MEDICLINIC

COVID-19 INFORMATION

COVID-19 UPDATE

27 March 2020

INTENSIVE CARE UNIT

ICU Preparedness for COVID-19

Considering that 5-10% of COVID-19 patients will require hospitalisation support and 25 – 50% will require critical care skills and resources, from a preparedness point of view, we are looking at the following detail per hospital:

Table 1. Potential Strategies for a Phased and Tiered ICU Pandemic Plan

Phase	Impact	Strategies to consider
1	Minimal impact on daily operations Likely to occur when up to 10% of beds are occupied by patients with pandemic illness	Review and test pandemic response plans, including: • Infrastructure and equipment (Section 2) • Workforce training, planning and support (Section 3, Staff Protection and Sustainability) • Communication plans (Section 4) • Infection control (Refer to Staff Protection and Sustainability) • Diagnostics and treatment protocols (Refer to Identification and Treatment) • Transport and transfer policies (Refer to Staff Safety and Sustainability) • Ensure 'trigger points' to move to higher level response have been agreed in advance
2	Moderate impact on daily operations, with ICU at or near maximum capacity ICU is still able to meet demand for critical care and ventilated patients Likely to occur when up to 25% beds are occupied by patients with pandemic illness	• Measures to reduce demand and increase physical capacity (Section 1 and 2) • Repurpose alternative clinical areas for non-ventilated critical care patients (Section 2) • Address workforce and staffing needs (Section 3, Staff Protection and Sustainability) • Defer or divert non-emergent surgery to private hospitals or other services (Section 1) • Limit ICU involvement in non-clinical ICU services (e.g. Hospital TPN)
3	Severe impact on daily operations, with overall demand for critical care exceeding ICU capacity ICU at or near maximum capacity for ventilated patients Likely to occur when up to 50% beds are occupied by patients with pandemic illness	• Repurpose alternate clinical areas for ventilated patients (Section 1 and 2) • Reassess requirements and thresholds for ICU admission and discharge (Refer to Section 5) • Consider transfer of patients to other facilities or identify additional resources to be transferred into the hospital to facilitate on-going ICU care
4	Overwhelming impact on daily operations, with demand for critical care services significantly exceeding organisation-wide capacity ICU no longer able to meet demand for ventilated patients	• Delivery of care to critically ill patients in areas without pre-existing critical care infrastructure • Ongoing liaison with hospital and state health services

1. Space:

Surge plans need to include plans for alternate care sites within the hospital for patients needing ICU care, and alternatives for those that need care but not necessarily in hospital although still requiring medical supervision . This can be done through:

- In hospital environment determination of:
  - The number of ICU/HC beds
  - Number of EC beds and EC beds with ventilator capacity
  - Number of negative pressure and isolation rooms
  - A trend of the bed occupancy per unit
  - Number of theatres with anaesthetic machines for potential ventilation
  - Develop additional plans in combination with prediction model
- Out of hospital environment determination of
  - CPAP and non ventilatory oxygenation devices

- Facilities that can support control and management of such patients (large fit for purpose tents or halls , that can be ventilated and temp controlled etc
- Electronic flow registry of patients

- Operational approach to reduce routine ICU demand through:
  - The management of non-urgent elective surgery (deferment or cancellation)
  - Minimise unnecessary transfers between hospitals
  - Reserving ICU admission for patients requiring ICU specific interventions like ventilation, vasopressor support, etc.
  - Identify recovery, sub-acute facilities
  - Additional support / supervision for ward staff to manage patients of a higher acuity and shift stable patients to other areas to free up higher acuity nursing personnel
  - Triage criteria of who should go to ICU or who may be managed in lower acuity settings
  - Facilitate expedient discharge from ICU to lower acuity areas when discharge criteria are met

- Infrastructure requirements
  - Clinical areas where critically ill patients will be nursed needs to fulfil the following criteria (should be permanent but may be portable in some cases):
    - Two oxygen outlets
    - One air outlet
    - Two suction outlets
    - 10 – 12 main electricity outlets
    - Appropriate physiological monitoring (monitors and modules)
  - The ability to meet the above standards may be limited during the advanced phases of the pandemic, necessitating adjustments based on the clinical needs of patients and available resources

2. Resources

- Each hospital should ideally plan to have the ability to appropriately care for patients and staff during the pandemic. To do this, hospitals have to quantify their current stock of equipment:
  - the number of monitors and pressure modules,
  - number of working ventilators
  - number of BP-cuffs & ECG electrodes
  - number of sub-glottic machines
  - number of dialysis machines
  - number of portable x-ray machines
  - number of mechanical compression devices
  - ICU specific ethicals and surgicals
  - proning equipment, i.e. excess capacity of pillows (should prone ventilation be requested by the treating physicians)

    - number of linen and increase in linen capacity to make provision for turnaround times
    - laundry turnaround times
- When additional equipment and stock is not available, alternative methods to provide respiratory support may need to be considered based on the clinical guidelines for the pandemic
- Identify available logistic channels for supply, storage and procurement of additional equipment. This may include:
    - Equipment from the operating theatres
    - Older but functional equipment not presently in use (e.g. older ventilators which can be operationalised by biomedical & technical department)

EQUIPMENT to consider for repurposed areas:

- Beds
- Cardiac monitors
- Modules (pressure/temp/capnography)
- ECG Electrodes
- BP-cuffs
- Ventilators
- Mobile x-ray machines
- Dialysis capability (machines for CRRT,HD,PD)
- Pressure relieving mattresses
- Proning equipment
- Infusion pumps & syringe drivers
- Feeding pumps
- Alternating pressure devices (calve/feet pumps for mechanical DVT prophylaxis)
- Subglottic suctioning machines
- Aerogen controller placements
- Manual resuscitators (BVM devices)
- TPN pumps for hospitals using Amika pumps

FROM A TECHNICAL POINT OF VIEW:

- Enough oxygen supply to manage the increased use of oxygen via low & high flow systems, i.e. nasal cannula, face masks, HFOT, NIV and invasive mechanical ventilation
- Enough mobile oxygen cylinders

CSSD NEEDS

- Cidex OPA for the cleaning of Vela & Hamilton ventilator component cleaning
- Containers for these re-usable parts
- Increased capacity to wash and disinfect re-usable equipment, i.e. BVM devices, bougies, laryngoscope blades, Glidescope blades, sterile packs for the insertion of lines

STOCK: SURGICALS & ETHICALS

a) <u>Respiratory</u>

- Endotracheal tubes with sub glottic suction ports (different sizes)
- Tube holders
- Cuff pressure managers (Tracoe Smart Cuff Manager)
- Ventilator circuits – ideally dry, dual limb, with port for MDI
- Gibeck bacterial/viral filters (FIL194) 3X vent (if at all we would like to keep the system close for 3 days). So, 3 filters per vent every 3 days
- 72 hour Perryhill inline suction catheters
- Disposable exhalation valves for ventilators as far as possible for all vents
    - VALV015 – Draeger Evita
    - VALV760
    - VALV761 – Draeger Savina
- Mouth trays
- Sterile water (1L pour bottles)
- Disposable Halyard suction probes (SUCT005)
- HFOT circuits (airvo circuits) with adult and paediatric nasal prongs
- NIV masks – different sizes – single use. It is imperative that we have a proper fit and good seal, otherwise there will be aerosol generation, necessitating airborne precautions. There have been concerns with the use of HFOT during COVID-19, but no clear evidence to proof or disprove
- Patients that do get HFOT should wear a surgical mask over the nasal cannula to prevent spreading of droplets
- In-line neb-T (nebu 898) for patients that needs nebs that is not coming into an MDI form
- Aerogen disposable in-line nebuliser (not the ones that fit into the humidifier chamber, as we are trying to stay away from heated humidification, rather want to use HMEF's)
- Subglottic suctioning canister, filter, and connection tubes
- Nasal cannula
- Facemask with filters (email Venesha)

b) *<u>Medications specific for respiratory</u>*:

a. Acetylcysteine - apparently, if these patients develop secretions they are quite thick
b. Sedation and neuromuscular blockers– deep sedation necessary for complicated ventilation and proning
    - Propofol
    - Midazolam
    - Morphine
    - Remifentanil
    - Esmeron
    - Cisatracrium
c. Systemic steroids NOT routinely prescribed

d. Chlorhexidine 2% solution for mouth care
e. Ideally, nebulisation should be avoided, so, please ensure we have enough stock of MDI's that can be given via the ventilator circuit

c) Cardiovascular

a. Infusion administration sets for both infusion sets and syringe driver sets
b. Needleless connectors
c. Disposable/single use pressure bags
d. Arterial & central venous cannulas
e. Transducer sets (at least 2 per patient)
f. Temperature probes for the measuring of core temperature
g. Urinary catheters, especially the latex ones with temperature probe to use in the critically ill, septic patients – all sizes
h. Tegaderm CHG – different sizes for arterial line and CVP
i. *Medication specific for cardiovascular support*:
    i. Fluids – probably balanced solutions, but this will be determined by prescribing physicians. A restrictive fluid approach is advised
    ii. Vasopressors: Adrenalin, Nor-Adrenalin, Dobutamine, Dopamine, Phenylephrine. There is a form of myocardial stunning / decompensation later on in the disease progress
    iii. LMWH for DVT prophylaxis, probably Clexane – we might need substitutes and comms to doctors if this happens
    iv. PPI's (usage might increase due to prophylaxis for stress response)
    v. Antimicrobials for secondary infections – probably carbapenems for gram negative, and probably Linezolid for gram positive – nothing in the literature on what agents are preferred (?Tazobactam/Piperacillin)

d) Renal

a. Dialysis catheters
b. Tegaderm CHG for dialysis catheter
c. Latex Urinary catheters in different sizes, as well as those with the temp probe
d. Precision catheter bags
e. Catheter securement devices
f. Medication specific for renal support
    i. Heparin vials for continuous heparin infusion
    ii. Duralock / citrate solutions used for locking of lumens)
    iii. Furosemide during initial stages of AKI

e) GIT system / nutrition

a. Enteral nutrition sets
b. TPN sets
c. Nasogastric tubes (ryles and flexifeeds)
d. Nasofix
e. Lopez-valve
f. Medication specific for GIT support

i. Enteral nutrition bags
ii. Parenteral nutrition from the different companies

f) <u>Integumentary system</u>

a. Linen savers
b. Linen and laundry supplies
c. <u>Medication specific for GIT support</u>
i. Cavilon cream and cavilon spray
ii. Alternatives = zinc oxide cream

3. Staff

Nursing

- Due to potential workforce shortages, it is likely that non-critical care trained medical, nursing and allied health staff will have to assist in the care of intensive care patients. This should occur with the relevant managerial authorisations, and under the supervision of critical care trained staff, utilising a team-based model of care.
- ICUs and hospitals should prioritise meeting the minimum standards for staffing. However, available resources may change depending on the demand placed upon a health service.
- Hospitals to determine:
  - Number of ICU and non-ICU staff
  - Number of available agency staff
  - Different staff to patient allocation principles, i.e. core teams / tiered staffing
  - Number of ICU specialists / physicians / intensivists
  - Infectious diseases specialists per region
  - Training strategies for PPE & clinical management of these patients
- We **recommend** workforce planning should include consideration for pandemic specific requirements, such as additional workload from donning and doffing personal protective equipment (PPE), the need for additional rest days, and the need to allocate staff to key non- clinical duties such as enforcing infection control procedures especially intense cleaning to free up clinical personnel .
- Specialists who are not able to operate or do elective procedures should be re trained and deployed to assist and support with ward rounds, discharge panning facilitation, preparation of additional bed capacity , relieving colleagues in critical areas , providing valuable liaison between clinical and management groups, and pandemic follow up and feedback
- We **recommend** all nursing staff capable of caring for critically ill patients should be urgently identified. These potentially include:
  - Nursing staff with formal critical care training or experience, but not currently working in ICU (e.g. redeployed, in administrative or non-clinical roles, recently left workforce)
  - Paediatric ICU nursing staff
  - Nursing staff with experience of critically ill patients in other areas of the hospital

    - Nursing staff in departments with reduced clinical activity who are familiar with a critical care environment (e.g. anaesthetic nurses)
    - Recently retired staff who have critical care or other critical skills (theatre, CSSD etc)
- We **recommend** a formal rapid orientation program is provided, and these nurses should work under the supervision of an experienced ICU nurse.
- We **recommend**, in addition, nurses without critical care experience may be suitably trained and are redeployed to assist with the following:
    - Supervision of staff and visitors donning/doffing of PPE
    - Routine nursing care - turning, washing
    - Re-supply, storage and inventory of equipment
    - Medication delivery and checking
    - Documentation and reporting
    - Maintaining bed management and patient flow information
    - Supporting essential pandemic research projects

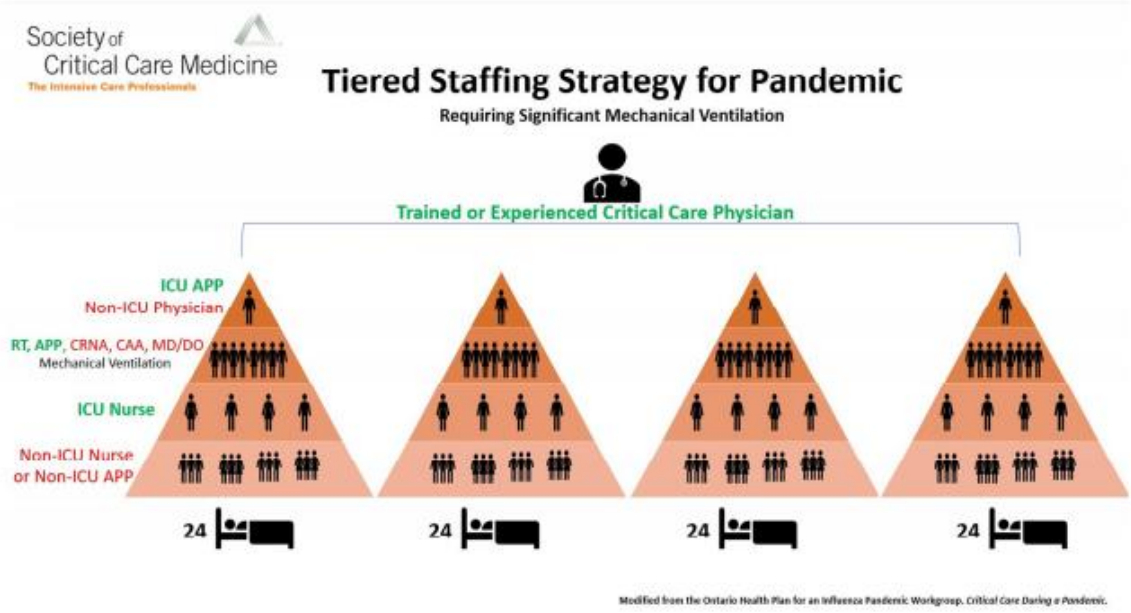
Early warning score for 2019-nCoV Infected Patients

PARAMETERS	3	2	1	0	1	2	3
Age				<65			≥65
Respiration Rate	≤8		9 - 11	12 - 20		21 - 24	≥25
Oxygen Saturations	≤91	92 - 93	94 - 95	≥96			
Any Supplemental Oxygen		Yes		No			
Systolic BP	≤90	91 - 100	101 - 110	111 - 219			≥220
Heart Rate	≤40		41 - 50	51 - 90	91 - 110	111 - 130	≥131
Consciousness				Alert			Drowsiness Letargy Coma Confusion
Temperature	≤35.0		35.1 - 36.0	36.1 - 38.0	38.1 - 39.0	≥39.1	

Early warning rules for 2019-nCoV Infected Patients

Score	Risk Grading	Warning Level	Monitoring Frequency	Clinical Response	Solution
0	/		Q12h	Routine Monitoring	/
1 - 4	Low	Yellow	Q6h	Bedside evaluation by nurse	Maintain existing monitoring/ Increase monitoring frequency/ Inform doctor
5 - 6 or 3 in one parameter	Medium	Orange	Q1-2h	Bedside nurse notifies doctor for evaluation	Maintain existing treatment/ Adjust treatment plan/ CCRRT* remote consultation
≥7	High	Red	Continuous	Bedside nurse notifies doctor for emergency bedside evaluation/ CCRRT remote consultation	CCRRT on-site consultation
≥7	High	Black	Continuous	✓ Patients are extremely severe with irreversible end-stage diseases facing death, such as serious irreversible brain injury, irreversible multiple organ failure, end-stage chronic liver or lung disease, metastatic tumors, etc. ✓ Should be discussed urgently by the expert group about the admission decision.	

Fig. 1 Early warning score and rules for 2019-nCoV infected patients. *CCRRT: Critical Care Rapid Response Team



- **Critical care nurses supervise and advise noncritical care nurses on critical care issues**
  - **Vasopressor and sedation titration**
- **Suggested ratios**
  - **1 noncritical care nurse to 2 patients**
  - **3 noncritical care nurses collaborating with 1 critical care nurse**

Medical

We **recommend** additional medical staffing for the ICU should be sourced by considering:

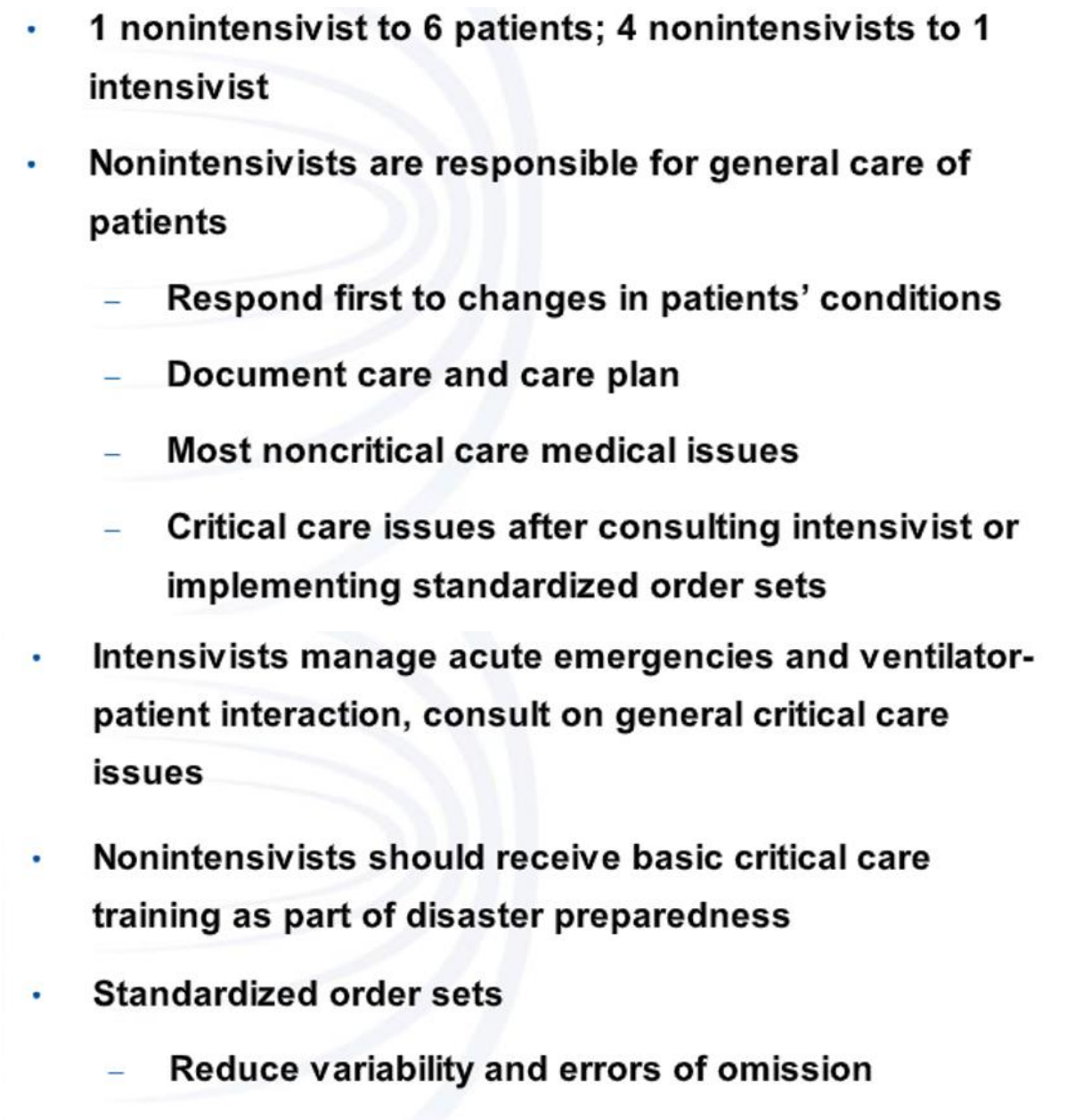
- Senior medical staff with critical care training, but not currently working in ICU
- Paediatric ICU medical staff
- Anaesthetic staff (due to a reduction in surgical activity)
- Junior medical staff with critical care experience

We **recommend** medical staff should be deployed in a manner that is aligned with their current scope of practice.

- Anaesthetic staff may be deployed as hospital 'resuscitationists', making up intubation teams, to lead rapid response teams or to assist in intensive care ideally under the supervision of intensive care specialists

- Medical staff with critical care training may be deployed to manage ICU patients in repurposed clinical areas physically separate from the ICU, under the supervision of more experienced ICU staff
- Junior medical staff with little to no ICU training may assist with documentation and non- ICU clinical activities

Where medical staff are requested to perform duties outside their scope of practice due to severe workforce shortages (e.g. Anaesthetists taking on an Intensivist role), this should be at their discretion and with organisational reassurance regarding indemnity coverage as well as adequate supervision.



Allied Health

- **Physiotherapists** with previous critical care experience should be identified by hospitals and facilitated to return to ICU.

- **Occupational therapists** and psychologists all provide excellent coordination and people management skills
- **Pharmacists** with critical care experience should be identified and mobilised to assist the core ICU pharmacy staff.
- **Social workers** may need to be redeployed to assist with families isolated from their critically ill loved ones.
- **Suitable volunteers** with appropriate training and supervision in PPE may also fill appropriate support roles (e.g. assisting at ICU reception, directing families).

ALLIED HEALTH

1. **Physiotherapists**
    a. Strict hand hygiene practices
    b. Donning & doffing when doing aerosol producing procedures i.e. open suctioning
    c. Mobile PPV – rather use disposable PEEP bottles or single use incentive spirometry
    d. Mobile vibrators – rather use manual percussion OR exceptional cleaning strategies between patients, as COVID-19 patients sheds virus. The amount of shedding is determined by the viral load of the patient. Patients in ICU will have a high viral load

2. **Radiology department**
    a. Try and limit movement of patient between ICU and Radiology department. Ideally mobile X-rays should be done
    b. Strict hand hygiene practices
    c. Type of PPE will depend on the type of patient needing imaging

3. **Dialysis companies**
    a. Clinical technologist do don PPE based on patient condition
    b. Strict hand hygiene practices
    c. Enough machines for CRRT, HD and PD
    d. Enough circuits for different type of dialysis
    e. Enough dialysate solutions

Additional Considerations

To ensure a sustainable workforce, we **recommend** the following:

- Streamlining of administrative processes which limit staffing flexibility and onboarding of new staff members
- Accommodation for staff unable to return home
- Should identify accommodation (guest houses or empty hotels) and rest facilities for staff and services like laundry and catering / nutrition and sustenance (local coffee shop delivers every hour ….)
- Staff reassurance regarding indemnity coverage for operating beyond their normal scope of practice (in a phase 3 or 4 scenario) this needs to be negotiated / lobbied with the HPCSA/ SANA and other official bodies

- Debriefing and psychological support; staff morale may be adversely affected due to the increased workload, anxiety over personal safety and the health of family members (refer to Staff Protection and Sustainability)
- The cancellation of pre-arranged annual leave during a pandemic should only be considered if absolutely necessary. Maintaining staff morale is imperative. Short breaks rather than annual leave. Take sick leave / absenteeism into picture

4. Strategy
    a. Scheduling of staff
    b. Pharmacy substitution (sedation/NMB/vasopressors/fluids)
    c. Re-use policies
    d. ICU triage during surge capacity
    e. Standardised order sets
    f. Training of all doctors and allied health professionals on hand hygiene and the appropriate use of PPE
    g. CDC recommendations on limited supplies of PPE

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