



Guidelines for Intensive Care in the ACT during an Influenza Pandemic

June 2013

Version 2.0

Abbreviations

ACT	Australian Capital Territory
ADON	Assistant Director of Nursing
CCT	Critical Care Taskforce
CDC	Communicable Disease Control Unit
CNC	Clinical Nurse Consultant
CHC	Calvary Health Care
CJJH	Calvary John James Hospital
CRRT	Continuous Renal Replacement Therapy
HDU	High Dependency Unit
HEMSC	Health Emergency Management Sub Committee
HSFAC	Health Services Functional Area Coordinator
ICU	Intensive Care Unit
NCPH	National Capital Private Hospital
NSW	New South Wales
OH&S	Occupational Health and Safety
Southern LDH	Southern NSW Lower District Hospital
TCH	The Canberra Hospital

Suggested amendments or additions to the content of this plan are to be forwarded in writing to:

ACT Health Intensive Care Network Coordinator
GPO 825 Canberra City 2601 ACT

Amendments promulgated are to be certified in the following table

AMENDMENT		ENTERED	
Number	Date	Signature	Date
Version 1.0	March 2010	Alison Kingsbury	
1.1 Amended	May 2010	Alison Kingsbury	1 May 2010
1.2 Amended	August 2010	Alison Kingsbury	August 2010
Version 2.0	June 2013	Lisa Wright	June 2013

- Amendments will be circulated to: Health Emergency Management Sub Committee (HEMSC)
- ACT Critical Care Taskforce (CCT)
- ACT Intensive Care Network

This plan is to be reviewed and/or updated by the ACT Critical Care Taskforce and submitted to HEMSC for endorsement on the following occasions:

- on the conclusion of an influenza pandemic
- on the introduction of any major policy, plan or legislative changes which affect the ACT, and
- at least every 2 years

The next planned review will be in August 2015.

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1 Introduction

This document has been developed as the guiding document for providing intensive care services in the ACT in the event of an influenza pandemic. This document has been developed in conjunction with ACT Health plans and should be used to plan services, workforce and resources.

Background

Influenza represents the greatest potential stress on intensive care services for the near future, with both an increase in demand for services and decreased staff resources due to illness limiting capacity. This document provides guidance for providing surge capacity and maintaining services during a pandemic period. The contents have been sourced from national, local and inter-state documents to provide a consistent approach to critical care planning. The following are related documents which can provide more information if required.

Linkage of plans

National

The National Action Plan for Human Influenza Pandemic
The Australian Health Management Plan for Pandemic Influenza

ACT

ACT Emergency Plan
ACT Health Emergency Plan Management Sub-Plan
ACT Public Health Emergency Management Plan
ACT Epidemic Infectious Disease Plan
Pandemic – SOP – Business & Infrastructure
Calvary Health Care Communicable Diseases Response Sub-Plan 2010

Legislation

Quarantine Act 1908
Health Act 1993
Health Professionals Act 2004
Medicines, Poisons and Therapeutic Goods Act 2008
Occupational Health and Safety Act 1989
Public Health Act 1997
Emergencies Act 2004

Other Jurisdictions

New South Wales

PD2010_028 Influenza Pandemic Providing Critical Care
PD2010_052 Influenza – NSW Health Influenza Plan
NSW HEALTHPLAN
GSAHS Pandemic Influenza Plan

2 Objectives

The objectives of this plan are to:

- outline the resources and procedures for ACT Intensive Care Units during an influenza pandemic
- ensure health resources are utilised effectively and equitably during an influenza pandemic
- ensure that intensive care clinical services in the ACT are adequately aware and prepared for pandemic influenza contingencies
- ensure consistent reporting of patients admitted to intensive care with influenza
- ensure effective inter-agency collaboration across clinical networks and regional stakeholder groups involved in pandemic planning and response

3 Pandemic influenza – the hazard

Influenza represents a serious risk to individuals, communities and society in general, with different strains and levels of virulence providing a fluctuating state for health planning and protection. Influenza is classified into three groups: influenza A, influenza B, and influenza C. Influenza B and C represent the lowest threat for humans and have never resulted in a pandemic influenza¹. Influenza A is responsible for all known pandemics.

4 Concepts of pandemic phases and emergency management stages

The World Health Organisation (WHO) has developed a series of pandemic phases to alert the world of the seriousness of the pandemic threat and need to mobilise preparedness activities². Australia has devised a set of phases to correspond with the WHO phases to reflect activity in Australia and internationally. These phases are outlined in Table 1.

The key objective during the **containment stage**, is to contain the spread of the pandemic as much as possible, in order to “buy time” for the development and distribution of an effective pandemic influenza vaccine.

In the **post-containment stage, sustain**, the key objective is to ensure the fabric of society remains intact by ensuring essential services is maintained.

Given the level of uncertainty surrounding many aspects of planning for influenza pandemic, another key objective at all stages is to maintain as much flexibility as possible in order to be able to rapidly adapt as circumstances change.

In 2009 the Australian Government developed the **protect stage** which sits beside contain and sustain. It is a stage specifically for a disease that is mild in most individuals, but severe in some and enables some of the measures of contain and sustain, with a focus on identifying the people in whom disease may be severe and providing medical care and interventions to reduce likely suffering.³

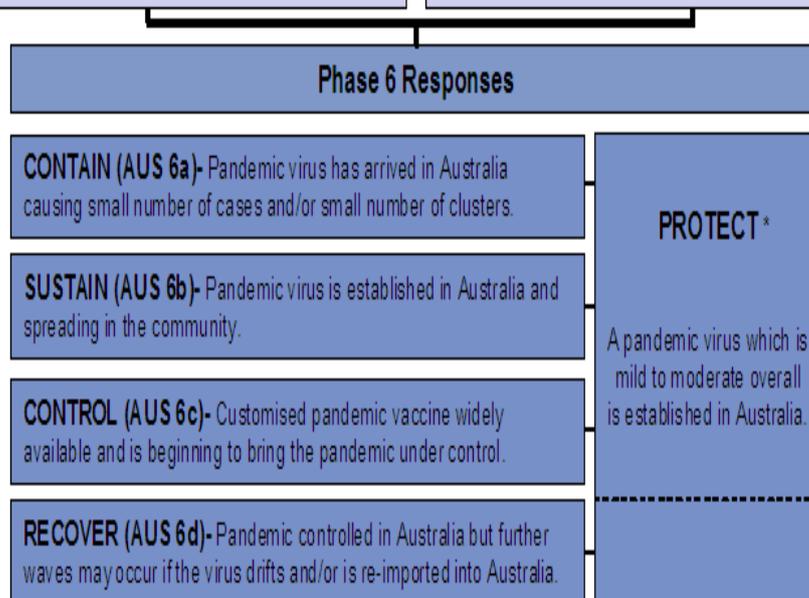
¹ Lagace Wiens P.R, Rubinstein E, Gumel A, Influenza epidemiology- past, present and future. Critical Care Medicine. Vol 38 (4). 2010.

³ Protect Phase, Annex to Australian Health Management Plan for Pandemic Influenza June 2009

The following table outlines the phases during a pandemic.
 Further information can be obtained from: <http://www.healthemergency.gov.au>

Table 1

Australian Phases for Influenza Pandemic #	
Pandemic virus emerges overseas	Pandemic virus emerges in Australia
<p>OS1- Animal infection overseas: the risk of human infection or disease is considered low</p> <p>OS2- Animal infection overseas: substantial risk of human disease</p>	<p>AUS1- Animal infection in Australia: the risk of human infection or disease is considered low</p> <p>AUS2 - Animal infection in Australia: substantial risk of human disease</p>
<p>ALERT (OS3)- A novel virus with pandemic potential causes severe disease in humans who have had contact with infected animals. There is no effective transmission between humans. Novel virus has not arrived in Australia.</p> <p>DELAY (OS4) - Novel virus has not arrived in Australia. Small cluster of cases in one country overseas.</p> <p>DELAY (OS5) - Novel virus has not arrived in Australia. Large cluster(s) of cases in only one or two countries overseas.</p> <p>DELAY (OS6)- Novel virus has not arrived in Australia. Large cluster(s) of cases in more than two countries overseas.</p>	<p>STAMP OUT (AUS3)- A virus with pandemic potential infecting birds or other animals in Australia and causing a small number of human cases (no human-to-human spread or at most rare instances of spread to a close contact)</p> <p>AVERT (AUS4)- Small cluster of human cases occurring in Australia caused by a virus with pandemic potential (limited human to human transmission in Australia but spread is highly localised, suggesting the virus is not well adapted to humans.)</p> <p>AVERT (AUS5)- Larger cluster(s) of human cases caused by a virus with pandemic potential with Australia only one of two countries to be affected globally. (human to human spread still localised in Australia, (substantial pandemic risk).</p>



#All phases are flexible and allow for actions to be taken out of sequence, in a non-linear fashion or for different phases to coexist across regions within Australia.

* The PROTECT phase focuses on minimising the impact of the pandemic virus on vulnerable people. PROTECT can incorporate aspects from CONTAIN, SUSTAIN and CONTROL phases where appropriate. PROTECT may incorporate or be replaced by the RECOVER phase.

5 Roles of hospitals

The Canberra Hospital (TCH) and Calvary Health Care (CHC) would be designated as influenza hospitals, and other hospitals such as Calvary John James (CJJH) and National Capital Private Hospital (NCPH) would be kept as free as possible of patients with influenza.

6 Roles of intensive care areas

Triaging and reporting of patients

Following the declaration of a 'Health Emergency State' by the Chief Health Officer, increased monitoring of intensive care bed status within the territory will occur. When intensive care capacity across the ACT is overwhelmed, a decision by the Director-General will be made to use the triage tool. The triage tool to be applied to all patients requiring intensive care is outlined in Appendix 1. This decision will be made in consultation with the Chief Health Officer, Deputy Director-General of Canberra Hospital and Health Services (CHHS) and Chief Executive of Calvary Hospital or their delegates.

It is acknowledged that there will be issues related to the triaging and availability of scarce resources, which may present ethical dilemmas for clinicians. The decision to admit a patient to an Intensive Care Unit utilising the triage tool is consistent with principles outlined in the NSW Health Intensive Care Taskforce position paper in Health Disaster Response by Intensive Care Services July 2007. In addition to the recommendations and standard operating procedures for intensive care unit and hospital preparations for an influenza epidemic or mass disaster from the European Society of Intensive Care Medicine (2010).

Reporting

Identification of patients with suspected or diagnosed influenza are to be notified to the Infection Control Clinical Nurse Consultants at the relevant hospitals and the On Call Communicable Diseases Officer, Health Protection Service ACT Health (ACT Health 2007).

The Intensive Care Units will provide regular data to their hospital bed/demand management units and/or Infection Control Unit (in a declared external disaster to the hospital disaster controller/commander) who will provide data to the Communicable Disease Control Unit at Health Protection Services ACT Health.

Clinicians are responsible for reporting deaths attributed to influenza to the Communicable Disease Control section of Health Protection Services as per the ACT Health policy Notification of deaths associated with H1N1 influenza in the ACT (CED 10/008). Reporting of deaths to CDC should occur within 12 hours or by the next morning. It remains the responsibility of the treating clinician to inform a patient's next of kin and other health professionals as appropriate with normal clinical practice⁴.

Reporting process for Influenza Patients during a Pandemic

Patients admitted to either unit must be reported to the Infection Control Unit daily to allow Health Protection Unit via Communicable Disease Control (CDC) to monitor the extent of the pandemic across healthcare facilities and in the general community. The process for reporting is outlined below. Each unit will develop its individual process and responsibilities for reporting.

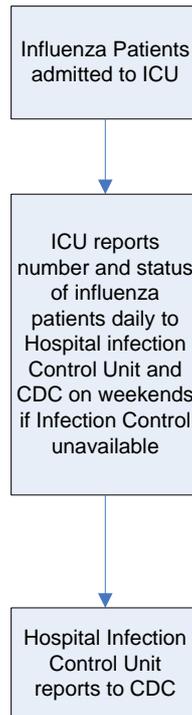
⁴ ACT Health policy Notification of deaths associated with H1N1 influenza in the ACT. 2010

If assistance or advice is required from Communicable Disease Control (CDC) contact via phone 6205 2155

Or via pager after hours for emergency situations: 9962 4155 (request CDC)

Or via email cdc@act.gov.au

Reporting Process



Example:

Patients admitted to Intensive Care /High Dependency with Influenza must be included in a daily report to Infection Control Unit and CDC by 1000hrs. The report should be emailed to the CNC of Infection Prevention & Control or cdc@act.gov.au
The report will be sent by the treating Intensivists or their delegate.

Information required by Infection Control and CDC may vary according to the disease characteristics and stage of Pandemic. An example of information which may be required is below:

Number of patients	<i>Example 5</i>
Female/Male numbers	<i>3 Female/ 2 Male</i>
Adult	<i>4</i>
Paediatric	<i>1</i>
Neonate	<i>0</i>
Influenza strain identified	<i>4 Influenza A / 1 Influenza B</i>
Ventilation status	<i>5 ventilated</i>
Pregnancy	<i>1</i>
Aboriginal or Torres Strait Islander status	<i>1</i>

Adult patients

The Canberra Hospital ICU will act as tertiary level 6⁵ facility and Calvary Hospital ICU will remain as a level 4 facility caring for patients within the ACT identified through the triage tool as described above.

Paediatric patients

The Canberra Hospital will require resources and consumables to treat paediatric patients for an indefinite time until specific paediatric intensive care resources are available or the patients can be discharged to the paediatric unit at TCH.

⁵ NSW Health Intensive Care Service Plan – Adult Services 2001

7 Intensive Care capacity in the ACT region

The following table outlines the potential intensive care capacity in the ACT region. Increasing capacity will be at the direction of each hospital executive and/or hospital controller. The ability to increase capacity is dependent on:

- The availability of nursing and medical staff trained in intensive care
- The availability of support staff
- The availability of equipment, medication and supplies
- The availability of appropriate space including isolation rooms

Table 2

Adult Critical Care Unit	ICU Level (NSW)	Total Bed areas	Isolation rooms	Negative pressure	ICU Ventilators (invasive and non-invasive)	CRRT	Alternative resources available (see Table 4)
Canberra Hospital	6	31	4	Yes	29 Draeger Evita XL 6 Vision Non-invasive ventilators	6 Prismaflex	Yes
Calvary Health Care	4	10	10	Yes	4 Servo <i>i</i> 2 Vision Non-invasive ventilators	2 Prismaflex	Yes
Calvary John James Hospital	4	6	1	No	2 Servo <i>i</i> 1 Vision Non-invasive ventilator	Nil	
National Capital Private Hospital	4	5		No	4 Servo <i>i</i>	1 Prisma	
Queanbeyan Hospital (SLDH)	N/A	4 HDU	Nil	N/A	1 Non-invasive ventilator (ED)	Nil	

Note: All CRRT units use Gambro fluid

Table 3

Total Ventilator resources (including ICU, ED, theatres and transport)

Facility	Total Number	Location
The Canberra Hospital	<p>29 Ventilators</p> <p>5 Transport ventilators</p> <p>15 Anaesthetic machines</p> <p>5 Transport ventilators</p>	<p>Intensive Care 24 Evita XL (with paediatric capacity)</p> <p>Intensive Care 5 Oxylog 3000 1 MRI compatible Versamed i-vent</p> <p>Operating Theatres 15 Draeger</p> <p>Emergency Department 4 Oxylog 3000 1 Oxylog 3000+ 2 Philips V60 NIV</p>
Calvary Health Care*	<p>7 Adult ventilators</p> <p>1 Transport ventilator</p> <p>7 Anaesthetic machines</p> <p>3 Transport ventilators</p>	<p>Intensive Care 4 Servo i (paediatric capable>500gms)</p> <p>Intensive Care 1 Oxylog 3000</p> <p>Operating Rooms 7 GE ventilator / anaesthetic machines</p> <p>Emergency Department 1 Oxylog 3000 1 Oxylog 1000 1 Parapac 2 Philips V60 NIV</p>
National Capital Private Hospital	<p>4 Ventilators</p> <p>1 Transport</p>	<p>Critical Care Unit 4 Servo i</p> <p>1 GE transport</p>
Calvary John James Hospital	2 Ventilators	<p>Intensive Care Unit 2 Servo i (paediatric capacity) 1 Vision NIV</p>
Queanbeyan District Hospital		1 NIV

Continuous Renal Replacement Therapy

The Intensive Care Units in the ACT public hospitals have a total of 8 continuous renal replacement therapy (CRRT) units, which would allow 8 patients to be dialysed. National Capital Private Hospital has 1 CRRT unit which could possibly be used. Potential assistance from the renal dialysis unit would need to be negotiated further dependent on patient haemodynamic stability and resources of the dialysis unit. All CRRT units utilise Gambro fluid. (See Table 2)

Transport and retrieval

Intensive Care at the Canberra Hospital has 5 Oxylog 3000 portable ventilators and 1 MRI compatible ventilator, which could be used for transporting patients for diagnostic procedures or transfer to another facility.

The Capital Region Retrieval Service (CRRS) would be consulted for retrieval of unstable patients from Calvary Hospital, Calvary John James and Queanbeyan hospitals along with retrieval of patients requiring intensive care in the ACT dependant upon the cross border agreement between Southern LDH and ACT during the containment phase.

CRRS should be contacted via the Aeromedical & Medical Retrieval Service (AMRS) on 1300 873 711.

Extra Corporeal Membrane Oxygenation (ECMO) Referral

Patients requiring Extra Corporeal Membrane Oxygenation (ECMO) will be referred to the NSW Health ECMO service utilising the protocol through AMRS on 1800 650 004 at Appendix 3 or to the Alfred Hospital in Melbourne depending on capacity contact through Senior Registrar ICU.

Consumables

Consumables will be replenished by the supply department as per the normal supply schedule, however if extra supplies are required, requests should be made through local hospital processes. A list of commonly required consumables is located at Appendix 2.

8 Alternative resources

Table 4

Private hospitals

Hospital	Contact	Physical bed spaces	ICU Ventilators	CRRT
National Capital Private Hospital	6222 6666 (CNM Critical Care)	5	4 Servo i ventilators	1 Prisma
Calvary John James Hospital	6281 8100 (CNM Intensive Care)	6	2 Servo i ventilators	NA
Southern LDH	HSFAC 0477313985	Queanbeyan (4 HDU beds)	NA	NA

Ward/ other hospital areas within Canberra Hospital and Calvary Health Care

There are other areas of the hospital, which may be able to accommodate intensive care patients with ventilatory support. These areas have medical gas and suction supply, with limited patient monitoring. Use of these areas requires approval by Hospital Executives in accordance with local hospital plans.

Within TCH and Calvary additional areas include:

Hospital	Area	Number of bed spaces available for intensive care patients
The Canberra Hospital	Post Anaesthetic Care Unit (PACU)	18
	Extended Day stay unit (EDSU)	14
	Coronary Care Unit (CCU)	19
Calvary Health Care	Post Anaesthetic Care Unit (PACU)	9 functional bed areas with monitors 15 bed spaces
	Day stay unit (DSU)	6

Southern LDH resources

The surrounding region of Southern NSW has limited intensive care resources in Goulburn, Wagga Wagga, Griffith and Albury. Patients from areas close to Canberra such as Queanbeyan and Yass may require tertiary treatment in Canberra.

9 Workforce

During a health emergency such as an influenza pandemic, it is expected that a high number of staff will be affected as well as an increase in demand for critical care services. Therefore there may be changes to the normal workforce in ICU as well as other areas of the hospital. Some of the considerations to workforce are:

- The skill level and combinations of staff which are acceptable during a pandemic, utilising less experienced staff working with regular staff to accommodate demand
- Administrative processes including orientation and training.

Model of care / patient: staff ratios

The model of care would change according to the workforce available and care required by the patients in intensive care. A different model of care may include utilising experienced ICU staff in a team with less experienced staff to care for a number of patients. This model would allow for supervision of patients and staff and is similar to the model proposed by NSW Health⁶. This model would need to be evaluated on a daily basis dependant on acuity and number of patients and should be discussed by the Director of Intensive Care and Senior Nurse responsible for ICU. If there is an oversupply of staff at one ICU, it may be necessary to redeploy trained staff to another ICU to ensure minimum staffing requirements. The redeployment of staff will occur following negotiation with individual Hospital Executives and in accordance with local hospital plans.

A minimum level of staffing of intensive care patients would be:

- 1 experienced ICU RN supervising 4 non- ICU trained carers
- 1 senior nurse coordinating 6-8 patients to support ICU and non- ICU trained staff each shift
- 1 Clinical Development Nurse or equivalent to orientate and train new staff to basic staff standards e.g.: ventilation, monitoring and fluid administration to be available 7 days /week
- 1 overall unit coordinator each shift to liaise with Bed/Demand Management, ICU services at other hospitals, infection control

Potential capacity ACT public hospitals

Capacity for extra staffing would be dependant on staff who have relevant skills and do not currently work in the intensive care units. These staff may include:

- Previous ICU staff employed elsewhere in ACT Health
- Nursing students
- Staff from Post Anaesthetic Care Unit
- Nursing staff employed at University of Canberra, Australian Catholic University
- Medical students

⁶ NSW Health PD2010_028, Influenza Pandemic Providing Critical Care.

Obligations of staff

Staff are to communicate with ACT Health if they are unable to attend work due to illness or the need to care for family members as per the normal policies of ACT Health. If a state of emergency is declared, the obligations of ACT Health staff would be consistent with the Emergency Act, if enacted by the Chief Minister.

Protection of staff/ OH&S

Staff are required to utilise Personal Protection Equipment (PPE) supplied by the hospital and follow infection control policies of their hospitals and ACT Health.

Education and training

ACT Health Staff Development Unit has developed basic ventilation and monitoring self directed learning packages for non- ICU staff. These packages will be used in preparation for staff to work in the intensive care units. Contact Critical Care Educator, Staff Development Unit for copies.

Each unit will provide annual mandatory unit based training on PPE and pandemic planning for all staff.

Strategies for workforce management

The Director or delegate, ADON, Nurse Managers and Clinical Nurse Consultants will meet and liaise daily with their respective hospital management and between Canberra ICU and Calvary ICU to evaluate staffing requirements for the following 24 hours.

Strategies should be developed for de-escalation as demand decreases, ensuring the progressive planned release and support of staff who have been working under stress, for prolonged periods and in different areas to their normal workplace.

The emphasis for staff should be on safety, with both employees and employers having a responsibility to minimise risk, comply with policies and report incidents including staff illness or injury.

Communication

An up to date list of all staff employed in each unit or those who work frequently in the areas should be kept by the Nurse Manager and Administration staff of the area in order to contact staff to attend the workplace or inform them of any changes.

Details should include:

Name

Phone number

Address

Designation

Ability to care for ventilated patients

Ability to care for ventilated paediatric patients

Competence with CRRT

Vaccination status

10 Glossary of terms

Attack rate: the percentage of the population that will become ill (note that approximately this number again will become infected but not show signs or symptoms).

Available beds: a fully, staffed, funded and equipped bed, configured to intensive care standards, which is in use or immediately available for use.⁷

Critical care unit: comprise both intensive care units and high dependency units.

CRRT: continuous renal replacement therapy machine (e.g., PRISMA machine) used in the intensive care unit.

Containment stage of a pandemic: the early period of a pandemic when it is still possible to follow up individual cases and small clusters of cases, and their contacts, and to institute measures to prevent further spread.

Haemodialysis: intermittent haemodialysis machines are used by the Haemodialysis Unit, for intermittent dialysis of both inpatients and outpatients (usually three times per week, for 4-6 hours).

High dependency unit:⁸ a specially staffed and equipped section of an intensive care complex that provides a level of care intermediate between intensive care and general ward care.

Patients may be admitted to the high dependency unit (HDU):

- a. from the ICU as a step-down prior to transfer to the ward, or
- b. directly from the ward, recovery or emergency areas.

Typically patients in HDU will have single organ failure and are at a high risk of developing complications. An HDU should have resources for immediate resuscitation and management of the critically ill. Equipment should be available to manage short-term emergencies, e.g., a need for mechanical ventilation.

In stable patients routine monitoring and support may include ECG, oximetry, invasive measurement of blood pressure, low-level inotropic support and non-invasive ventilation. High dependency units support surgical services and emergency departments, but only to the extent of overnight ventilation, if required.⁹

Intensive care unit¹⁰ A specially staffed, and equipped, separate and self-contained section of a hospital for the management of patients with life threatening or potentially life-threatening, and reversible or potentially reversible organ failure. An intensive care unit (ICU) provides resources for the support of patients and their families, and utilises the specialised skills of medical, nursing and other staff experienced in the management of critically ill patients. These skills and resources, necessary to care for the critically ill, are most efficiently concentrated in one area of the hospital. This does not preclude the division of one ICU into a higher level (e.g.

⁷ Joint Faculty of Intensive Care Medicine *Minimum Standards for Intensive Care Units 2011*. www.cicm.org.au

⁸ Joint Faculty of Intensive Care Medicine Recommendations on Standards for High Dependency Units Seeking Accreditation for Training in Intensive Care 2011. www.cicm.org.au

⁹ NSW Health Department. *Intensive Care Service Plan – Adult Services 2001*. NSW Government Action Plan, Sydney

¹⁰ College of Intensive Care Medicine of Australia and New Zealand

for ventilated patients) and lower or "step-down" level (e.g., for post-operative patients), nor does it preclude the siting of specific high dependency areas elsewhere in the hospital (e.g., neurosurgical, post-operative cardiothoracic area). Within each unit, policies should be available which detail the admission and discharge criteria of patients. There should also be protocols for retrieving patients, and for transferring patients to other intensive care units for more comprehensive patient care when necessary.

Isolation room definitions:

- a. Single room – single isolation room without negative pressure or ante-chamber
- b. Negative pressure room – single isolation room configured for negative pressure with or without an ante-chamber

Physical bed spaces: total number of physical bed spaces, whether available or not.

Post-containment stage of a pandemic: later in a pandemic when the rate of transmission of the virus is such that available resources for containing and following-up cases and their contacts are exhausted, and therefore containment is no longer feasible.

Post-exposure prophylaxis: providing antiviral medication to people already exposed to the virus, and therefore at risk of infection, but who are not yet symptomatic (standard course: 10 oseltamivir 75 mg tablets over 7 days).

Pre-exposure prophylaxis: providing antiviral to people at risk of exposure prior to their potential exposure (course: one 75 mg tablet of oseltamivir daily for the entire period of potential exposure, and for 7 days after the last exposure).

Operational beds: staffed and equipped beds, which are in use or immediately available for use for ventilation of a patient. It is a bed (or bed equivalent) configured to intensive care standards and one that is fully staffed and funded.¹

Ventilators:***Mechanical ventilators:***

- a. Intensive care ventilators - will provide a full range of ventilatory options including spontaneous and controlled ventilation, pressure control etc and positive end-expiratory pressure (PEEP). Most intensive care ventilators can be configured for paediatric and/or neonatal ventilation as per the manufacturers specifications, and are suitable for prolonged ventilation (>24 hours).
- b. Transport ventilator - may provide some or all of the requirements of intensive care ventilators, but are generally smaller, light-weight, easy-to-use ventilators with limited ability to provide prolonged ventilation (e.g., the Oxylog 2000). These ventilators may be located within the ICU or emergency department.
- c. Anaesthesia machines - may provide some or all of the requirements of intensive care ventilators, but are generally quite large machines that require some training to use. These machines may not be suitable for provision of prolonged ventilation.

Non-invasive ventilators: also called BiPAP machines usually provide ventilation through a tightly fitted facemask, but they may also be attached to an endotracheal tube if necessary.

Appendix 1

Influenza Pandemic Triage

It is well recognised that in the event of a pandemic influenza that critical care recourses may be insufficient to provide maximum levels of care to all patients that may derive some benefit from them. It is therefore a requirement that under such conditions that the best use of available recourses are made. This means that, as per standard triage methods, recourses will be allocated on the basis of need and survivability.

Patients will be assessed and adjudicated whether or not they will be considered for critical care support as per the guidelines proposed by *Christian et al. CMAJ; November 21, 2006 ; 175(11) 1377 – 1381*

Instructions for the application of the triage Protocol to determine a patient's need for critical care during an influenza pandemic*

1. Assess whether the patient meets the inclusion criteria†
 - If yes, proceed to step 2
 - If no, reassess patient later to determine whether clinical status has deteriorated
2. Assess whether the patient meets the exclusion criteria†
 - If no, proceed to step 3
 - If yes, assign a “blue” triage code; *do not* transfer the patient to critical care; continue current level of care or provide palliative care as needed
3. Proceed to triage tool, initial assessment (see Fig. 1)

*The triage protocol applies to *all* patients undergoing assessment for possible critical care and not only those with influenza-like symptoms.

†See below for inclusion and exclusion criteria.

Christian et al. CMAJ; November 21, 2006; 175(11) 1379

Box 1 Detailed inclusion and exclusion criteria used in the triage protocol for critical care during an influenza pandemic

Inclusion criteria	Exclusion criteria
<p>The patient must have 1 of the following:</p> <p>A. Requirement for invasive ventilatory support</p> <ul style="list-style-type: none"> • Refractory hypoxemia (SpO₂ < 90% on non-rebreather mask or FIO₂ > 0.85) • Respiratory acidosis (pH < 7.2) • Clinical evidence of impending respiratory failure • Inability to protect or maintain airway <p>B. Hypotension (systolic blood pressure < 90 mm Hg or relative hypotension) with clinical evidence of shock (altered level of consciousness, decreased urine output or other evidence of end-organ failure) refractory to volume resuscitation requiring vasopressor or inotrope support that cannot be managed in ward setting</p>	<p>The patient is excluded from admission or transfer to critical care if <i>any</i> of the following is present:</p> <p>A. Severe trauma</p> <p>B. Severe burns of patient with any 2 of the following:</p> <ul style="list-style-type: none"> • Age > 60 yr • > 40% of total body surface area affected • Inhalation injury <p>C. Cardiac arrest</p> <ul style="list-style-type: none"> • Unwitnessed cardiac arrest • Witnessed cardiac arrest, not responsive to electrical therapy (defibrillation or pacing) • Recurrent cardiac arrest <p>D. Severe baseline cognitive impairment</p> <p>E. Advanced untreatable neuromuscular disease</p> <p>F. Metastatic malignant disease</p>

	<p>G. Advanced and irreversible immunocompromise</p> <p>H. Severe and irreversible neurologic event or condition</p> <p>I. End-stage organ failure meeting the following criteria:</p> <p>Heart</p> <ul style="list-style-type: none"> • NYHA class III or IV heart failure <p>Lungs</p> <ul style="list-style-type: none"> • COPD with FEV1 < 25% predicted, baseline PaO2 < 55 mm Hg, or secondary pulmonary hypertension • Cystic fibrosis with post bronchodilator FEV1 < 30% or baseline PaO2 < 55 mm Hg • Pulmonary fibrosis with VC or TLC < 60% predicted, baseline PaO2 < 55 mm Hg, or secondary pulmonary hypertension • Primary pulmonary hypertension with NYHA class III or IV heart failure, right atrial pressure > 10 mm Hg, or mean pulmonary arterial pressure > 50 mm Hg <p>Liver</p> <ul style="list-style-type: none"> • Child–Pugh score ³ 7 <p>J. Age > 85 yr</p> <p>K. Elective palliative surgery</p>
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Note: SpO2 = oxygen saturation measured by pulse oximetry, FIO2 = fraction of inspired oxygen, NYHA = New York Heart Association, COPD = chronic obstructive pulmonary disease, FEV1 = forced expiratory volume in 1 second, PaO2 = partial pressure of arterial oxygen, VC = vital capacity, TLC = total lung capacity.

Christian et al. CMAJ; November 21, 2006 ; 175(11) 1379

If inclusion criteria are met and exclusion is not the patient will be assigned a priority for critical care treatment on the basis of their Sequential Organ Failure Assessment (SOFA) score (Figure.1).

Figure 1. Scoring criteria for the Sequential Organ-Failure Assessment (SOFA) score*

Variable	Score				
	0	1	2	3	4
PaO ₂ /FIO ₂ , mm Hg	> 400	≤ 400	≤ 300	≤ 200	≤ 100
Platelet count, × 10 ⁶ /L	> 150	≤ 150	≤ 100	≤ 50	≤ 20
Bilirubin level, mg/dL (μmol/L)	< 1.2 (< 20)	1.2-1.9 (20-32)	2.0-5.9 (33-100)	6.0-11.9 (101-203)	> 12 (> 203)
Hypotension†	None	MABP < 70	Dop ≤ 5	Dop > 5 Epi ≤ 0.1 Norepi ≤ 0.1	Dop > 15 Epi > 0.1 Norepi > 0.1
Glasgow Coma score	15	13-14	10-12	6-9	< 6
Creatinine level, mg/dL (μmol/L)	< 1.2 (< 106)	1.2-1.9 (106-168)	2.0-3.4 (169-300)	3.5-4.9 (301-433)	> 5 (> 434)

Note: PaO₂ = partial pressure of arterial oxygen; FIO₂ = fraction of inspired oxygen; MABP = mean arterial blood pressure, in mm Hg;
 *Adapted, with permission, from Ferreira FL, Bota DP, Bross A, et al. Serial evaluation of the SOFA score to predict outcome in critically ill patients. *JAMA* 2001;286:1754-8. Copyright © 2001, American Medical Association. All rights reserved.
 †Dop (dopamine), epi (epinephrine) and norepi (norepinephrine) doses in μg/kg per min.

Patients in critical care will be reassessed at 48 and 120 hours post admission to assess if ongoing critical care support is warranted and justified in view of the scarcity of resources.

Figure 2. Prioritization tool used in triage protocol for the assessment of patients' needs for critical care during an influenza pandemic.

Initial assessment

Triage code	Criteria	Action or priority
Blue	Exclusion criteria met or SOFA score > 11*	<ul style="list-style-type: none"> • Manage medically • Provide palliative care as needed • Discharge from critical care
Red	SOFA score ≤7 or single-organ failure	Highest priority
Yellow	SOFA score 8–11	Intermediate priority
Green	No significant organ failure	<ul style="list-style-type: none"> • Defer or discharge • Reassess as needed

48-hour assessment

Triage code	Criteria	Action or priority
Blue	Exclusion criteria met or SOFA score > 11 or SOFA score stable at 8–11 with no change	<ul style="list-style-type: none"> • Provide palliative care • Discharge from critical care
Red	SOFA score < 11 and decreasing	Highest priority
Yellow	SOFA score stable at < 8 with no change	Intermediate priority
Green	No longer dependant on ventilator	• Discharge from critical care

120-hour assessment

Triage code	Criteria	Action or priority
Blue	Exclusion criteria met or SOFA score > 11 or SOFA score < 8 with no change†	<ul style="list-style-type: none"> • Provide palliative care • Discharge from critical care
Red	SOFA < 11 and decreasing progressively	Highest priority
Yellow	SOFA < 8 with minimal decrease (< 3-point decrease in past 72 h)	Intermediate priority
Green	No longer dependant on ventilator	• Discharge from critical care

Note: SOFA = Sequential Organ-Failure Assessment (see Appendix 1, available at www.cmaj.ca/cgi/content/full/175/11/1377/DC1).
 *If an exclusion criterion is met or the SOFA score is > 11 anytime from the initial assessment to 48 hours afterward, change the triage code to Blue and proceed as indicated.
 †If an exclusion criterion is met or the SOFA score is > 11 anytime from 48 to 120 hours afterward, change the triage code to Blue and proceed as indicated.

Appendix to: Christian MD, Hawryluck L, Wax RS, et al. Development of a triage protocol for critical care during an influenza pandemic. *CMAJ* 2006;175(11):1377-81. Copyright © 2006, CMA Media Inc.

The triage protocol has 4 main components:

Inclusion criteria, exclusion criteria, minimum qualifications for survival and a prioritization tool.

The **inclusion criteria** (Box 1) identify patients who may benefit from admission to critical care and primarily focus on respiratory failure, since the provision of ventilatory support is what fundamentally differentiates the ICU from other acute care areas (e.g., step-down units).

The **exclusion criteria** (Box 1) can be broken down into 3 categories:

1. Patients who have a poor prognosis despite care in an ICU.
2. Patients who require resources that simply cannot be provided during a pandemic.
3. Patients with advanced medical illnesses whose underlying illness has a poor prognosis with a high likelihood of death, even without their current concomitant critical illness.

The first category reflects the “hard” boundaries that many Intensivist recognize from their day-to-day care of patients, The second category of exclusion criteria includes patients who may benefit from critical care but would require intense use of resources and prolonged care that cannot be justified during a pandemic, when the goal is to do the most for the most with the limited resources available. The third category of exclusion criteria includes patients who have high resource requirements and are likely to experience significant complications from influenza.

The “minimum qualifications for survival” form the third component of the triage protocol. These qualifications represent a ceiling on the amount of resources that can be expended on any one person. This is a concept foreign to many medical systems in developed countries but one that has been used in war zones and refugee camps. The minimum qualifications for survival dictate reassessment at 48 and 120 hours, as well as an ongoing cut-off ceiling if a patient ever has a SOFA score of 11 or higher or any other exclusion criteria. The key component of the minimum qualifications for survival is the attempt to identify at an early stage patients who are not improving and who are likely to have a poor outcome. In day-to-day practice, it may take days or weeks of intensive care before this poor outcome occurs. During a pandemic, several other patients could have had their lives saved during this time.

The final component of the triage protocol is a tool for the prioritization of patients for admission to the ICU and access to ventilation (Fig. 2; the complete prioritization tool.)

For ease of use, the familiar colour scheme (blue or black, red, yellow, green) commonly used in civilian and military disaster triage protocols was adopted.

Patients in the blue (or black) category are those who fall into the expectant category and should not receive critical care.

Depending on their condition and medical issues, patients may either continue to have curative medical care on a ward or palliative care.

Patients in the red category have the highest priority for ICU admission and mechanical ventilation, if required. In selecting the patients for this category, the aim is to find those who are sick enough to require the resource and whose outcome will be poor if they do not receive it but are not so sick that they will not recover even if they do receive ICU care. Patients with

single organ failure, particularly those with respiratory failure due to influenza who otherwise have a low SOFA score, are included in the red category assuming they have no exclusion criteria. These patients will derive the maximum benefit from ICU care and mechanical ventilation. The goal is to optimize the effectiveness of the triage protocol so that every patient who receives resources will survive. Although this is unlikely to be completely successful, it can be used as a target to guide modification of the triage protocol based on patient outcomes during a pandemic.

Patients in the **yellow** category are those who, at baseline, are very sick and may or may not benefit from critical care. They should receive care if the resources are available but not at the expense of denying care to someone in the red category. At the reassessment points, patients who are improving are given high priority (**red**) for continued care, while those who are not showing signs of improvement are classified as yellow.

Patients in the **green** category are those who should be considered for transfer out of the ICU because they are well enough to be cared for without mechanical ventilation or other ICU specific interventions.

Appendix 2.

Intensive Care consumables for increased patient demand during a pandemic

Extra supplies should be ordered through the normal hospital process during business hours and through the After hours Hospital Manager or equivalent after hours and on weekends.

Correct at May 2013

Product ID	Description
29016	Bag effluent Prismaflex 5 litre
10411	Bag urinary drainage
11414	Cannula arterial femoral 20G X 8cm
18223	Catheter suction closed system 12f long
18224	Catheter suction closed system 14f
10692	Circuit for MR290 chamber with air entrainer
14330	Circuit ventilator 22mm dry elbow pressure port
18337	Circuit ventilator wet dual MR290 kit
28648	Cuvette vent CO2 non disposable
19378	Filter breathing bacterial viral HME
28382	Flow sensor expiratory spiralog
29017	Fluid warming line Prismaflex
15751	Glove non sterile latex 6-7 pow/free
15750	Gloves non sterile latex 7-8 pow/free
15854	Glove non sterile latex 8-9 pow free
10345	Glove sterile single medium latex pow/free
26499	Gown fluid resistant blue
10213	Gown fluid resistant yellow
69557	Liner suction 2L "SERRES"
18164	Mask face resp precautions P2/N95
10405	Mask oxygen adult latex free
29015	Predilution set Prismaflex ST100
15466	Sucker yankeur
14230	Syringe arterial blood sampling
15471	Tape fixation ett oral
15267	Transducer DTX plus DT4812 single pole
15911	Transducer gabarith Pmset safedraw
41337	Tube oxygen 3 m
15457	Tube unsterile 3 m
28383	Valve expiratory vent disposable

Pharmacy/ fluid items

Pharmacy supplies should be ordered through normal hospital processes during business hours and through the After hours Hospital Manager or equivalent after hours. The below items are ordered through supply department.

Product ID	Description
88197	Lactasol Fluid dialysate haemofiltration solution Prisma 5L
81377	Haemasol Fluid dialysate solution (lactate free) Prisma 5L
80029	Fluid IV glucose 5% 1000ml bag
80033	Fluid IV Hartman's 1000ml bag
80036	Fluid IV NaCl 0.9% KCL 1000ml
88281	Fluid IV NaCL 0.9% 100ml
33902	Fluid water for injection 1000ml

Appendix 3.

NSW Health Extra- Corporeal Membrane Oxygenation (ECMO) Medical Retrieval Protocol

An increasing demand for ECMO support has been observed for patients with severe respiratory failure who are at the limits of conventional therapy. Improving survival rates of patients treated with ECMO have led to an increased demand for this support. Often these patients present to hospitals which do not have ECMO facilities and expertise resulting in a tertiary referral service performing an ECMO rescue mission.

Patients who may be considered for ECMO are often too sick to safely transport with conventional equipment therefore the need arises to establish the patient on ECMO and stabilise their condition prior to transport. The safe management of an ECMO retrieval patient requires a coordinated response by the referring and receiving hospitals, ECMO team, Ambulance and the medical retrieval services.

For children in NSW, ECMO is provided at the Sydney Children's Hospital and the Children's Hospital at Westmead. Both these centres may also refer patients to the Royal Children's Hospital in Melbourne most commonly for non-cardiac patients where extended therapy is anticipated. The medical retrieval of paediatric and neonatal patients on ECMO is performed by the staff from the Royal Children's Hospital in Melbourne and transportation by Air Ambulance Victoria in collaboration with CHW and/or SCH and NETS. Early notification of NETS is essential to ensure appropriate support is available. Clinical and logistic support may be provided by the Ambulance Service of NSW and the NSW adult ECMO medical retrieval service as required.

For adults ECMO is provided at tertiary facilities in NSW with level 6 Cardiothoracic and ICU services including:

- John Hunter Hospital
- Liverpool Hospital
- Prince of Wales Hospital
- Royal North Shore Hospital
- Royal Prince Alfred Hospital
- St Vincent's Hospital
- St George Hospital
- Westmead Hospital

The primary reason for ECMO in these facilities is for cardiac surgery in adults however there has been an increasing incidence of ECMO being required to support adult patients in refractory respiratory failure.

Increasingly in adult cases, ASNSW is being called upon to transport an ECMO clinical team plus necessary equipment to metropolitan and rural based hospitals to stabilise patients on ECMO. St Vincent's Hospital and Royal Prince Alfred Hospital, in collaboration with AMRS, provide the ECMO referral and transfer service and ECMO retrieval team on alternate weeks. AMRS is notified of the active ECMO referral service. To organise the referral and transfer of a patient requiring rescue ECMO the following steps and conditions must be adhered to:

1. Early notification of a patient potentially requiring referral for ECMO is essential and should be undertaken in accordance with the "Indications for ECMO Referral" Guideline
2. Initial contact is with AMRS who will then contact the active ECMO service (either the on call General Intensive Care consultant at RPAH or the Cardiac Intensive Care consultant at SVH). The receiving hospital's ICU consultant would then discuss the case with the referring clinician, on-call cardiac surgeon and medical perfusionist.
3. The destination hospital (either SVH or RPAH) will be determined according to the patients underlying condition, required clinical/surgical intervention and access to an available ICU bed.

AMRS is to be contacted to facilitate all adult ECMO referrals and transportation Phone: 1800 650 004

Case selection and treatment protocols used during ECMO are now well defined by the International Extracorporeal Life Support Organization (ELSO). The NSW ECMO Medical Retrieval Services Steering Group developed the following "Indications for ECMO Referral Guideline" which is to be used by all referring clinicians.

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