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RECOMMENDED GUIDELINES ON PERIOPERATIVE NURSING MANAGEMENT DURING COVID- 19 PANDEMIC

PREOPERATIVE PHASE

A. Scheduling and accepting of surgical procedures should be based on the following factors:

1. Trained and competent perioperative nurses

- Perioperative nurses must have a proper orientation and training on proper donning and doffing, including areas of such procedures
- Infection prevention & control protocols must strictly implement and monitored (e.g., wearing of mask, social distancing and proper hygiene).
- Perioperative nurses should be provided correct information on timely reporting and contact tracing which are to be reported to the authorized personnel
- Only trained intra-operative nurses must be at the OR to ensure efficiency and effectiveness, thus maintaining the smoothness of the procedure to minimize operative duration and potential undue exposure

The organization strongly discourages the routine assignment of UNTRAINED WARD nurses to the OR and vice versa to prevent cross contamination. The OR is a specialized area that requires intensive training and team work. It is preferable that experienced perioperative nurses should be maintained in the OR as they already have existing working relationships with the rest of the operating team .

- Staffing should include security officers in the donning and doffing areas.

2. Inventory of PPEs.

- Inventory of PPEs must be monitored strictly and the staff be made aware of any deficiencies and shortages.
- Surgical team must use PPEs according to the Risk Stratification COVID 19-transmission.

RISK LEVEL	MINIMUM PPE	CATEGORY
HIGH RISK	<ul style="list-style-type: none"> ▪ Fit – tested N95 mask or any equivalent filtering facepiece respirator ▪ Sterile, water impermeable surgical gown ▪ Face shield or goggles ▪ Sterile surgical gloves ▪ Head cap ▪ Shoe covers or dedicated closed shoes 	<ul style="list-style-type: none"> ▪ Emergency Procedures – done regardless of RT-PCR result or symptoms ▪ High Risk (Aerosol Generating Procedures or AGP, Aerodigestive tract procedures) for Covid 19 confirmed patients ▪ Low Risk procedures for covid 19 confirmed patients ▪ RT-PCR cannot be done or unavailable at the time of surgery
LOW RISK	<ul style="list-style-type: none"> ▪ Surgical mask ▪ Sterile, water impermeable surgical gown ▪ Face shield or goggles ▪ Sterile surgical gloves ▪ Head cap 	<ul style="list-style-type: none"> ▪ Low- risk procedure in asymptomatic patient ▪ Low- risk procedure in symptomatic patient but RT-PCR negative result

3. Availability of OR Room

- An OR with negative pressure is ideal
- Positive pressure OR with ACH of 25/hr acceptable
- Designated COVID OR – most proximate to the entrance
- Turnaround time of each procedure must be taking into consideration, expect no less than 1 hour for cleaning and disinfection..Hence, terminal cleaning and disinfection process should be accounted for in the schedule to avoid overlap
- Communication and coordination with the surgical team members are vital to the efficiency of the OR.

4. Availability of Machines/ Instruments/ Materials

- Perioperative nurse must prepare the surgical related equipments/ machines/ supplies in advance to minimize movements during the operation. .
- Ideally, disposable supplies and equipment should be used for COVID confirmed patients. If this cannot be avoided, proper cleaning and disinfection is paramount to ensure safety of succeeding cases.
- Communication and coordination to the surgical team members are vital to the efficiency of the OR.

5. Screening of Patient

- Consider testing all patients with RT-PCR and/or chest CT scan if indeterminate or discordant clinically
- If possible, defer procedure until a confirmed COVID 19 case tests negative on RT-PCR
- Consider IDS consultation prior to surgery as needed
- Informed consent must contain possible risk of hospital- acquired COVID 19 infection during the hospital stay.

6. Surgical team Screenings

- Testing for Covid-19 among surgical team members prior to surgical procedure is an institutional policy, taking considerations on the financial capability, availability and accessibility of the procedures and kits.
- All members of the surgical team should be screened for COVID symptoms and exposure, including body temperature prior to donning.

B. Traffic flow of the patient must be properly followed

- The surgical team must be in PPE based risk stratification before the patient is brought into the suite.
- Planning and mapping of OR rooms to be used during procedures in the restricted areas should be communicated to the team..

Reference: PCS Guidelines on Post ECQ Resumption on Elective Surgeries and Outpatient clinics

INTRAOPERATIVE PHASE

1. All known or suspected COVID-19 positive patients requiring surgical intervention must be treated as positive until proven otherwise in order to minimize infection spread.
2. Designated COVID operating areas must be allocated to COVID patients' urgent/emergent procedures. The OR closest to the entrance of the OR block entrance should be the first one designated to COVID patients. Use a dedicated negative pressure OR if possible.
3. All staff must be specifically trained to don, doff and dispose of personal protection equipment (PPE) including masks (level 2 or 3 filtering face piece (FFP) depending on the aerosol-generating risk level), eye protection, double non-sterile gloves, gowns, coveralls, bouffant hair caps and shoe covers. *Staff must be oriented on the proper designated areas for donning and doffing procedure.*

4. Consider handing off of patient from Covid Unit/Ward to Perioperative Unit via telephone. Endorsing pertinent data that includes but is not limited to Informed Consent, pre-operative medications, blood products, special precautions, etc. Prophylaxis and skin testing may be done in the Operating Suite depending on the incision time of the procedure.
5. The post-operative destination of the patient should already be determined and made known to the Unit to avoid delays in transports. Dedicated equipment for Covid confirmed patients should be identified (e.g., transport ventilators, stretchers, wheelchairs, incubators).
6. Surgical instrument sets, packs, essential items and supplies shall be opened and covered with sterile drape before anesthesia induction.
7. If possible, minimize the number of the surgical team and equipment inside the Operating Suite. Once the procedure is ongoing, the team must make all efforts to use what is available inside the OR suite to minimize foot traffic-and prevent cross contamination.
8. The Time Out Process (WHO Surgical Safety Checklist) must be performed. No member of the surgical team shall go outside the OR suite. If one must leave the OR suite, he/she shall remove the PPE at the doffing area and don a new set of PPE before going back to the OR suite.
9. The OR door must be kept closed at all times. Personnel present in the OR during surgery must not leave the room. There must be a “runner” nurse outside the OR suite who will tend to the needs of the surgical team and will be responsible for the documentation of the whole procedure. Use telephonic or other electronic tools to facilitate communication from inside to outside the OR to minimize door opening and foot traffic.
10. Smoke evacuator when electrocautery must be used and available.
11. If there is no procedure next on the designated COVID OR, consider completing the post-anesthetic recovery the patient fully in the OR prior to transport to the next level of care.
12. Place soiled and pre-cleaned instruments in a yellow plastic bag and proceed to designated area of decontamination.
13. All unused supplies and drugs brought inside the OR must be discarded. Exposed equipment and machine which remain inside the OR shall undergo disinfection using UV light or chemical disinfection.

Anesthesia Management

1. The use of Regional Anesthesia techniques over General Anesthesia if possible.
2. Disposable airway equipment should be used whenever feasible.
3. Rapid sequence intubation (RSI) should be considered to avoid manual ventilation and potential aerosolization. If available, a closed suction system must be done during airway aspiration.
4. A dedicated ventilator should be used in the OR for general anesthesia in positive or suspected positive COVID-19 patients.
5. When a general anesthetic is required, a HEPA (High Efficiency Particulate Air) filter should be connected to the patient end of the breathing circuit and another one between the expiratory limb and the anesthesia machine. HEPA filters and soda lime must be changed after each case.
6. A video laryngoscope is recommended to keep the incubator further from the patient's airway during the intubation.
7. Only the minimum number of staff (anesthesiologist, 1 assistant and the Circulating RN) shall be inside the OR during intubation. The rest of the surgical team shall wait outside the OR suite until the patient is successfully intubated. It is recommended that the surgical team wait at least 10 minutes after the intubation before entering the room.
8. A physical barrier between the incubator and the patient may be used to minimize exposure. An "aerosol box", consisting of a transparent acrylic box has been widely adapted for use in various ORs around the world, effectively shields a health provider's face from patient's airway. A plastic sheet may also be used as a barrier to shield the health care providers' face from the patient's airway during aerosol generating maneuvers e.g end tracheal intubation, suctioning of secretions.

References:

Centers of Disease Control and Prevention

American Colleges of Surgeons

Philippine College of Surgeons

Surgery in COVID-19 patients: operational directives: World Journal of Emergency Medicine; F.Coccolini^{1,20*}, G. Perrone², M. Chiarugi¹, F. Di Marzo³, L. Ansaloni⁴, I. Scandroglio⁵, P. Marini⁶, M. Zago⁷, P. De Paolis⁸, F. Forfori⁹, F. Agresta¹⁰, A. Puzziello¹¹, D. D'Ugo¹², E. Bignami¹³, V. Bellini¹³, P. Vitali¹⁴, F. Petrini¹⁵, B. Pifferi¹³, F. Corradi⁹, A. Tarasconi², V. Pattonieri², E. Bonati², L. Tritapepe¹⁶, V. Agnoletti¹⁷, D. Corbella¹⁸, M. Sartelli¹⁹ and F. Catena²

Response of Operating Room Nurse on Pandemic Crisis (SARS-CoV-2 or COVID-19 Pandemic); E. Abano, Philippine Heart Center Management of COVID-19 Surgical Cases in the Operating Room; St. Luke's Medical Center – Quezon City; Interim Guidelines of National Kidney and Transplant Institute

POST OPERATIVE PHASE

1. PPE must be properly removed and disposed of outside the OR in the dedicated doffing area. It is during breaks in the doffing process that a health care worker could get infected.
3. After surgery, the patient can either stay in a dedicated PACU for COVID cases, or-remain inside the theater-for post-anesthetic care until safe transport to the regular unit is assured.
4. Once the room is vacated, meticulous environmental sanitation should be performed

Transport

5. The hospital should have a step by step, well-defined path pre-allocating some corridors and elevators to COVID patients.
6. Transport personnel should use the same route/path from transport origin to destination
7. The hospital may provide security personnel to secure the path/route during transport
8. The hospital should also instruct the housekeeping services to sanitize the path/route of the infected patient
9. The transport personnel must sanitize hands before donning of new PPEs, (wear a surgical mask, disposable waterproof gloves, disposable cap, and shoe covers) during transport and minimize contact with other patients.

Endorsement

10. Transport personnel will doff and do hand hygiene after endorsement in the ward/ICU and the bed use for transport must be sanitized before going back to point of origin.
11. The perioperative nurse must strictly implement infection control measures like using face mask at times, hand hygiene. Social distancing must be strictly implemented when eating meals; use of personal or disposable utensils is encouraged to prevent contamination.

References:

PCS-ORNAP Guidelines 2015
OR Technique Instructional Manual- AHMC Guidelines
EAMC DOH Guidelines

ENHANCED CLEANING AND DISINFECTION PROTOCOLS

1. GENERAL GUIDELINES:

Prepare all the needed materials and solutions before entering the room prior to cleaning.

1.2 Practice strict hand hygiene with the use of soap and warm running water, and alcohol-based hand sanitizer before donning and after doffing.

1.3 Wear designated OR scrubs, disposable surgical mask, head cover, protective eye wear, disposable apron, disposable shoe cover, and disposable gloves to reduce the risk of direct contact with contaminated surfaces.

1.4 Ensure mask is fitted and do not adjust or touch the front part of the mask

1.5 For confirmed cases, Level 3 -4 PPEs should be worn during cleaning.

1.6 Carefully remove the soiled PPEs and dispose properly.

1.7 Store chemicals in labeled and closed container.

1.8 Medical waste shall be disposed of as COVID-19 related medical waste.

1.9 Personnel must take a full shower after cleaning the room of a confirmed case before entering a clean area.

1.10 Report any break to protocols and exposure to contamination to possible COVID 19 secretions.

2. CLEANING AND DISINFECTION OF SURFACES:

2.1 COVID patients must have a designated OR room with negative pressure or at least an assigned room for confirmed cases.

2.2 After every surgical case cleaning shall commence immediately. The room is recommended to undergo UV light or Chemical Disinfection Mist prior moving anything or cleaning the room especially for confirmed COVID 19 cases if not possible to wait for 24 hours prior cleaning.

Misting is optional. If both are not possible, make sure to wear complete PPE and perform frequent disinfection for three times using the right cleaning solution.

2.3 Visible surface dirt or soilage should be completely removed before disinfection.-Cleaning using a detergent or soap and water prior disinfection is the first step.

2.4 Blood spills, fecal and other body secretions must be soaked with disinfectant for at least 30 minutes before wiping it twice without spreading and disposed properly.

2.5 When cleaning large amount of spill or disinfecting floor, place warning signs.

2.6 Increase frequency of cleaning and disinfecting focusing on high-touch surfaces such as OR bed, tables, doorknobs, faucets and all shared objects with frequent use.

2.7 Clean and disinfect surfaces as soon as possible when the patient presented with respiratory symptoms was present.

2.8 Cleaning of hard, non-porous surfaces should be physically cleaned:

A 10 % diluted bleach solution, an alcohol solution with at least 70 % alcohol, and/ or an EPA-registered disinfectant for use against COVID-19

Prepare a 10% diluted bleach solution:

Mix five tablespoon or 25 ml (5 ml is equal to 1 tablespoon) of bleach per gallon of water.

Allow at least 10 minutes of contact time before wiping, or allow to air dry.

2.9 Bleach solutions should be made fresh daily.

2.10 Use approved or pre-approved EPA-registered disinfectant for use against novel corona virus or the list of disinfectants for use against SARS-CoV2. Follow the manufacturer's instructions for disinfectants strength, dilution concentration, application method, contact time, use of protective equipment and safety information.

2.11 For items that cannot be cleaned using detergent or alcohol

2.12 Place all disposable cleaning items and medical waste in rubbish waste bag.

2.13 Cleaning equipment including mop heads and cloth should be disinfected completely and dried before re-use. ***DOUBLE DIPPING in cleaning solution is highly discouraged***

2.14 Cleaning equipment, such as buckets and trash cans should be emptied, cleaned and disinfected with a new batch or set every new case.

CLEANING AND DISINFECTION OF RE-USABLE MEDICAL EQUIPMENT:

Perform pre-wash using warm running water to remove debris.

Check items before soaking .using approved EPA-disinfectant solution for at least 30 minutes.

Remove debris and flush tubing, and rinse thoroughly. Air dry, inspect, pack and label and send items for sterilization.

Make sure that items passed all the indicators for sterilization before re-using it.

There should be a designated re-processing area, cleaning materials and soaking basins.

Cleaning items used must be disposed properly every after set or reprocess.

CLEANING AND DISINFECTION OF RE-USABLE LINEN:

Use disposable gown and drapes for suspected and confirmed COVID cases.

Visible contaminants must be removed from the soiled linen and must be soaked by disinfectant for at least 30 minutes. Carefully pack the infectious linen in an infectious waste bag and sealed before transport and label the infectious bag properly.

Infectious waste must have a designated transport container with cover and a designated washing machine.

Infectious linen should be processed based on the protocol using approved disinfectants before re-using it. Inspect re-processed linen or packing it for sterilization and must passed the sterilization before re-using it.

Document and report any untoward incident.

EFFECTIVE METHODS OF DECONTAMINATING N95 MASK FOR REUSE?

KEY FINDINGS:

Based on one study, hydrogen peroxide vapor and ultraviolet radiation were shown to be effective in decontaminating SARS-CoV-2 on N95 fabric while maintaining respiratory integrity.

- Considering the current pandemic, there is a potential for shortage of N95 facepiece filtering respirator (FF R) for healthcare workers.
- No studies in humans were found comparing effectiveness of N95 post-decontamination.
- Based on one mechanistic study, hydrogen peroxide vapor and ultraviolet radiation were shown to be effective in decontaminating SARS-CoV-2 on N95 fabric while maintaining respiratory integrity. Dry heat and ethanol were also able to reduce the viral load of SARS-CoV-2 but with significant reduction in respirator fit and function.
- Mechanistic studies done on influenza virus (A/H5N1 , HI NI) have shown that ultraviolet germicidal irradiation, microwave generated steam, or warm moist heat were able to reduce the viral load by as much as 4 log and at the same time maintain respirator performance by keeping the percent penetration below 5% and the pressure drop within standards.
- While UV germicidal irradiation was able to maintain integrity of FFRs up to 3 cycles, microwave generated steam may melt the metallic components of certain N95 masks.
- Bleach, ethanol and isopropanol all affected the integrity of the mask by increasing the mean penetration of the mask beyond the 5% limit.
- The Centers for Disease Control (CDC) does not recommend routine decontamination then reuse of FFRs as standard care but decontamination With UVGI, HPV or moist heat may be considered as an option in FFR shortages. Copyright Claims: This review is an intellectual property of the authors and of the Insitute of Clinical Epidemiology, National Insitutes of Health-UP Manila and Asia-Pacific Center for Evidence Based Healthcare Inc.

RESULTS

No studies in humans were found comparing effectiveness of N95 after decontamination.

Hydrogen peroxide vapor (HPV) demonstrated SARS-CoV-2 inactivation after 10 minutes for N95 fabric and stainless steel with more than 4-10g reduction. Filtration performance was similar with controls after 2 cycles and was still Within acceptable standards after 3 cycles of decontamination. Respirator performance of previous studies on HPV were also within standards up to 20 cycles with no significant changes in form, filtration or fit. Successful decontamination of *G. stearothermophilus* [191], MRSA [61] and aerosolized bacteriophages [201] was also reported.

Decontamination with ultraviolet light (I-IV) at a wavelength of 260-285 nm revealed rapid inactivation of SARS-CoV-2 on steel after 10 minutes but slower inactivation on N95 fabric With a 4-log reduction after 60 minutes. Respirator fit and function were similar with controls up to 2 cycles and within OSHA standards up to 3 cycles. The UV dose used in the study was 0.33 J/cm² at 10 minutes, 0.99 J/cm² at 30 minutes and 1.98 J/cm² at 60 minutes [5]. While there are no set recommendations on the minimum UV dose required for decontamination, a study has reported a significant reduction in viral loads of MS2 coliphage with a minimum dose of 1 J/cm² [11] and other decontamination studies using a set UV dose between 1 J/cm² and 1.8 J/cm² demonstrated a reduction of log in both H1N1 and H5N1 influenza virus when virus was aerosolized or in droplets. However, performance may go down to a reduction of log 1.25 if mask is soiled. With mucus or sebum. [4-10]. Structural integrity, filtration and fit of N95 masks in previous studies were also not significantly altered up to 3 cycles. The efficiency of UVGI, however, may be affected by shadowing and material of respirator facepiece and straps.

SARS-CoV-2 inactivation was also demonstrated after decontamination in a 70°C oven for 60 minutes and 70% ethanol for 10 minutes. However, significant reduction in respiratory integrity was observed for subsequent decontamination cycles. Other studies have also shown chemicals such as bleach, ethanol and isopropanol increase the mean penetration of the mask above the 5% limit.

Warm moist heat and microwave generated steam had good decontamination performance on bacteriophages and influenza Virus. Both reduced viral load of influenza by log with mean penetration and resistance still within acceptable standards. Although respirator filtration and fit were preserved for most of the N95 models tested, partial separation of the inner foam nose cushion from the respirator was noted on one model of N95 respirator tested. Also, N95 metal parts may melt when subjected to microwave generated steam. Steam sterilization was effective against *B. subtilis* spores but a decrease in filtration performance was detected.

The Centers for Disease Control (CDC) does not recommend decontamination then reuse of FFRs as standard care but decontamination with UVGI, HPV or moist heat may be considered as an option in FFR shortages. However, proper precautionary measures need to be taken such as cleaning hands with soap and water before and after touching the FFR, using a pair of non-sterile gloves when donning the respirator and performing a seal check, inspecting the respirator for any defects or degradation of parts, and performing a user seal check.

Ref: <https://www.psmid.org/rapid-review-decontamination-methods-for-n95-mask/>

1. SURGICAL MASK

Specifications:

Disposable, non-woven, pleated, hypoallergenic, high filtration capacity, with adaptable nose bar, very low resistance to breathing (N88)

Recommended use for HCW who are:

- Not directly handling COVID-19 patients
- No risk of splashing or spraying of bodily fluids

Extended use of surgical mask without removing for up to 6h (3,4), when caring for a cohort of COVID-19 patients is feasible but increases the risk of contamination. The use of a face shield over a surgical mask (covering the chin and sides of the face) may extend the use of the face mask

Reprocessing of surgical masks is **NOT RECOMMENDED**.

Cloth masks are NOT considered as an alternative to surgical masks for health care workers.

2. EYE PROTECTION (GOGGLES/ FACE SHIELDS)

Specifications:

- Anti-fog with side shield is preferred
- Made of polycarbonate material
- Lightweight with adjustable head-strap
- Must cover the side of the face and below the chin.

Recommended use for HCW who are:

- involved or performing AGP
- directly caring for probable or confirmed COVID-19 patients
- performing procedures with risk of splashing or spraying of blood and other bodily fluids.

Extended use or limited re-use of goggles/face shields are accepted.

Situations where goggles/face shields should be discarded:

- goggles or face shields are damaged
- item can no longer fasten securely to the HCW
- visibility is obscured upon use of the item

Reprocessing of goggles/face shields is accepted.

Method of Reprocessing goggles/face shields:

a. The most common method of reprocessing is by washing with soap/detergent and water first, followed by disinfection , then rinsing with water and lastly by air drying.

Disinfection Alternatives:

1) soak with 0.1% sodium hypochlorite for 5 minutes

2) wipe with 70% ethanol with a minimum contact time of 5 minutes.

3) soak with 3% hydrogen peroxide for 30 minutes

b. Another method to reprocess goggles is to clean it then decontaminate the goggles, then expose to ultraviolet radiation in a UV sterilizing cabinet for 15 minutes. This method is supported by a study by Ziegenfuss where decontamination of eye protection equipment was found effective, using ultraviolet radiation (UV): at 253.7 nm wavelength. Check compatibility of eye shield material with disinfecting agent in a small peripheral portion , as some materials may opacify upon contact with the agent

The reuse/reprocessing of goggles/face shields without appropriate decontamination sterilization is strongly discouraged because it is one of the principal sources of transmission to health care workers.

3. RESPIRATORS (N95, N99, N100)

Specifications:

At least 95% filtration efficiency, fluid resistance, with nose clip, 2-strap design with welded strap attachment, with nose foam.

Fit testing is a critical component to a respiratory protection program whenever workers use tight-fitting respirators. Use a test agent, either qualitatively detected by the wearer's sense of taste, smell, or involuntary cough (irritant smoke) or quantitatively measured by an instrument, to verify the respirator's fit.

Recommended use for HCW:

- involved in or performing aerosolizing procedures (endoscopy, intubation, etc.)
- directly caring for COVID-19 suspect or confirmed patients
- performing procedures with risk of splashing or spraying of blood and other bodily fluids
- can be used for up to 8 hours

Extended use is safe and accepted provided that the respirator must maintain its fit and function.

Conditions that will prevent extended use of N95 masks

- soiled with blood or bodily fluids
- discarded following use in aerosol generating procedures
- following close contact with, or exit from, care area of COVID-19 suspect or confirmed patients
- damaged (tie or ear loops are torn or broken)
- hard to breathe through

Extended use is favored over reuse.

Reuse after extended use is not accepted.

Reuse is permitted provided the following steps are observed to reduce contact transmission.

- Can rotate 5-7 pcs of N95 respirators for each HCW
- Use one N95 in a particular day, take off and store
- Store by hanging used respirators in designated storage area or use a breathable container such as a paper bag in between uses
- Avoid respirators touching each other in storage to minimize potential cross contamination this amount of time in between use, exceeds the 72-hour expected survival time for SARS CoV
- Minimize cross contamination by labeling one respirator per HCW.
- Use of face shield over an N95 respirator.

Limited re-use for not more than 5 times per device to ensure adequate safety margin.

Contact transmission caused by touching a contaminated mask is identified as a primary hazard for use and reuse of respirators.

Reprocessing Methods: There are three decontaminating methods for ensuring effectiveness and integrity of respirator after reprocessing.

- Vapor of hydrogen peroxide (VHP) – STERRAD gas plasma sterilizer for 55 mins.
- UV radiation lamp – UV sterilizing cabinet for 15 minutes
- Moist heat incubation – hot air (oven) 70oC for 30 minutes

VHP and UV technique allows reuse up to three times; moist heat allows reuse for up to two times.

Decontamination methods not recommended by current evidences

- Ethylene oxide
- Ionizing radiation
- Microwave
- High temperature above 750C, such as autoclave or steam

Expired N95 can still be used, as long as there are no signs of damage (discoloration, residue shedding, and loss of elasticity of ear loops). However, it is advised to get in touch with the manufacturer prior to use.

Damage to the shape of respirators due to reprocessing may affect fit and protection properties.

4. Personal Air-Purifying Respirators (PAPR)

Principle:

- Battery powered blower that forces air through filter cartridges or canisters and into the breathing zone of the wearer, an airflow is created inside, either a tight-fitting facepiece or loose-fitting hood or helmet, providing a higher assigned protection factor (APF)
- Uses high-efficiency particulate air (HEPA) filter which implies that they have a greater level of respiratory protection than N95 masks.

Components:

- Headgear or Hood, face shield, head harness, nose cup assembly, spectacles, visor covers, inhalation and exhalation valves, port adapter, cartridge filter, PAPR system, belt, air hose, battery chargers, etc.

Some Useful information about loose fitting PAPR

- Better than tight-fitting non-powered approved air-purifying respirators
- A fit test is not required
- Can be worn with a limited amount of facial hair.
- May offer significant splash protection for the face and eyes.
- Patients can see the face of the HCW, providing better interpersonal communication.
- Can be cleaned, disinfected, re-used, and shared.
- Less taxing from a physiological/breathing resistance perspective than other respirators.

Limitations of PAPR

- May interfere with the user's visual field because of the limited downward vertical field of view.
- Ability to hear may be reduced because of the blower noise, and noise induced by the movement of a loose head covering.
- Ability to use a stethoscope may be limited.
- Batteries have to be recharged or replaced.
- Requires a significant amount of storage space in between shifts.
- Highly recommended for health facilities to have a program on
 - o Maintenance, cleaning and proper disinfection
 - o Battery supply and maintenance
 - o Formal Training on donning and doffing, because removal of the hood is more complicated

Role of PARPs in contingency and capacity settings

Access to PARPs may be even more limited due to cost and need for routine maintenance.

5. GOWNS

Specifications:

- PPE gown - also commonly known as Surgical gown, sometimes called isolation gowns
- Material Non-woven polypropylene (disposable single use), or non-woven cloth, polyester or polyester-cotton (washable, reusable)
- Long sleeved, tie back, covers down to mid-calf, light weight, durable, breathable, water and blood resistant

Appropriate use of gowns.

- Gowns are worn over scrub suits.
- In conventional capacity situation use, surgical or isolation gowns (polypropylene-made).
- In contingency capacity strategies, shift gown use towards use of cloth gowns.
- Upon entry to a room or area of a suspect or confirmed COVID patient, use clean isolation gown.
- In actual and close contact patient encounter with COVID suspect or confirmed case, use two layers of gowns as much as possible. One may opt to combine the use of polypropylene made gowns with cotton made gowns.
- If a combination of cotton made gown and polypropylene made gown is needed, use the polypropylene made gown as inner layer, followed by the cotton gown as the outer layer. Quickly dispose of the cotton gown once it is stained or soiled and replace immediately if necessary.
- In the operating Room, don an unsterile gown as first layer protection at the donning area and then proceed inside the operating cubicle for another layer of sterile gowning process.

Removal/disposal of gowns, if it is:

- Wet, soiled or damaged
- Exposed to chemicals, infectious substances or bodily fluids
- Used in providing care outside designated cohort of COVID-19 patients

Extended use is acceptable in HCW providing care for a cohort of COVID-19 patients

Reuse/Reprocessing of gowns made of cloth is accepted.

Cloth gowns are to be laundered after each use.

Reprocessing:

- **Cotton gowns:**
 - Washing machine – wash and disinfect with warm water (60-90°C) and laundry detergent
 - Manual washing – soak and stir with hot water and soap followed by soaking in 0.05% chlorine for 30 minutes then rinse with water and dry fully.

- **Disposable gowns**

- The CDC cites easy breakage of disposable gown ties and fasteners, making them less amenable to washing and reuse than reusable gowns.

When gowns are in short supply, the following are the alternatives but be aware of their limitations:

- Disposable lab coats are less durable than gowns
- Disposable impermeable plastic aprons cannot protect arms and back of torso
- Reusable patient gowns or lab coats but design or thickness may not be comparable
- Combination of pieces of clothing such as the following may be considered for activities that may involve body fluids and when there are no gowns available:
 - Long sleeved aprons in combination with long sleeved patient gowns or laboratory coats
 - Open back gowns with long sleeved patient gowns or laboratory coats
 - Sleeve covers in combination with aprons and long-sleeved patient gowns or laboratory coats

6. COVERALL (Hazmat Suit)

Specifications:

- Made of high-density polyethylene (HDPE) formed into non-woven fabric; other materials are polypropylene fiber with polyethylene coating, breathable, light weight, water-based liquids and aerosol repellent, low linting, tunneled elastic bands for the wrists, ankles and face, and thumb loops
- Ideal color is white or light blue, ideally single use, biohazard protective cover all clothing.

Recommended only for HCW who are:

- Involved or performing aerosol-generating procedures (endoscopy, intubation, etc.)
 - Directly caring for COVID suspect or confirmed cases
 - Performing procedures with risk of splashing or spraying of blood and other bodily fluids.
- Coveralls provide 360-degree protection including back and lower legs, sometimes the head and feet as well.

Reuse or reprocessing of coveralls is acceptable in times of severe shortage.

Ideally, coveralls are for single use. However, if supply becomes an issue, recycle those, which can be adequately cleaned, disinfected and sterilized.

Reprocessing:

The most common method of reprocessing is to initially, wash with soap/detergent and water followed disinfection then by rinsing with water and finally by air & sun drying

Disinfection Alternatives:

- 1) soak with 0.1% sodium hypochlorite 5 minutes
- 2) soak with 3% hydrogen peroxide for 30 minutes

Alternatives to commercially available coveralls:

Non-woven polypropylene –

- same material used to make reusable shopping bags
- made from thermoplastic polymer
- recyclable and reusable
- coveralls can be washed if they are used in low-risk areas.

Infectious disease experts do not recommend this type of non-woven polypropylene coverall as these are not meant for health care workers who come into direct contact with infected patients.

Advise on locally manufactured coveralls

- Current recommendations on specifications on medical grade coveralls is still undergoing quality and safety assessment by DOH and DTI.
- Local manufacturers are mandated by the FDA to:
 - ✓ secure a License to Operate (LTO) as medical device manufacturer
 - ✓ be guided by local (Philippine National Standard) and applicable international standards (ISO or IEC), in the absence of Philippine National Standard.
 - ✓ comply with technical requirements for the registration of medical devices
 - ✓ undergo safety testing by appropriate accredited laboratories.

Donated PPEs must also be subjected to the scrutiny and approval of individual hospital infection control committees and caution must be applied for use in Level 4 areas without the aforementioned precautions.

7. Surgical Cap

Specifications:

Disposable, non-woven surgical bouffant cap, shower type

8. Shoe cover

Specifications:

- Disposable, non-woven
- Fabric does not tear/break easily
- Non-skid, does not slip on wet floor

No recommendation can be made for the use of shoe covers versus no shoe covers for health care personnel caring for patients with suspected or known COVID-19 as part of appropriate PPE. No studies conducted at this time.

9. Gloves

Specifications:

- Hypoallergenic, nitrile, powder free, latex free (some are too thin), standard thickness, beaded cuff, smooth with micro textured finish, safe grip easy donning and comfort, excellent hand fitting.
- Superb tensile strength.
- With left and right hand marking on gloves.

Recommendations:

- Should be worn when providing direct care for a COVID-19 patient and then removed, followed by hand hygiene in between patients
- Should be worn when in close contact with a patient during physical examination then immediately removed followed by hand hygiene in between patients
- Do not use the same pair of gloves for multiple patients
- Double gloving is not recommended except in surgical procedures carrying a high risk of glove perforation
- Extended use of gloves (using the same gloves for a cohort of COVID-19 cases) must not be done.
- Changing gloves between dirty and clean tasks in the delivery of care to a patient and when moving from a patient to another, accompanied by hand hygiene, is absolutely necessary.

Use of Double gloves or single gloves

- No recommendation as no comparative studies were conducted.
- Using a single pair of gloves puts one at a theoretical risk that the organism may transfer from contaminated PPE to the hands after removal of the contaminated gloves or clothing, which may contribute to infection.

KEYPOINTS:

1. Most personal protective equipment (PPEs) are designed for single use, but in situations where supply is limited, extended use and reuse after reprocessing may be considered. The following PPEs may be reprocessed then reused: N95 mask, goggles, face shields, scrubs, coveralls, covered shoes and cotton gowns.
2. Reprocessing should follow the principles of cleaning and decontamination before disinfection and sterilization. Reprocessing should be performed by a trained staff in the sterile services department of a health care facility or at a bigger scale under controlled and standardized conditions.
3. Disinfection and reuse of disposable PPE may be possible, but always be aware that the processes used may compromise the integrity of the product and impact its effectiveness.
4. It must be understood that reprocessing of disposable PPE is an evolving subject where research and development is currently ongoing. More evidence may become available in the future.

5. It cannot also be overemphasized that these alternative strategies are only recommended in crisis situations where there is a critical shortage of supplies.

Ref: PCS-COVID-10-Rationale-Use-of-PPE

EMERGENCY CONSIDERATIONS FOR PPE

Gowns

Extended use: *Extending the use of gowns (disposable or reusable options) for one HCW to use on multiple patients with COVID-19 (multiple single-rooms when seen in succession or cohort of patients) during a single shift.*

- This strategy is not consistent with standard practice and therefore not recommended, but if adopted:
 - If it becomes visibly soiled, the gown must be removed using appropriate technique for reprocessing (*See reprocessing guidance below*) or disposal following local protocols (followed by appropriate donning of a new gown).
 - If it is removed for any other reason such as taking a break or completing a shift, the gown should be sent for reprocessing or disposed of following local protocols
- **Note: this emergency strategy (extended use) should be prioritized over the use of alternatives.**

Method

Commercial/ industrial laundry machines

Product(s)

Laundry detergents

Process

Follow instructions from the washer/dryer manufacturer.

Use hot water (70–80°C X 10 min) [158–176°F]) and an approved laundry detergent.

Dry linens completely in a commercial dryer.

Additional considerations

Gowns with small holes, tears, or missing fastening ties need to be mended and those that are thin or ripped need to be discarded.

Method

Manual laundering

Product(s)

Laundry detergent, Hospital disinfectant

Process

1. Clean by immersing in detergent and hot water solution and use mechanical action (scrubbing) to remove soil.
2. Soak in a 0.05% chlorine solution for approximately 30 minutes after cleaning with detergent and water.
3. Rinse with clean water to remove residue.
4. Allow to fully dry, ideally in the sun.

Additional considerations

Laundry staff should wear reusable rubber gloves, gowns or aprons and face protection (face shield and goggles) when manually laundering gowns.

Eye Protection

Goggles: Goggles provide barrier protection for the eyes. They should fit tightly over and around the eyes or personal prescription lenses, be indirectly vented (to prevent penetration of splashes or sprays) and have an anti-fog coating to help maintain clarity of vision. The lens is made of plastic, commonly polycarbonate, and there is an adjustable elastic strap to allow snug fit around the eyes. Goggles used for healthcare applications are typically reusable.

Face shields: Provide barrier protection to the facial area and related mucous membranes (eyes, nose, lips) and are considered an alternative to goggles. Face shields are not meant to function as primary respiratory protection and should be used concurrently with a medical mask (for droplet precautions) or a respirator (for airborne precautions) if aerosol-generating procedure is performed. They should cover the forehead, extend below the chin, and wrap around the side of the face. Face shields are available in both disposable and reusable options.

1) Limited Supplies

Extended use: Extending the use of goggles or face shields (disposable or reusable) for one HCW to use on multiple patients with COVID-19 (multiple single-rooms when seen in succession or cohort of patients) during a single shift.

- This strategy is not consistent with standard practice and therefore not recommended, but if adopted:
 - If eye protection becomes visibly soiled, it should be removed using appropriate technique and sent for reprocessing or disposal following local protocols

(followed by appropriate donning of a new set of eye protection) before moving to another patient.

- If eye protection is removed for any other reason such as taking a break or completing a shift, it should be sent for reprocessing or disposed following local protocols.

Reuse:

A. *Reprocessing and reusing disposable face shields for one HCW to use on multiple patients with COVID-19 for a limited time-period (multiple shifts).*

- This strategy is not consistent with best practices and therefore not recommended, but if adopted:
 - A face shield should be **dedicated to one HCW**.
 - They should be immediately reprocessed when they are visibly soiled, whenever they are removed such as when leaving the isolation area, and at least daily (after every shift) prior to putting them back on (*See reprocessing guidance below*).
 - After reprocessing, a face shield should be stored in a transparent plastic container and **labeled with the HCW name** to prevent accidental sharing between HCW.
- **Note:** The number of times a disposable face shield could potentially be reprocessed is unknown; therefore, face shields should be closely examined prior to each reuse to ensure the integrity of the foam pad, elastic strap, and clarity of the visor.

B. *Dedicating a supply of reusable goggles or face shields to an isolation area (with one or more patients with COVID-19 in single-rooms or a cohort of patients) for multiple HCWs to use throughout one shift.*

- This strategy is not consistent with standard practice and therefore not recommended, but if adopted:
 - Items should be **reprocessed after each use** and stored at the entry to the isolation area, in a **dedicated area equipped for reprocessing adjacent to the isolation area** (dirty and clean storage area) (*See reprocessing guidance below*).

Type of equipment

Disposable face shield

Reprocessing steps

1. Carefully wipe the *inside* and then the *outside* of the visor using a clean cloth saturated with neutral detergent solution, rinse if needed.
2. Carefully wipe the *outside* of the visor using a clean cloth or wipe saturated with hospital disinfectant solution; be sure it remains wet for the required contact time.
3. Wipe the outside of visor with clean water to remove residue.
4. Fully dry (air dry or use clean absorbent towels).

Disinfectant Product Options

Chlorine-based disinfectant (0.1% chlorine solution) recommended over alcohol, as alcohol may damage and discolor plastic and deteriorate glues over time; note that it may also remove anti-glare and anti-fogging properties of the face shield.

Considerations / Additional Guidance

The emphasis of reprocessing should be on the outside of the visor.

Carefully avoid the foam cushion and elastic strap as they may not be tolerant to disinfectants.

Note: If reprocessing disposable face shields on a time-limited basis, they should be **dedicated to one HCW**.

Type of equipment

Reusable goggles or face shield

Reprocessing steps

1. Immerse in or wipe with neutral detergent and warm water solution, use mechanical action to remove any visible soiling, then quickly rinse with clean water; rinse if needed.
2. Immerse in or wipe with hospital disinfectant solution for the required contact time.
3. Rinse with clean water (sink if available or by immersing in a bucket of clean water) to remove any residue.
4. Fully dry (air dry or use clean absorbent towels).

Disinfectant Product Options

Manufacturers should be consulted for their guidance and experience in disinfecting their respective products.

Considerations / Additional Guidance

Chlorine-based disinfectant (0.1% chlorine solution) recommended over alcohol as alcohol may damage and discolor plastic and deteriorate glues over time; note that it may also remove anti-glare and anti-fogging properties of the eye protection.

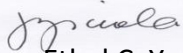
Note: Solutions must be regularly replaced as they will quickly become contaminated.

Ref: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/non-us-settings/emergency-considerations-ppe.html>

This recommendation was validated by Dr. Esther A. Saguil – Chair, Philippine Surgical Infection Society- Philippine College of Surgeons and Dr. Benjamin Daniel S. Valera – President Philippine Society of Anesthesiologists.



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