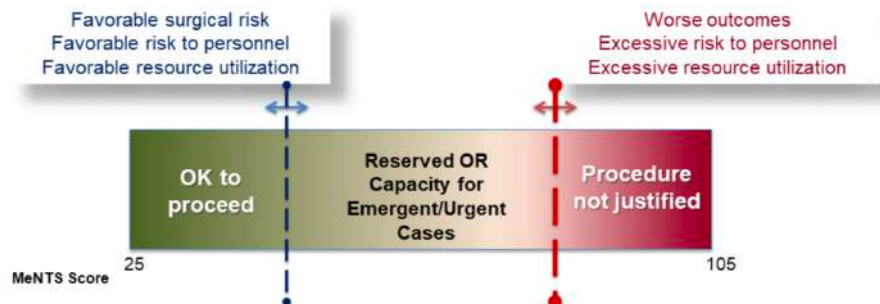
- b. It is strongly suggested to do intubation with minimal staff in rooms with negative pressure. If these are readily available, covid-19 patients may then be transported after a waiting period of 10-20 minutes to avoid transmission of viral particles to other staff. The entire OR may also be performed in the same negative pressure rooms. However incidence of surgical site infections may also be a concern.
- c. If negative pressure room is not available, high frequency air exchange / ventilation (at least 20 air exchanges per hour) HEPA filtered room may be effective too
- d. Reduce the time and distance COVID-19 patients have to travel
- e. Keep patients in masks and transport personnel with N95,
- f. Keep physical distance while transporting, ideally through an exclusive COVID-19 route
- g. Keep things inside the OR to a minimum (ie. equipments, medicine, supplies) to avoid contamination and wastage.
- h. Minimize the essential staff in the room with no break and no changing or crossing of rooms.
- i. Collaborate with anesthesiologists, wait for 10 - 20 minutes before entering OR after intubation and extubation. Only anesthesiologist and an assist if necessary should be inside the OR during intubation and extubation.
- j. All these will need practice to be standardised, thus everyone including OR nurses and staff should simulate processes and work flows to avoid accidents and increase risk of exposure.
- k. Where resources are available, zoning of work spaces and designating dedicated COVID and NON-COVID health care teams may be beneficial to allow continuation of services in your respective institutions. This allows access to the usual process leading them to surgery or other treatment options appropriate for non-COVID patients without compromise. Reevaluation of work flows and decision making process should be made frequently as the landscape changes.

2) **Prioritize** emergency and urgent, life threatening cases such as cholangitis^{4,17-18}, sepsis, biliary obstruction, massive bleeding, organ failure and trauma, whether COVID or NON-COVID. Procedures may or may not necessarily be surgical but these problems need to be addressed with the best strategy available (medical, endoscopic or percutaneous) offering least risk and harm. The [PAHPBS risk urgency decision matrix](#)¹ developed in the first recommendation and a modified precautionary guide adapted from Hanna et al¹⁹ remain as guides to set priority for surgery (Fig 2). However, ***guidelines do not substitute for clinical judgement and discernment.***

3) **Patient selection** is key especially for patients with cancer^{4,20-31}

- a. Create and utilise a multidisciplinary triage system to categorise non-emergent, essential surgical cases according to risk stratification and local resources. Non-emergent, essential surgeries are described as those necessary to treat a specific disease for which postponing or deciding against it may result in death, poor quality of life or permanent impairment. Cancer surgeries for solid tumors are examples of such.
- b. Key factors to consider in decision making will involve the following:
 - i. urgency based on symptoms and expected progression
 - ii. safe postponement period⁸
 - iii. complexity of the surgery and length of surgical time
 - iv. patient risk factors pertaining to underlying medical conditions such as diabetes, hypertension, cirrhoses and risk to exposure
 - v. healthcare worker risk for COVID-19 exposure
 - vi. availability of resources including the need for ICU care post op, critical care, blood products, special instruments for OR use
 - vii. approach to surgery whether open, laparoscopic or robotic
 - viii. length of time for recovery and hospital stay
 - ix. informed consent regarding potential risks following surgery during a pandemic should be discussed with the patient.
 - x. available alternative approach taking into consideration risk of exposures

- c. An interesting approach would be a proof of concept called Medically Necessary Time-sensitive (MeNTS) scoring system approach which takes into consideration factors mentioned above.³² A higher cumulative MeNTS score denotes poorer outcomes, higher risk of COVID-19 transmission and need for hospital resources.



- d. Communication with the whole team is of paramount importance to avoid unnecessary admissions, procedures and waste of resources. This includes anaesthesiologist, nursing, OR & peri-operative care staff, radiology and laboratory for availability of resources such as surgical instruments or sutures, blood and blood products,
- e. Take advantage of technology to continue online multidisciplinary meetings in either making decisions especially when hospital resources are low and surgical complexity is expected or in reassuring your patients.
- 4) **Provide** context, consideration, care and commitment in communication with patient to reassure them that as we all face this unprecedented pressure on healthcare systems, safety for all is our priority.³³⁻³⁴ Delaying essential cancer surgeries for a few weeks maybe necessary as the risk of COVID-19 infection reported a higher mortality rate especially those who were pre-symptomatic during the time of surgery. This showed a 20.5% mortality in the series of elective cancer surgeries performed at the peak of the covid-19 crisis in China.^{25,36,37} Meanwhile, continue to keep in touch with patients by telephone or other means of telemedicine as appropriate. Patients need to know they are not

abandoned or neglected. Cancelling or delaying surgeries do not mean absence of care. Apart from safety issues, many of us in the surgical field including trainees have been called to the frontline to provide support to our already fatigued internists who have been delivering their unwavering service since the beginning.

5) **Procedural Check list** and set up - Layers of Screening is essential.

- a. A thorough history, PE
- b. diagnostics including CT chest³⁸ in all patients especially undergoing liver, biliary, pancreatic resection and emergency procedures should be practiced. This will not only serve as a good metastatic work up but may also detect beginning or subtle changes in the lung parenchyma necessitating further examination or tests to exclude or confirm the presence of Covid-19.
- c. RT-PCR COVID-19 test ^{10,40-44} should be done in all highly suspicious and symptomatic patients while IgG IgM antibody testing may seem fast but there are caveats resulting to false positives & false negatives especially in asymptomatic thus this must be performed and interpreted meticulously with guidance and clearance from infectious diseases partners. Some societies like the ACS, SAGES and RCS recommend to test all patients for surgery mainly because they can retrieve their results within a short period of time

Test results			Clinical Significance
RT-qPCR	IgM	IgG	
+	-	-	Patient may be in the window period of infection.
+	+	-	Patient may be in the early stage of infection.
+	+	+	Patients is in the active phase of infection.
+	-	+	Patient may be in the late or recurrent stage of infection.
-	+	-	Patient may be in the early stage of infection. RT-qPCR result may be false-negative.
-	-	+	Patient may have had a past infection, and has recovered.
-	+	+	Patient may be in the recovery stage of an infection, or the RT-qPCR result may be false-negative.

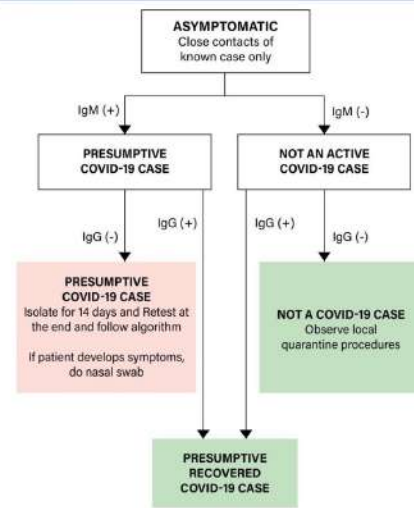
keeping in mind a variance between test kits. Results of sensitivity of test, shows that testing all asymptomatic patients without history of close

Diagnostic Test Sensitivity in the Days After Symptom Onset[†]

SARS-CoV-2 Test	Days after Symptom Onset		
	1–7	8–14	15–39
RNA by RT-PCR	67%	54%	45%
Total Antibody	38%	90%	100%
IgM	29%	73%	94%
IgG	19%	54%	80%

Adapted from: Zhao J et al. Antibody responses to SARS-CoV-2 in patients of novel coronavirus disease 2019. Clin Infect Dis. 2020 Mar 28.[29]

ALGORITHM ON THE USE OF RAPID ANTIBODY TESTS FOR TESTING COVID-19 AMONG ASYMPTOMATIC PATIENTS AND HEALTHCARE WORKERS WITH RELEVANT HISTORY OF TRAVEL/EXPOSURE
AS OF APRIL 7, 2020



contacts may not be necessary. Until further validation is available, antibody testing should be used with caution and discernment.

- d. Equally important is to make sure that blood and blood products are available if surgery is planned.
 - e. Operating room equipments, instruments, medications and staff should be lean inside the operating room to lessen contamination
 - f. High touch equipments should be wrapped in transparent plastic and immediately discarded after surgery ⁴⁵⁻⁴⁶
 - g. Minimize staff exposure and foot traffic in the OR.
 - h. Include COVID-19 status of patient in WHO time out checklist so that everyone is reminded and aware.
- 6) **Protect** yourself and your entire team by using enhanced PPE ⁴⁷⁻⁴⁹ (for confirmed, probable or suspected COVID-19 patient) consisting of at least the following:
- a. Cap and NIOSH approved N95 mask or PAPR if available, booties, preferably those that will cover up to the mid calf, hazmat suit / overall suit, triple gloves, goggles / mask and face shield.

- b. It is essential to understand that fogging of goggles and face shields may occur due to the body heat generated underneath the layers of PPE worn, thus affecting visibility. Application of anti-fogging solution to the lens or face shield may help.
- c. Follow proper Donning and Doffing protocols with a safety officer following guidelines available in your own institutions. Some available resources maybe applicable to your setting,. These may be viewed from the following sites: [CDC guidelines, \(donning and doffing\) PGH, St Lukes.](#)
- d. For definitely non-Covid and very low risk for COVID-19, it is most prudent not to waste PPEs in this time of global shortage. The importance of a stringent screening process prior to surgery can help in the judicious and rational use of PPEs

PAHPBS Recommendations for Rational PPE use

	Level I	Level II	Level III
What	Non-COVID	Perioperative Care for Suspect, Probable or Confirmed COVID-19	Aerosol Generating Procedures for Suspect, Probable & Confirmed COVID-19
When	No symptoms, no history of contact, Within 6 ft from patient more than 1 minute	Performing rounds or consultations for patients with <ul style="list-style-type: none"> • (+) Covid Symptoms • Pending results of RT_PCR • (+) RT-PCR 	Performing Aerosol Generating Procedures with <ul style="list-style-type: none"> • (+) Covid Symptoms • Pending results of RT_PCR • (+) RT-PCR
Where	OPD, clinics, ER, ICU, Wards, Patient Rooms, Hallway, OR, RR, Endoscopy	OPD, clinics, ER, ICU, Wards, Patient Rooms, Hallway, RR	Where AGP are performed in ER, ICU, OR, RR, Endoscopy
PPE	Surgical mask + cap, booties, sterile gown and sterile gloves for surgical procedures	N95, Goggles/Face Shields, Capx2, Booties, Double Gloves, Isolation Gowns or Hazmat Suits if available	N95 or higher, Goggles & Face Shield, Capx2, Booties, Double Gloves for sterile procedures in OR, Hazmat Suits (for endoscopy), + sterile gloves, Sterile gowns for surgical procedures

Always remember hand hygiene in between steps

- 7) **Prevent** and mitigate aerosol transmission from surgical smoke during surgery. Coronavirus particle size measures 0.06-0.14 um. This is comparable to HIV, HPV, HBV thus, theoretically, the hazardous effects of surgical smoke from the reported data warns us of the possible transmission of aerosolised particle of coronavirus ^{1, 36-37, 50-57}.
- a. For open surgeries, electro-surgical tips should be attached to a smoke evacuator, where smoke evacuator is not available, [attach the tip of the cautery into a suction tubing](#) as illustrated in the link given.
 - b. Judicious use of energy devices such as ultrasonic scalpels because these also generate a significant amount of surgical plume. In contrast to electrocautery, ultrasonic devices generate low temperature (80-100C)⁵¹ vaporisation producing large quantities of cellular debris carrying a higher chance of transmitting infectious and viable particles from the blood and tissues as by-products of the process.⁵⁰ Although its effect on the novel corona virus is unclear, it is most prudent to practice risk reduction under the prevailing circumstances.
 - c. Minimise long dissecting times especially on the liver parenchyma to reduce smoke production.
 - d. Avoid placing of drains in confirmed, probable or suspect COVID-19 patients.
 - e. In laparoscopy, where [commercial smoke evacuation systems](#) are not available, an immediate solution that may help mitigate the effects of aerosol generation is by using available operating room devices consisting of a HEPA filter or a heat and moisture exchange filter used by the anesthesiologists for the ventilation machine, connector and a short tubing attached to the valve of a least dependent trocar. This may act as a [passive filtering](#) (Boni) device or an [active suction](#) (Teh) device connected to a closed vacuum suction canister serves as an alternative approach. HEPA filters can trap up to 99.9997% of particles at 0.3 microns and above in comparison with the commercially available ULPA filter systems that are capable of filtering 99.999% of particles at 0.1 microns and some can be effective to 0.05

microns utilising layers filters including ULPA and charcoal coated filters. Thus, an added security to the the HEPA filter with a filter capability of 99.997% maybe achieved by the closed vacuum suction system described above. The vacuum canister may be filled up to one third with water +/- hypochlorite or Dakin's solution and submerge the tip of the other end of the suction tubing just enough into the upper portion of the water or solution. This will allow particles to settle in the solution. Please note that this is not to be used for suctioning fluid inside the abdominal cavity.

- f. This alternative solution is also used to desufflate the artificial pneumoperitoneum in laparoscopy before specimen removal, conversion and removal of trocars.
- g. Close stopcock valves of all instruments to avoid leaks of surgical smoke during the procedure
- h. NO trocar valve should be opened to release surgical smoke or gas during and after the procedure without properly desufflating and evacuating the artificial pneumoperitoneum by a filtered device.
- i. Integrity of N95 or higher respirators & goggles provide a third layer of security against the hazardous effects of surgical smokes.

8) **Pneumoperitoneum** management during laparoscopy ^{1, 36-37, 50-56}.

- a. Pneumeritoneum should be minimised at a pressure of 8-10 mmHg to sustain field exposure and not exceed 12 mmHg especially in laparoscopic liver resection when sometimes a higher pressure is necessary.
- b. Do not use re-use trocars which may have incompetent seal caps that leak the gas from pneumoperitoneum.
- c. Prior to the start of procedure, make sure that insufflation valves of all trocars are closed.
- d. Make small incisions just enough to allow trocar insertion and avoid trocar slippage during procedure.
- e. Minimize change of instruments as gas is leaked through the sealing valve every time an instrument goes in and out of the trocar.

- f. Trendelenburg position in laparoscopic liver resections should also be minimised to prevent gas pooling in the diaphragm causing respiratory compromise.
- g. Do not insert sponges because pneumoperitoneum escapes on insertion and removal especially when trocar caps are removed.
- h. Do not use Carter Thompson to puncture the fascia for external suspension of some organs
- i. Avoid extracorporeal Pringle manoeuvre. All these increase chances of CO2 escape during the manoeuvres.
- j. Avoid hand assisted lap surgeries since you vent the gas every time your hand goes in and out

9) **Post procedural** processes

- a. Disinfection of room of at least 15-20 mins prior to the next case
- b. Sterilization of Covid separate from non-Covid instruments
- c. Debrief & precise documentation after each procedure will help improve and refine procedures to better prepare for post-pandemic new normal.
- d. Give yourselves a little pat on your shoulder and thank each member of your team. Don't forget to doff slowly, safely and surely with your security officer.

We hope that these perspectives forming the set of strategies will be useful to enhance leadership roles in your respective units and institutions in designing your workflows and OR environment, care for your patients while you protect yourselves, your teams, and your loved ones. This will help us build resilient systems in winning the war against Covid-19.

FOR the Philippine Association of HPB Surgeons

Catherine Teh, MD. FPCS, FRCS(Ed)

President

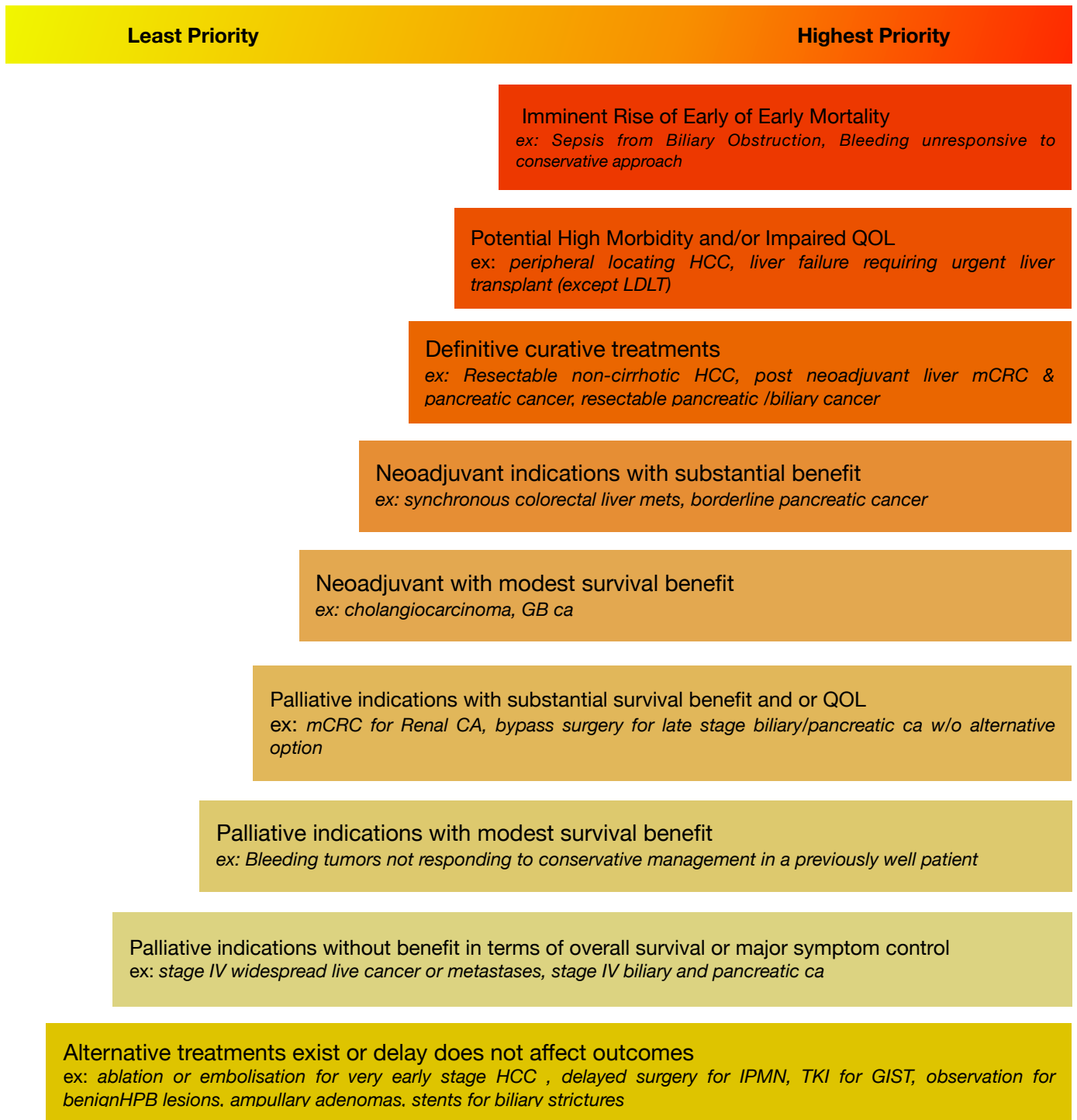


Fig 2. PAHPBS modified precautionary guidelines for prioritisation of surgery during COVID-19 pandemic for HPB diseases

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