Optimising, prolonging and preserving personal protective equipment in COVID-19 - A rapid review of the evidence

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COVID19 Canberra Health Service and ANU College of Health and Medicine – Optimising, prolonging and preserving PPE

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Acronyms:

- WHO: World Health Organization, CDNA: Communicable Diseases Network Australia, PPE: Personal protective equipment, HCW: Healthcare worker, IMV: invasive mechanical ventilation, NIV: non-invasive ventilation, HFNC: high-flow nasal cannula, PP: prone position

Summary:

- Ensure good **whole facility general infection prevention measures**:
    - Maintain social distancing where possible, no shaking hands, no touching your face
    - Good respiratory hygiene and cough etiquette, good hand hygiene
    - Do not turn up to work if unwell
    - Split teams and do not mix, work from home, staggered lunch hours
- **Ensure proper PPE use** → robust but rational:
    - Adequate and ongoing PPE training, opportunities to be fit tested for N95 masks
    - Clearly demarcated donning and doffing areas → Trained PPE observer or buddy to check technique
    - Clear pathways for notification and management of breaches in PPE
    - **Before patient interaction requiring airborne precautions, a FIT CHECK MUST OCCUR → If proper seal CANNOT be achieved, DO NOT ENTER**
- **1. REDUCE: Minimise the need** → use administrative and environmental/engineering management
    - Telehealth and hotlines for suspected cases, post-pone non-urgent procedures or clinic visits
    - **Cohort confirmed COVID19 cases** WITHOUT co-infection of other airborne or contact transmissible ID
        - Have dedicated teams only for COVID19 patient care to allow extended PPE use if required
        - Restrict HCWs entering room and minimise interactions → plan activities → eg. Check vital signs during medication administration
        - Consider: do I need to be going in? What am I going to do? Do I have everything I need?
- **2. Coordinate PPE supply chains** → have central coordination of requests, storage, distribution and management of supplies, restrict access
    - Keep track of PPE burn rate → use PPE forecasts to plan management
- **3. Extend → reuse → alternatives**
    - Surgical and respirators: 6hrs w/o taking off (+/-2hrs) → **do NOT touch the front of your mask → do NOT have the mask around your neck**
        - Must be removed if: wet, soiled, damaged, loses fit, difficult to breathe through, splash of chemicals or body fluids, after AGP, if leaving non-patient care area, or if moving to non-COVID19 patient
    - Gowns → some suggest leaving on gown for cohort, other suggest leaving mask and eye protection on but changing gown between patients
        - Can use cotton gown if required (+ apron if AGP or splash), or reusable waterproof gown, or impervious open back gown
    - Face-shield/eye-protection → can be cleaned immediately after doffing and hand hygiene → ensure storage in clean space

EVIDENCE BASE AND SOURCE	SUMMARY – RELATING TO CONSERVATION AND OPTOMISATION OF PPE USE FOR COVID-19
28/03/20, Guideline: ***Surviving Sepsis Campaign: guidelines on the management of critically ill adults with COVID-19*** *https://link.springer.com/article/10.1007/s00134-020-06022-5*	- For ICU COVID-19 patients, undergoing an AGP, recommend use of a fitted respirator mask in contrast to a surgical mask o In addition to other PPE such as gloves, gown and face shield of safety goggles o AGPs include: intubation, bronchoscopy, open suctioning, nebulised meds, manual ventilation, proning, NIV, CPR o PARPs should be used by HCWs who fail N95 fit testing, or when N95s are in limited supply - For HCWs caring for non-ventilated patients, or performing non-AGPs on mechanically ventilated patients, they suggest use of a surgical mask, in contrast to a respirator (+ gloves, gown, eye protection) (good evidence provided here)
07/04/20, Guideline: ***ACEM Clinical Guidelines for the management of COVID-19 in Australasian emergency departments, V2.2***[1] *Updated regularly: https://acem.org.au/Content-Sources/Advancing-Emergency-Medicine/COVID-19/Resources/Clinical-Guidelines*	- *Very, very good guidelines – well written, updated regularly, clear and easy to read, good diagrams* - Transmission is primarily through respiratory droplets and contact, including fomites. However, aerosol transmission may. occur in. settings where AGPs have occurred. This includes: intubation, bronchoscopy, open suctioning, nebulised treatment, NIV, bag-mask ventilation, turning a patient to prone, tracheostomy, insertion of an ICC, CPR o No current report of faecal-oral transmission - General measures – ensure staff: o Maintain **social distancing** where possible, no shaking hands, no touching your face o Good **respiratory hygiene and cough etiquette** o Good **hand hygiene** o Do not turn up to work if unwell - PPE should form part of a package of infection prevention and control measures o Appropriate triage and flow of patients o Environmental management → adequate spacing, correct cleaning, well ventilated rooms o Standard precautions and hand hygiene for all patients o All patients, visitors and staff to adhere to respiratory hygiene and cough etiquette o Use of surgical masks by health care facility staff o Family members or visitors to COVID19 positive/suspected patients to use contact and droplet precautions o Single-use disposable equipment or dedicated equipment, or cleaned and disinfected between patients o Shared staff equipment should be cleaned regularly (keyboards, phones, pagers, mobile devices) - **PPE recommendations for ED (below)** → *See attached Figure 1. For further details* o *Suspected or confirmed COVID-19 cases* → Ensure appropriate donning, doffing and disposal of PPE with checker ▪ Contact + droplet → surgical mask, goggles or face shield, long-sleeved gown, gloves, consider hair cover ▪ AGPs or critically unwell → negative pressure room or single, well ventilated room • Respirator mask (with seal check), goggles or face shield, gloves • Long-sleeved gown → if not fluid resistant, use water-proof apron • Hair cover or hood o *Use of PPE for clinical patients without any epi or clinical criteria who are low risk for COVID-19* ▪ **Surgical face mask, hand hygiene, gloves for patient contact**

- For AGPS in any patients → airborne PPE
- Resus, MET and trauma teams → surgical mask and gloves if no AGPs → airborne PPE if AGPs likely
- For all staff:
    - Adequate and ongoing PPE training, opportunities to be fit tested for N95 masks
    - Clearly demarcated donning and doffing areas
    - Clear pathways for notification and management of breaches in PPE
    - Trained PPE observer or buddy to check technique
- Recommend "robust but rational use of PPE"
    - Ideally PPE is changed between patients, but may not be feasible in the context of limited resources
    - Practice "extended use", rather than "reuse" of N95s if possible
        - Discard after use for an AGP, or if contaminated with blood, secretions or other fluids
        - Discard after care or leaving a patient is co-infected with a disease requiring contact precautions
    - Consider use of a cleanable face shield over an N95 to reduce surface contamination
    - Perform hand hygiene w/ soap and water or hand sanitiser before and after touching or adjusting a mask
    - Discard any mask that is damaged or damp, or hard to breathe through
- Advice coming from international experience includes:
    - All staff to wear surgical masks
    - In Hong Kong, all patients as inpatients, or outpatients were given a daily surgical mask
    - In China, all ED, ID, respiratory teams, and endoscopic proceduralists must upgrade their surgical masks to N95s
    - All staff must wear a protective face screen while collecting specimens from suspected or confirmed patients

06/04/20, WHO, Interim guidance: ***Rational use of PPE for COVID-19 and considerations during severe shortages[2]***

https://apps.who.int/iris/bitstream/handle/10665/331695/WHO-2019-nCov-IPC_PPE_use-2020.3-eng.pdf

- *This is a large document detailing recommendation for PPE use, and alternatives in a severe shortage – the whole document is NOT summarised here – please see the complete document for the full information*
- PPE should be used alongside other measures such as physical distancing, hand hygiene and normal precautions, administrative and considered patient flow (ie. Triage and risk stratification), environmental and engineering, and cleaning.
- PPE optimisation involves ←minimise PPE need + use PPE appropriately + coordinate PPE supply chain
- **1. Minimise the need**
    - Telehealth and hotlines to evaluate suspected cases
    - Use physical barriers such as glass or plastic windows in areas such as pharmacy or triage
    - Post-pone non-urgent procedures, reduce frequency of clinic visits, telemedicine where appropriate
    - Cohort confirmed COVID19 cases without co-infection of other transmissible ID
        - Can then streamline workflow and facilitate extended use of PPE
        - Have dedicated teams only for COVID19 patient care to allow extended PPE use if required
        - Restrict HCWs entering room and minimise interactions → plan activities
            - Check vital signs during medication administration, or have food delivered to HCW
        - Consider using specific PPE only if in direct contact with the patient or touching the environment
            - Ie. Wearing only a mask and face shield but not gloves and gown if entering just to ask questions

        - Visitors should not be allowed, but if necessary, restrict the numbers of visitors and time allowed
            - Ensure clear instructions and help to don and doff
- **2. Ensure rational and appropriate use of PPE**
    - Ensure PPE used it appropriate to the setting, care/work being undertaken, and the patient COVID19 status or risk
    - HCWs involved in AGPs (inc. intubation, bagging, NIV, CPR, ect.) should use respirators, eye protection, gloves and gowns (or gown w/ apron if not fluid resistant).
    - Suspected or confirmed cases staying at home, and carers should receive information on appropriate mask use
- **3. Coordinate PPE supply chain**
    - Use PPE forecasts based on rational models to ensure rationalisation of requested supplies
    - Have a centralised request management approach of stock of PPE to limit wastage, overstocking and distribution
- *Includes a detailed table on recommended PPE according to setting and personnel – not summarised here*
- *"Based on current evidence, in consultation with international experts… WHO carefully considered **last resort temporary measures** in crisis situations to be adopted **only** when there might be a serious shortage of PPE or in areas where PPE may not be available."* → **should be avoided when caring for severe or critically ill COVID19 patients or w/ co-infections**
- Hierarchy of measures:
    - **1. Extend PPE use** → use longer than according to normal standards
        - Medical and respirator masks → 6hrs w/o taking off when caring for cohort of patients
            - Must be removed if: wet, soiled, damaged, difficult to breath through, splash of chemicals or body fluids, if displaced from face, or if front of respirator is touched to adjust it
        - Gowns → same gown for cohort of patients, EXCEPT if patients have other ID requiring contact precautions
            - Must be removed if: wet, soiled or damaged, splash of chemicals of body fluids
        - Goggles or safety glasses → use without removing for entire shift when caring for cohort
        - Face shield → use without removing for entire shift when caring for cohort
    - **2. Reprocessing followed by reuse**→ much PPE cannot be cleaned w/o losing their properties
        - Ensure efficacy of the process to guarantee disinfection or sterilization
        - Reprocessing method must not result in residual toxicity for HCWs
        - Process must ensure the item maintains functional integrity and shape
            - Need process to inspect, repair if applicable, and then dispose of reused PPE when necessary
        - Surgical masks → no evidence for reprocessing, respirators → some evidence
        - Gowns → cotton gowns only → can use apron for AGP or likely splash
        - Goggles → soap and water, then disinfectant or 70% alcohol wipes → can place in container for later cleaning → after cleaning ensure stored in clear area
        - Face shield may be cleaned immediately after doffing and hand hygiene → soap and water then disinfectant or alcohol wipe
    - **3. Consider alternative items** compared with the standards recommended by WHO
        - Replacement of standard PPE with items produced w/ materials not necessarily meeting requirements (such as cotton masks) has not been proven to be effective and is discouraged

	- Ensure gloves are changed between COVID19 patients and that appropriate hand hygiene is followed (and changing gloves and hand hygiene between dirty and clean tasks) - *NB. Risks of prolonged mask use include: dermatitis, ache, increased fatigue and impaired work capacity, early exhaustion, increased non-compliance with best-practice (adjustment or face/mask touching)*
05/03/20, Aust DoH Guideline: ***Interim recommendations for the use of PPE during hospital care of people with COVID-19***[3] *https://www.health.gov.au/resources/publications/interim-recommendations-for-the-use-of-personal-protective-equipment-ppe-during-hospital-care-of-people-with-coronavirus-disease-2019-covid-19*	- **Contact and droplet precautions for routine care** of suspected or confirmed cases - **Contact and airborne precautions for AGPs** o <u>AND care of clinically ill COVID19 patients requiring high level or high-volume hands-on contact outside of ICU</u> o <u>AND care of critically ill COVID19 patients in ICU</u> o P2/N95 masks should be fit-checked before each use – unless used correctly, they are unlikely to be protective o If HCWs are required to remain in a patients room for a long period, a PAPR may be considered for additional comfort and visibility - A staff log of entry should be maintained
03/04/20, Vic DoH Guidance: ***COVID-19 Healthcare worker PPE guidance***[4] *05/04/20, Vic DoH Guidance:* ***Healthcare worker PPE: use of N95 respirators in clinical settings***[5] *https://www.dhhs.vic.gov.au/health-services-and-general-practitioners-coronavirus-disease-covid-19*	- <u>"Surgical masks should be worn in **high-risk areas by all HCWs, for all patient interactions**."</u> This includes: o ICU, ED and urgent care centres, COVID19 wards, acute respiratory assessment clinics o Birth suite rooms o Thoroughfares frequently accessed by suspected or confirmed cases of COVID-19 - <u>Unless damp or soiled, a surgical mask may be worn for the duration of a clinic or shift of up to four hours.</u> o Masks must be removed and disposed of for breaks - AIRBORNE and contact precautions should be used when: o Undertaking an AGP on a suspected or confirmed case o Undertaking an AGP and it is not possible to determine if a patient is a suspected case (eg. Found unconscious) o Undertaking a high risk procedure on a patient – REGARDLESS OF COVID-19 STATUS ▪ Head, neck and ENT surgery or endoscopy ▪ Invasive procedures involving the sinuses (inc. max-fac and neurosurgery) ▪ Ophthalmological procedures that breach the nasal mucosa ▪ Gastroscopy ▪ Bronchoscopy ▪ Emergency dental work that uses tools that produce aerosols o Caring for patients admitted to ICU with severe infection → likely to have higher viral load - There are two types of N95 masks o Standard masks only particulate resistance, but not fluid (3M 8110, 8100S, 8210) o Medical and surgical → both particulate and fluid resistance (3M 1860, 1860S, 1870+, BSN 72509-10) - Medical and surgical N95 respirators should be used when there is a risk of high velocity splashes, sprays or splutter o Could use standard respirator w/ face shield - <u>HCWs must perform a fit check every time they put on a P2 respirator</u>

	○ **<u>NO CLINICAL ACTIVITY SHOULD BE UNDERTAKEN UNTIL A SATISFACTORY FIT IS ACHIEVED</u>** ○ Ensure straps are in the right place, compress mask across face, cheeks and bridge of nose ○ Check the positive pressure seal → gently exhale → if air escapes, needs adjustment ○ Check the negative pressure seal → gently inhale → if respirator is not drawn in to face, or leaks → adjustment ○ HCWs with facial hair (inc. 1-2 day growth), will not be able to get an adequate seal → use PARP - P2 and N95 masks should be replaced when: ○ Contaminated w/ blood or body fluids, and following AGP ○ Replaced if hard to breathe through or if mask no long conforms to face ○ Leaving area of patient care, or moving to a patient not isolated for COVID-19 - Prioritising PPE ○ Prioritise surgical masks for frontline staff (ICU, ED, COVID-19 wards, assessment clinics, theatre, birthing suits) ○ Store masks in a secure area under supervision of staff, and not accessible to patients ○ Unless damp or soiled, a surgical mask may be worn for up to four hours ○ Consider substitutions: apron instead of full gown, full-face shield instead of a surgical mask if appropriate ○ Use expired stock for training
29/03/20, Singapore, presentation: ***National Centre for Infectious Diseases Overview, Diagnostic Testing, Staff monitoring, PPE[6]*** *Taken from provided PowerPoint slides (Obtained from Imogen Mitchell)*	- *Only information regarding PPE is included here – however, contains helpful information regarding staff monitoring* - Infection control measures include: ○ All staff twice daily temperature monitoring – details entered online ○ Work from home if possible, minimise physical interactions, ensure physical spacing ≥1m ○ <u>Stagger working hours and lunch times</u> ○ <u>Split teams to work from different locations</u> ○ <u>All clinical staff to wear surgical masks</u> (not administrative or offices, unless >10 people congregating) - Recommended PPE for HCW ○ Suspected or confirmed cases → airborne and contact precautions → N95 ○ Intubation → REGARDLESS of COVID-19 status (inc. elective OT) → airborne and contact precautions → N95 ▪ For deteriorating patients → early identification and transfer to ICU is recommended ○ Emergency department → ED 'blue' zone → surgical mask → no gown, gloves or eye protection ▪ ED triage nurses + ED 'pink' (fever) zone → airborne and contact precautions → N95 ○ AGPs in non-suspected cases → airborne and contact precautions → N95 - Extended PPE use ○ **<u>Can wear N95 mask and eye protection from room to room → N95 and eye protection for up to 6hrs</u>** ▪ <u>Change gown and gloves between patients or room → recommended single use</u> ▪ Use cap/hair covering to keep hair away from face ○ Medical staff → can remove all PPE after completing WR or clinical duty ○ Nursing staff → after activities or clinical duty → remove eye protection and disinfect and store BUT can leave mask on whilst doing paper based work → then can just put other PPE back on before going back in

	○ Allied health and housekeeping → after completed activities → remove all PPE
27/02/20, Hong Kong, presentation: ***Hospital Authority Communication Kit – Coronavirus disease 2019 (COVID-19), version 3.5 (Abbreviated version for Emergency Medicine)***[7] *Taken from PowerPoint slides*	- Universal masking of patients – inpatients provided with masks, and outpatients asked to bring their own - Have segregated within ED for influenza-like-illnesses - Full airborne and contact precautions required for all AGPs - Enhanced ventilation measures in patient waiting areas ○ Increased air flow rate with fresh air in waiting areas included use of mobile HEPA units where necessary - *For interest: had total of ~1400 airborne isolation beds available, 90 day stockpile of PPE and 3mth backup of hand sanitiser* - Respirator fit test program → all HCWs to be offered N95 fit test program – particularly those in high risk areas ○ Before use of an N95, a fit test should be performed for each user ○ A fit check should be performed by each user every time when using an N95 mask ○ IF A PROPER SEAL CANNOT BE ACHIEVED, DO NOT ENTER THE CONTAMINATED AREA - All visitors, volunteers and clinical attachments were temporarily suspended - PPE recommendations ○ High risk areas (triage, ED, isolation rooms in ICU or ED) ▪ Routine care AND AGPs → airborne and contact precautions ▪ No patient contact → surgical mask ○ Other patient areas ▪ Routine care → surgical mask ▪ AGPs → airborne and contact precautions ▪ No patient contact → surgical mask - Conservation of PPE ○ Extend the use of N95 respirators and eye protection between patients ▪ Change mask if damaged or soiled • This includes use after a high-risk AGP → CPR, emergency intubation or bronchoscopy ▪ Change gloves, gowns and perform hand hygiene between patients – do NOT touch mask or eye protection ○ Eye protection with a face shield should be reserved for handling of confirmed cases or anticipation of large splashes of fluids or excretions (AGP, trauma case, ect) ▪ For other patient activities requiring eye protection, consider using visor or reusable goggles ○ In the shortage of isolation gowns → can use impervious open back gown ○ Reusable goggles → if not soiled, use disinfectant wipe → if soiled, clean w/ detergent and water first
24/03/20, website: ***Recommendations for PPE Conservation: Restrict, Reduce, Re-Use***[8] *http://www.ihi.org/communities/blogs/covid-pandemic-conserving-personal-protective-equipment*	- **Restrict** ○ <u>Restrict all **visitors**</u> with possible exceptions (one per infant and children, one per active labour, one per palliative) ▪ Minimise entrances and screen all visitors → standardised workflows for screening and communication ○ <u>Minimise staff exposure</u> → develop a checklist prior to patient encounters ▪ Does the patient need to be seen? By who? Can we minimise the number of care providers in the room? ▪ What will I need? Review all equipment and supplies needed before entering

	▪ Bundle as many tasks together o <u>Restrict access to PPE</u> → centralised location with specific individuals responsible for distribution and allocation - **Reduce demand for PPE** o Eliminate elective surgeries and procedures o Minimise unnecessary face to face encounters → convert to telehealth o Develop an inventory to identify high use areas and ensure appropriate use o Use "COVID19 intubation teams" to perform all intubations on COVID19 patients - **Re-use (and extend)** o Extending wear of N95s and facemasks with clinicians changing just gloves and gown o Ensure clear guidelines with information regarding what circumstances and what the parameters for extended and/or re-use is
30/03/20, statement: ***ANZCA statement on personal protective equipment during the COVID-19 pandemic***[9] *http://www.anzca.edu.au/documents/pcu_anzca-covid-ppe-statement_20200330.pdf*	- **"Stocks of PPE are finite and need to be used judiciously in readiness for their required availability in the coming weeks and months."** o In the process of developing a consensus statement on the use of PPE with CICM, ANZICS, ACEM, ASA, AHPPC - Not suspected or confirmed COVID-19 → Routine precautions - Routine care of suspected or confirmed cases → Contact and droplet - AGP in suspected or confirmed cases OR care for critically ill cases → Contact and airborne - "**Given that the incidence of community acquired infection is currently low, patients without epidemiological risk factors or symptoms should be deemed low risk. The use of standard PPE in these patients is appropriate and contributed to preserving supplies."**
03/04/20, NSW guideline: ***COVID-10 Infection and Prevention and Control – Advice for Health Workers***[10] *http://www.cec.health.nsw.gov.au/keep-patients-safe/coronavirus-covid-19*	- Seven principles for COVID-19 infection prevention and control o 1. Early recognition of patients with confirmed, probable or suspected COVID-19 o 2. Physical distancing – between staff and patients, and staff and staff o 3. Respiratory hygiene and cough etiquette o 4. Standard precautions for all patients always o 5. Transmission based precautions when appropriate ▪ Extended use • P2/N95 can be worn for up to 8hrs uninterrupted → repeated episodes with several patients Cannot touch mask surface, and must be discarded if contaminated and following AGPs. Replace if mask is hard to breath through, becomes moist or loose • Gloves should be changed in between patients, and if moving from a dirty to clean site on the same patient • Gown/apron should be removed and discarded on leaving the room/zone • Reusable eye protection should be cleaned/disinfected between use ▪ Masks, gloves and gowns must NOT be worn outside of patients rooms (ie. Break room or reception)

	○ 6. Ensure proper hand hygiene ○ 7. Clean the environment and shared patient care equipment
07/03/20, QLD guideline: ***COVID-19 – General considerations for conserving PPE***[11] *https://www.health.qld.gov.au/__data/assets/pdf_file/0032/946373/covid19-ppe-conserving.pdf*	- Strategies to conserve PPE should be commenced early as supply chain disruption may occur globally - **Reserve supply** → careful management of the supply chain at all levels ○ Health services should carefully monitor and manage PPE, including orders and distribution ○ Storage of PPE should be secure → not accessible to general staff, patients or public - **Reduce use** → use of PPE should be reconsidered at all points ○ PPE should be available to those who require it, but unnecessary use of PPE should be avoided ○ PPE training should use expired stock only - **Substitute** ○ Reusable gowns can be considered for use in areas currently using single use items ○ Plastic aprons may be used instead of long-sleeved gowns where appropriate ○ Can use re-usable eye protection instead of single use ○ Can use full-face shield instead of surgical mask if appropriate - **Extended use** ○ Extended use is the use of wearing the same PPE for repeated interactions ○ Before extended use is considered, all efforts should be made by other methods to remove or reduce the necessity for the use of a respirator → intercom or phones to communicate with patients in isolation ○ Extended use may be considered where a local risk assessment has been preformed ▪ Staff must be trained in the appropriateness of extended use ○ Most appropriate for masks and eye protection → mask and eye protection is left on for multiple patients ○ Masks must be removed: ▪ After AGP or if contaminated with blood of bodily fluids ▪ When moving outside patient care area (ie. to reception or to bathroom) ▪ Removed when moving to patients who are NOT isolated for COVID-19 ▪ If heard to breathe through, or loses shape ○ Clear instructions and training about criteria for changing a P2 mask should be provided to staff working in extended use areas ○ Masks must NOT be pulled down around the neck and re-worn ○ Reusable eye protection should be cleaned and disinfected as per local procedures
03/04/20, US CDC guidance: ***Strategies to Optimize the Supply of PPE and Equipment***[12] *https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html*	- All healthcare facilities should begin to use PPE contingency strategies ○ Maximise use of engineering and administrative controls → barriers and ventilation systems, reduced patient contacts ○ Cancel elective and non-urgent procedures and appointments ○ Reserve PPE for HCWs

	○ Use re-usable PPE that can be reprocessed ○ Use expired PPE for training ○ Consider allowing HCP to extend use of respirators, masks and eye protection for multiple patient encounters ○ Carefully prioritize PPE use for selected activities ○ If no commercial PPE is available, carefully consider alternatives
27/03/20, US CDC guidance: ***Pandemic planning – Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Settings[13]*** *https://www.cdc.gov/niosh/topics/hcwcontrols/recommendedguidanceextuse.html#risksextended*	- Overarching principles: ○ **Minimise the number of individuals** who need to use PPE by <u>administrative and engineering controls</u> ○ **Use alternatives →** other classes of respirators, PAPR where feasible ○ Implement practices to **allow extended use of N95 respirators where acceptable** ○ **Prioritise use of N95 respirators** for those at highest risk of infection or highest risk of complications - Implementation ○ <u>"Implementation of extended use or limited reuse of N95s should be made by professionals who manage the institution's respiratory protection program"</u> ○ Must consider the pathogen characteristics (route of transmission, prevalence, severity), AND local conditions (number of respirators available, burn rate, ect) ○ May consider early implementation of extended use and/or limited reuse BEFORE shortages occur, so that they will be available before peak demand ○ Favour extended use over reuse - Extended use recommendations N95 ○ Respirator must maintain fit and function ○ Workers in other industries routinely use N95 respirators for several hours uninterrupted ▪ Experience shows can be used for 8hrs continuous use ▪ Must allow for hygiene concerns and also practical considerations such as breaks ○ <u>Must be in conjunction with administrative and. Engineering controls to limit potential N95 contamination AND in conjunction with adequate training and reminders to reinforce principles of correct PPE use</u> ○ Discard N95 respirators after: ▪ AGP or contaminated w/ blood, secretions or other body fluids ▪ Following encounters with a patient with co-infection with an infection requiring contact precautions ▪ Consider using a face-shield over the N95 respirator or masking patients to reduce contamination ▪ Perform hand hygiene with soap and water before and after touching or adjusting the respirator ▪ Any obvious damage or it becomes hard to breathe through - Risk of extended use ○ Significant risk of contact transmission from touching surface of contaminated respirators ▪ Increased risk from re-use ○ Respirators may become contaminated w/ pathogens from patients co-infected with other healthcare pathogens (NRSA, VRE, C. diff, ect.) → could then contaminated hands of wearer → then self-inoculate or inoculate others

30/03/20, EUROPEAN CDC guidance: ***Infection prevention and control and preparedness for COVID-19 in healthcare settings***[14] *https://www.ecdc.europa.eu/sites/default/files/documents/Infection-prevention-control-for-the-care-of-patients-with-2019-nCoV-healthcare-settings_update-31-March-2020.pdf*	- *Helpful document – not all information summarised here* - Implemented strategies must account for availability of resources and extent of community transmission - If possible, provide triage by telephone or online to reduce the volume of patients presenting - For critical patients, plan ahead and avoid emergency intubations as much as possible o Consider performing all necessary procedures such as CVC and arterial line insertion in one session - Ensure visits to COVID-19 patients are limited to the absolute minimum - With small numbers of patients, it is preferable that patients are cared for in isolation rooms with a dedicated toilet o With widespread community transmission and large case loads → consider cohorting in a separate ward or section of the hospital → reduces PPE use - In the event of shortages, it is acceptable for a respirator to be used for caring for multiple patients with COVID19 o Up to 4-6hrs, respirator is not to be removed o Remove if damaged, soiled or contaminated - To reduce PPE use, staff should be allocated to perform a procedure or set of procedures in designated areas o Eg. Sampling performed by the same staff member in a designated area
15/03/20, Infection prevention blog: ***Conserving PPE in the COVI-19 Era***[15] *http://haicontroversies.blogspot.com/2020/03/conserving-ppe-in-covid-19-era.html?view=classic*	- **1. Know your inventory** → create a report of all PPE stockpiles → and the average burn rate in a normal week - **2. Develop an inventory target with projected usage** → plan expected increase in PPE use and duration of increase - **3. Critically evaluate current usage and limit PPE use** o Stop using contact precautions in patients colonized with VRE or MRSA o Consider stopping gown use for non-COVID contact precautions → ensure arms bare below the elbow o Begin re-using items such as face-masks and N95s o Stop annual N95 fit-testing to avoid use of masks in the process o Limit visitors o Limit clinicians and HCWs entering the room - **4. Reclaim all PPE throughout the hospital and create central repository** - **5. Dispense PPE to units/clinics in small increments** - **6. Investigate alternative produces** → old cloth surgical gowns ect.
09/12/19, QLD GUIDELINE: ***P2/N95 mask fit checking***[16] *https://www.health.qld.gov.au/clinical-practice/guidelines-procedures/diseases-infection/infection-prevention/transmission-precautions/p2n95-mask*	- **Fit check** → a check performed each time a mask is put on o All staff should be trained in how to perform a fit check when donning PPE o **No clinical activity should be undertaken until a satisfactory fit has been achieved** - **Fit testing** → qualitative or quantitative method to evaluate a specific make, model and size of mask for an individual o Staff working in high risk areas should be tested and educated on fit checking o Should occur at the start of employment for HCWs in high risk clinical areas (ICU or respiratory physiotherapists) o Should occur at regular intervals – recommended annually

2008, 3M FAQ: ***Infection Prevention N95 Particulate Respirators FAQ***[17] *http://multimedia.3m.com/mws/media/323208O/n95-particulate-respirators-1860-1860s-1870-faqs.pdf* *3M:* ***Fit testing***[18] *https://www.3m.com.au/3M/en_AU/safety-centers-of-expertise-au/respiratory-protection/fit-testing/*	- It is recommended that all users of N95 respirators **undergo fit testing** to determine if a user can obtain a good face fit for a given respirator style ○ Important for mask seal, compatibility and stability ○ Should occur on commencement of employment and annually ○ Additional fit testing should occur when a new respirator style is used, and if there is significant facial structure changes - **A fit check** is not the same as a fit test ○ A fit check is a brief procedure performed by the wearer to check if the mask is achieving a good seal ○ This must occur each time it is donned or adjusted - "How long can 3M N95 respirators be used? ○ **"… until damaged, breathing becomes difficult, or contaminated w/ blood or body fluids. If contact transmission is of concern, it may be appropriate to dispose of immediately after each use."**

Figure 1. ACEM Guidelines - PPE use in different clinical situations

	No PPE	Surgical Mask Hand Hygiene Use gloves for patient contact	Droplet PPE • Surgical mask • Eye protection • Gloves • Gown / apron • Consider hair cover	Airborne PPE • N95/P2 respirator • Eye protection • +/- face shield • Gloves • Long sleeved gown +/- apron • Hair cover or hood
Staff not directly in contact with patients **> 1.5m distance at all times***	✓	✓ Surgical mask and gloves if entering cohorted isolation area		
COVID assessment clinic			✓ (risk assessment†)	✓ (risk assessment†)
Triage			✓ (risk assessment†)	
Clinical staff in direct contact with patients Assess COVID risk status and AGP likelihood		✓ Patients screened negative or minimal for COVID risk and no respiratory symptoms	✓ Fever or acute respiratory infection or, screened suspected or definite COVID, no AGPs	✓ Severe acute respiratory infection (or undifferentiated case requires AGPs + admission)
Performing Aerosol Generating Procedures				✓
Prolonged direct clinical care in higher risk patient environments			✓ Clinical ED areas with cohorted fever or acute respiratory infection or, screened suspected or definite COVID no AGPs (risk assessment†)	✓ Clinical ED areas with cohorted severe acute respiratory infection (or undifferentiated case requires AGPs + admission) (risk assessment†)
Resuscitation Team			✓ No AGPs	✓ Likely AGPs
Trauma Team			✓ No AGPs	✓ Likely AGPs
Paediatric patients with AGPs				✓

* Consider mask use to reduce possibility of infection between staff and / or site visitors, particularly as COVID-19 becomes more widespread in the community.

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