ACI NSW Agency for Clinical Innovation

SERVICE MODEL

Intensive Care Service Model: NSW Level 4 Adult Intensive Care Units

Intensive Care Service Network

Recommended standards for standalone Intensive Care Units in smaller rural, remote and metropolitan NSW hospitals, developed to ensure that NSW residents have access to intensive care services close to where they live.

It is intended this document be used by Level 3 and 4 Intensive Care Units, to identify if in scope for the service model.

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Table of Contents

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Key Definitions

Role Delineation

The complexity of clinical services provided by health facilities in NSW, including intensive care, is described by their role delineation. Local Health Districts and Specialty Health Networks (LHD/SHN) are responsible for determining the role delineation level of their clinical services, with reference to the NSW Health Guide to the Role Delineation of Health Services (2002). This guideline outlines the support services, staffing profile and minimum requirements for the delivery of safe service provision.[1, 2]

A revised version of the Guide, to be released by NSW Health at the end of 2015, includes changes to the description of intensive care services, as summarised below. [3]

Intensive Care Service Levels – 2002 Guide	Intensive Care Service (ICS) Levels & Close Observation Unit (COU) – 2015 revised Guide
2	COU level 3 (standalone or no hospital ICS)
3	COU level 4 (designated unit in a facility with and ICS) or upgrade to a level 4 ICS
4	4
5	5
6	6

Intensive Care Unit

"An Intensive Care Unit (ICU) is a specially staffed and equipped, separate and self-contained area of a hospital dedicated to the management of patients with life-threatening illnesses, injuries and complications, and monitoring of potentially life-threatening conditions. It provides special expertise and facilities for support of vital functions and uses the skills of medical, nursing and other personnel experienced in the management of these problems."[2]

High Dependency Unit

"A High Dependency Unit (HDU) is 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."[2] Note that the revised NSW Health Guide to the Role Delineation of Health Services (2015) no longer refers to HDUs[3].

Close Observation Unit[3]

A Closed Observation Unit (COU) is a specially staffed and equipped area of a hospital that provides an intermediate level of care between intensive care and general ward care. A COU may be established in a hospital with no intensive care service (Level 3 COU) or in hospital with a Level 4, 5 or 6 ICU service (Level 4 COU). COUs do not ordinarily fall under the governance of the ICU service unless negotiated locally.

Level 3 & 4 Intensive Care Units

Nineteen of the forty six adult Intensive Care Units in NSW have a role delineation of either level 3 or 4[1].

Under the 2002 NSW Guide to the Role Delineation of Health Services, Level 3 ICUs are described as including capacity for recovery of post-operative patients and ward patients requiring more intensive observation than available within a general ward area. In addition, Level 3 Units should provide 24 hour access to a medical officer onsite, or have one available within ten minutes.[1, 2]

Level 4 Intensive Care Units are separate and self-contained facilities in the hospital. They have limited ability to provide basic multi-system life support (i.e. mechanical ventilation) usually for less than 24 hours, and can provide simple invasive cardiovascular monitoring.[1, 2, 3]

Open or Closed Collaborative Service Model

Intensive Care Units are often referred to as "open" or "closed" units, or functioning under open or closed models.

In an open model, the care of the patient in the Intensive Care Unit is managed by inpatient teams led by an admitting consultant and may not involve consultation with an intensivist or designated specialist.[4]

In a closed collaborative model, the intensive care team, led by an intensivist or designated specialist, has the primary responsibility for patient management, with support and input from the admitting consultant/inpatient team. The intensive care director and onsite specialist provide leadership and oversight of the unit's functions. Closed Intensive Care Units have been associated with a reduction in hospital and ICU mortality.[5]

Intensive Care Services

Intensive Care Units networked and functioning cooperatively, within or across an LHD or region to optimise service delivery. Strategic planning and monitoring of service delivery are managed across the network. Intensive Care Services (ICS) provide clinical care to patients requiring both intensive care and a level of care, which cannot be provided on an ordinary ward.

Intensivist

"An intensivist is a medical specialist in intensive care medicine"[2]. Intensive care medicine encompasses the assessment, resuscitation and ongoing management of critically ill patients with life-threatening single and multiple organ system failure. Work is not confined to the ICU, since patients are usually admitted to the unit from the care of a primary team elsewhere within the hospital. Intensive care specialists are also frequently involved in transporting and assisting with the management of seriously ill patients who may not eventually end up in the ICU.

In Australia and New Zealand, medical practitioners who wish to be intensivists are required to complete the training program of the College. This training program results in the award of the Fellowship of the College of Intensive Care Medicine of Australia and New Zealand (FCICM).[6]

This document also refers to the designated specialist. For the purposes of these recommendations, this refers to medical specialist with appropriate skills and training in intensive care medicine, approved by the relevant local medical appointment process, to provide specialist intensive care services. These specialists will usually have a background in either emergency medicine or anaesthesia.

Abbreviations

ACCCN	Australian College of Critical Care Nurses
ACI	Agency for Clinical Innovation
ADRG	Australian Diagnostic Related Group
AMRS	Aeromedical Retrieval Service
ANZICS CORE	Australian and New Zealand Intensive Care Society, Centre for Outcome and Resource Evaluation
ALOS	Average Length of Stay
ALS	Advanced Life Support
CEC	Clinical Excellence Commission
CICM	College of Intensive Care Medicine
CVAD	Central Venous Access Device
ED	Emergency Department
ICU	Intensive Care Unit
ICCMU	Intensive Care Coordination and Monitoring Unit
ICS	Intensive Care Service
ICSN	Intensive Care Service Network
HEET	Health Economics and Evaluation Team
IIMS	Incident Information Management System
JMO	Junior Medical Officer
LHD	Local Health District
MET	Medical Emergency Team
M&M	Morbidity and Mortality
MOH	Ministry of Health
NFR	Not for Resuscitation
NUM	Nursing Unit Manager
PD	Policy Directive
RN	Registered Nurse
SMR	Standardised Mortality Rates
RMR	Replacement, Maintenance and Repair
VMO	Visiting Medical Officer

Executive Summary

Patients admitted to intensive care are often critically unwell and the sickest in the hospital, and require timely access to specialist care 24 hours a day to ensure best possible outcomes.

Smaller Intensive Care Units, often situated in rural, remote and outer metropolitan hospitals, provide an important function, supporting the inpatient critical care needs for NSW. Capabilities of these units determine the acuity of patients that can be safely admitted, the complexity of procedures and surgery that can be undertaken in a hospital and the number of patients requiring transfer to higher-level hospitals for care.

These units are responsible for a significant proportion of intensive care activity within NSW. Over the 5 year period 2009/10 to 2013/14:

- nearly 64,000 (an average of 13,000 per year) hospitalisations involved a stay in a Level 3 and 4 Intensive Care Unit. These hospitalisations were associated with nearly 446,000 bed-days (an average of 90,000), with an indicative average annual cost for the entire hospitalisation of around $155 million.[63]
- separations grew by around 4.5% per year and beddays by 1.6%. Consistent with changes in clinical practice, the average length of stay for patients that had a stay in a Level 3 and 4 Intensive Care Unit fell by just under 3% per year.[7]

Investigations have demonstrated marked variation in the delivery of care across Level 3 and 4 ICUs in NSW. In some cases, this has been linked to suboptimal unit performance, poor patient outcomes and unsatisfactory carer and staff experiences.[4,8,9] There is evidence of poorly planned and coordinated care, primarily due to limited access to senior clinical critical care advice and management, particularly for deteriorating patients. The majority of Level 3 and 4 ICUs function under an open model.

Reasons for variation are multiple and complex, however some key contributing factors have been identified, which include:

- ambiguity around the role and functions of Level 3 and 4 ICUs
- gaps in governance and leadership
- lack of standardised clinical practice
- variation in transfers and retrievals processes.

Variation in service provision has potential to pose a risk to patient safety. It is recommended that Intensive Care Services align with the revised 2015 role delineation guide and that structures and processes are implemented to support governance and leadership. Central to the service model recommendations, is that ICUs provide services operating under a closed, collaborative model with an intensivist or designated specialist responsible for all admissions, coordination of care and discharges. This approach includes inpatient teams providing support and input into the care of patients in the ICU. There is evidence that closed Intensive Care Units, staffed and led by intensivists, are associated with lower hospital and ICU mortality, decreased length of stay and improved patient outcomes.[10]

The Intensive Care Service Model provides recommended standards for the safe and efficient delivery of care in Level 4 ICUs,[3] to improve the care of the critically ill patient.

The standards incorporate core principles of best practice service models, aligned with the CEC In Safe Hands[11] functions.

The recommended standards include:

1. Governance and leadership
2. Care planning, coordination and delivery
3. Standard protocols and procedures
4. Patient safety and experience, quality systems and data
5. Education, training and supervision
6. Workforce management
7. Equipment.

It is recommended that Level 4 ICUs be supported through functional links with a higher-level ICU, in a networked approach to intensive care service delivery. A networked "service" rather than a standalone "unit" approach enables timely access to senior critical care clinical advice and shared responsibility for intensive care service delivery, for a LHD or region. Implementation of similar models at two sites in NSW, has demonstrated improvements in patient outcomes and service provision.

An important premise underpinning these recommendations, is that where appropriate and feasible, NSW residents should have access to intensive care services close to where they live.

Implementation of the Intensive Care Service Model will support safe and efficient delivery of intensive care services, and compliance with various national quality and professional standards, NSW Ministry of Health policies/guidelines and other programs designed to improve the delivery of care to patients.

It is intended that this document will assist Level 3 and 4 Intensive Care Units, as described in the NSW Health Guide to the Role Delineation of Health Services (2002), to:

1. Undertake a structured self-assessment process, to identify gaps between the recommended standards and current practice.
2. Determine locally, which Level 3 and 4 ICU's are in scope for the proposed service model. For those Units in scope, facilitate review of the self-assessment findings and undertake further analysis of practice as required to better understand local issues and prioritise (e.g. IIMS, retrieval and service activity data, patient and staff surveys, complaints).
3. Identify and develop solutions for gaps and service deficiencies including:
    - assess the magnitude of the solutions (including what is in and out of scope)
    - assessment of resources required (if any)
    - timeframe required to fully implement the service model
    - potential risks / challenges to implement and how these maybe managed.
4. Develop an implementation plan.
5. Implement sustainable change through:
    - evaluation
    - ongoing monitoring of service delivery under the new service model, through the regular collection of Level 4 Intensive Care Clinical Indicators (Appendix 3), sharing achievements, innovations and new processes with key stakeholders.

Section 1

Background

In NSW, Local Health Districts and Specialty Health Networks (LHD/SHN) are responsible for determining the role delineation level of their clinical services. The role delineation of a service describes the complexity of clinical services provided by health facilities, including intensive care. The NSW Health *Guide to the Role Delineation of Health Services* (2002) outlines the support services, staffing profile and other minimum requirements for safe service provision.[1,2]

The 2002 Guide describes five levels of intensive care, of differing levels of complexity (Levels 2-5). A revised NSW Health *Guide to the Role Delineation of Clinical Services*[3], due for release end of 2015, includes changes to the description of Intensive Care Services. These changes are summarised below. While the activity data in this document is based on the 2002 Guide description of Level 3 and 4 Intensive Care Services, the recommendations reflect the revised 2015 Guide definitions.

Intensive Care Service Levels – 2002 Guide	Intensive Care Service (ICS) Levels & Close Observation Unit (COU) – 2015 revised Guide
2	COU level 3 (designated unit in a facility with no ICS)
3	COU level 4 (designated unit in a facility with and ICS) or upgrade to a level 4 ICS
4	4
5	5
6	6

There are 46 adult Intensive Care Units in NSW as defined by the 2002 Guide, outlined in the table below.[1]

Level	Number of units	Description of service and assigned hospitals
2	nil	Provide a recovery area for post-operative patients and a high dependency area for general ward patients requiring observation over and above available in general ward area.
3	7	Medical officer on site 24 hours or available within 10 minutes.
		Auburn, Bowral, Fairfield, Kempsey, Maitland, Ryde and Wyong
4	12	Provide basic multi-system life support, usually for less than 24 hours. Separate and self-contained unit. Medical director with training and experience in intensive care.
		Armidale, Bathurst, Bega, Broken Hill, Canterbury, Dubbo, Grafton, Griffith, Goulburn, Manning (Taree), Mona Vale and Shoalhaven
5	17	Provide long term mechanical ventilation and more complex interventions such as renal replacement therapy.
		Albury, Bankstown, Blacktown, Calvary Mater Newcastle, Campbelltown, Coffs Harbour, Gosford, Hornsby, Lismore, Manly, Orange, Port Macquarie, Sutherland, Tamworth, Tweed, Wagga Wagga and Wollongong
6	10	Provide complex multi-system life support for indefinite period. Referral centre for intensive care patients.
		Concord, John Hunter, Liverpool, Nepean, Prince of Wales, Royal North Shore, Royal Prince Alfred, St George, St Vincent's and Westmead

Level 3 ICUs in the 2002 Guide, will become either Close Observation Units (COUs) or Level 4 Intensive Care Service (ICS) as described in the revised Guide.[3] This document does not address COUs, which unless negotiated locally, will sit outside the governance of Intensive Care Services.

The Intensive Care Service Model has been developed to support the standardisation of Intensive Care Services across NSW and compliance with various national quality and professional standards, NSW Ministry of Health policies/guidelines and other programs designed to improve the delivery of care to patients.

Relevant quality and professional standards are outlined in the table below:

Quality/Professional Standards	Entity
National safety and quality health service standards (1, 6 and 9)	Australian Commission on Safety and Quality in Healthcare
In safe hands: a guide to the 10 functions	Clinical Excellence Commission
ACCCN ICU staffing position statement on intensive care nursing staffing	Australian College of Critical Care Nurses
Intensive Care position statement on provision of critical care nurse education	Australian College of Critical Care Nurses
Quality use of antimicrobials in healthcare	Clinical Excellence Commission
Minimum standards for intensive care units	College of Intensive Care Medicine of Australia and New Zealand
Clinical handover-standard key principles (PD2009_060)	NSW Health
Using resuscitation plans in end of life decisions (PD2014_030)	NSW Health
Care coordination: planning from admission to transfer of care in NSW public hospitals (PD2011_015)	NSW Health
Critical care tertiary referral networks and transfer of care (Adults) (PD2010_021)	NSW Health
Recognition and management of patients who are deteriorating (PD2013_049)	NSW Health
Infection control policy: prevention and management of multi resistant organisms (MRO) (PD2007_84)	NSW Health

Section 2

Methodology

The Recommended Standards have been developed to address gaps and deficiencies identified after a comprehensive diagnostic process. This included:

- undertaking a model of care survey[4]
- review of current literature[12]
- a service utilisation and cost analysis[7]
- clinical incident information management system (IIMS) data review[8]
- review of aeromedical retrieval data review[9].

More detailed information on the methodology can be found in Appendix 4.

Section 3

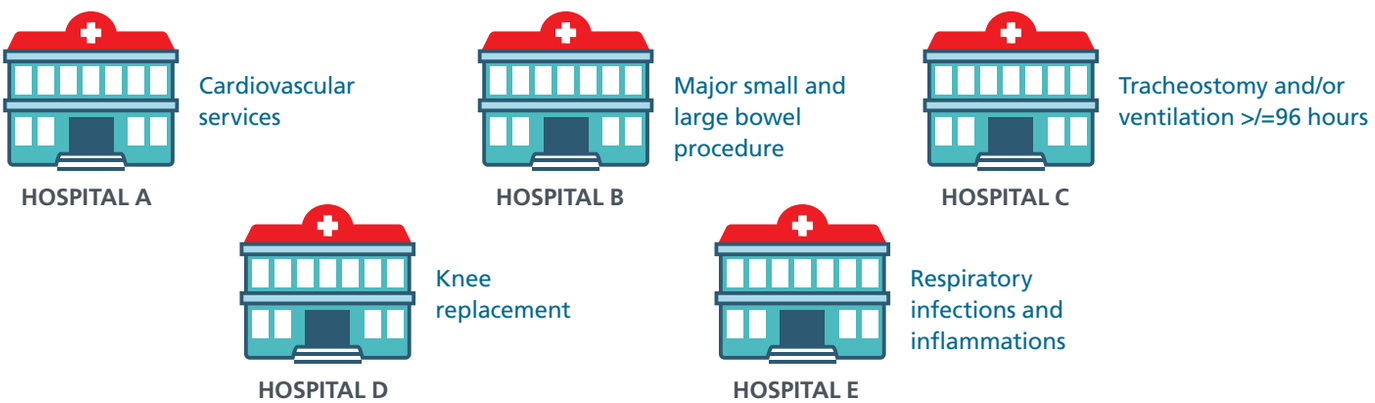
Current Situation

Patients admitted to intensive care are often critically unwell, and the sickest in the hospital and as such require direct access to specialist care 24 hours a day, to ensure best possible outcomes.

Smaller Intensive Care Units, often situated in rural, remote and outer metropolitan hospitals, fulfil an important function, supporting the inpatient critical care needs for NSW. Capabilities of these units determine the acuity of patients that can be safely admitted, the complexity of procedures and surgery that can be undertaken in a hospital and the number of patients requiring transfer to higher-level hospitals for care.

Patient case mix across these Level 3 and 4 ICUs is diverse. Cardiovascular and pulmonary disorders along with poisoning[64] and bowel procedures are the most common Australian Diagnostic Related Group (ADRG) codes assigned to patients on admission. However, the patient case-mix both within and across individual units is highly variable.[7]

Variation across Level 3 and 4 Intensive Care Units[1]: Top ADRG codes across five hospitals



Source: Admitted Patient Data: [7]

Service utilisation and cost

From 2009/10 to 2013/14 there were nearly 64,000 hospitalisations (an average of 13,000 per year) associated with an admission to a Level 3 or 4 ICU. These hospitalisations were associated with around 456,000 beddays (an average of 90,000 per year) and an average annual cost of around $155 million.[65] Over this period separations grew by an average of 4.5% per year, beddays by 1.6% and the average length of stay for the entire hopsitalisations fell by nearly 3% per year from 7.3 days in 2009/10 to 6.5 days in 2013/14.[7]

Level 3 and 4 ICUs provide care under a number of constraints including locum workforce, difficulties in recruitment and retention due to geographical location and the requirement to provide training and development in rural areas. Results from the survey, clinical incident review and retrieval data revealed that in many instances, care is poorly planned, and its delivery is uncoordinated, fragmented and unsupported, with limited access to senior clinical critical care advice and management, particularly for deteriorating patients. This creates variation in practice and poses considerable risk to patient safety.

Reasons for variation are multiple and complex, however a number of key contributing factors have been identified. These include:

- ambiguity around the role and functions of current Level 3 and 4 ICUs
- gaps in governance and leadership
- lack of standardised clinical practice
- variation in transfers and retrievals processes.

Section 4

Variation in Practice

1. Governance and leadership

Open vs Closed Models

Deficiencies in clinical governance and leadership resulting in poor care planning, have been identified in the diagnostic process. Over 75% of units operate under open model. Patients are managed by the admitting consultant/inpatient team, as opposed to a closed collaborative model.[4] In some instances, units function as a combination of both, depending on the admitting consultant, or which medical officer is on duty.

"Partly closed and partly open depending on the parent team of the patient and their willingness to contribute to the management." [4]

Nurse-led Units

Level 3 and 4 Units are frequently described by staff as being "nurse led": It is not within a registered nurse's scope of practice to provide clinical leadership and management to the critically ill patient, in the absence of a medical officer. Registered nurses in the intensive care setting, maybe accredited for specific advanced clinical practices under the direction of a medical officer.

"A core number of well trained, very experienced RNs... They do not do as told. They question every aberrant directive. If not satisfied, they will escalate and then escalate again. It cannot be overstated how important this group is, and very few people acknowledge their effectiveness... While it is a lovely place to work, the expectations on the nurses are considerable, and some can't cope with that expectation. In this hospital, there is no other way to keep patients safe." [4]

Medical Responsibility

Patients may be treated by several inpatient teams, with doctors sometimes unavailable due to other commitments such as surgery in theatre. As a result, ICU staff may have to contact multiple teams to obtain patient review and/or work outside their scope of practice to deliver care, as evidenced by the following:

"Orders for the patient needed to be addressed and finalised as the patient was in no man's land" [8]

"The only doctor in the hospital was busy elsewhere, and the nurse seemed to be alone with a deteriorating patient." [8]

"Physicians have clearly acknowledged that they lack ICU experience and skills and have largely delegated clinical responsibility to the nursing staff and ICU protocols." [8]

"These protocols do not replace the clinical assessment process by the physician on call." [6]

Resourcing and Unit Configuration

Unit configuration varies across Level 3 and 4 ICUs in NSW. All have a Nursing Unit Manager (NUM) to provide governance and leadership, although within some units the NUM has shared responsibilities between hospital areas, which can impact on internal resources and supervision of staff. This is compounded after hours, if the nurse in charge of the unit has a patient load and is also responsible for providing the facility's rapid response service.[4]

"[Not having a supernumerary] is a problem due to telemetry, Rapid response team responsibilities, graduate and junior nursing staff." [4]

2. Care Planning and Coordination

Instances of poor care planning and coordination, include the absence of daily management and care escalation plans, poor handover and discharge processes, have been identified.

Over 58% of units do not conduct daily ward rounds to assess, review, plan and document patient care.[4] Completion of daily management plans are dependent on the availability of a medical officer from the inpatient team responsible for the patient.

Management plans are prepared: "Only when an intensivist is available." [4]

"[The critically unwell patient] was not seen by, examined, assessed or had a management plan written by a doctor for two days… no medical entry or plan had been entered into or documented." [8]

These deficiencies hinder effective advanced care planning and the development of end of life management plans, resulting in confusion and potentially inappropriate treatment modalities.

"Most but not all [have end of life plans in place] and plans can be very muddy." [4]

"Mixed plans on occasions (NFR but for RR calls)." [4]

Only 58% of units have formal escalation plans for deteriorating patients.[4] These are not consistently adhered to and have resulted in failure to detect and escalate a change in patient's condition, and undertake a timely clinical review of deteriorating patients.

Escalation processes are described as:

"An assumed process." [4]

"The anaesthetist on call will come to the unit however they cannot be involved until the VMO asks for a consult (which doesn't happen unless I push them to do it for the patient safety)." [4]

Medical and nursing clinical handover processes are variable and described as:

"Done poorly or in ad-hoc way." [4]

"If handover occurs, it isn't always effective, evidenced by no Medical Registrar visit until paged to do so." [4]

3. Lack of standardised clinical practice

Significant variation exists in the type and delivery of clinical processes, level of adherence to established policy procedure and use of quality and safety methodologies. Many units do not comply with the 2002 NSW Guide to the Role Delineation of Health Services recommendations.[1]

Role delineation

Survey data revealed variation in mechanical ventilation practice, with 30% of Level 4 ICUs believing they could keep ventilated patients indefinitely.[4] Tracheostomy and/or ventilation >=96 hours is within the top three ADRG codes for two sites.[7] This practice is not consistent with practice guidelines for ICUs with a Level 4 role delineation.

"As long as there is communication with level 5/6 unit, we can go on indefinitely." [4]

"Could go longer if staffing is adequate and medical staff were specialists." [4]

"Ventilate only until retrieval service collects patient." [4]

Policy and procedures

Admission and discharge processes are inconsistent. Non-adherence to policy and procedure related to clinical handover, documentation of patient care, central vascular access device (CVAD) management and medication prescribing processes is common.[8] In addition, patient transfer pathways to referral hospitals may be influenced by:

"Medical officer affiliation." [4]

"Personal differences between doctors." [4]

"Collegial arrangements." [4]

Quality and safety processes

Quality and safety processes lack uniformity. A number of units identified there is not a consistent approach to the collection of quality indicators, review of morbidity and mortality (M&M) and clinical incident data or formal feedback mechanisms.

A minority of units contribute to the Australian New Zealand Intensive Care (ANZICS) CORE registry. This is partly due to the fact it is resource intensive, not mandated and perceived to be relevant only to higher acuity patients. As a consequence, there is paucity of data on risk adjusted outcomes for patients admitted to these units.

4. Transfers and Retrievals

Processes for patient transfer and retrieval to higher level care are not standardised. Areas identified for improvement include access to senior clinical critical care advice, timely recognition of the need to transfer, appropriate selection of patients and standardised methods to request the transfer of a critically ill patient.

Access to senior clinical advice

Units may not have 24-hour access to senior clinical critical care advice, with only half of units having in place formalised network arrangements to provide this support.[4]

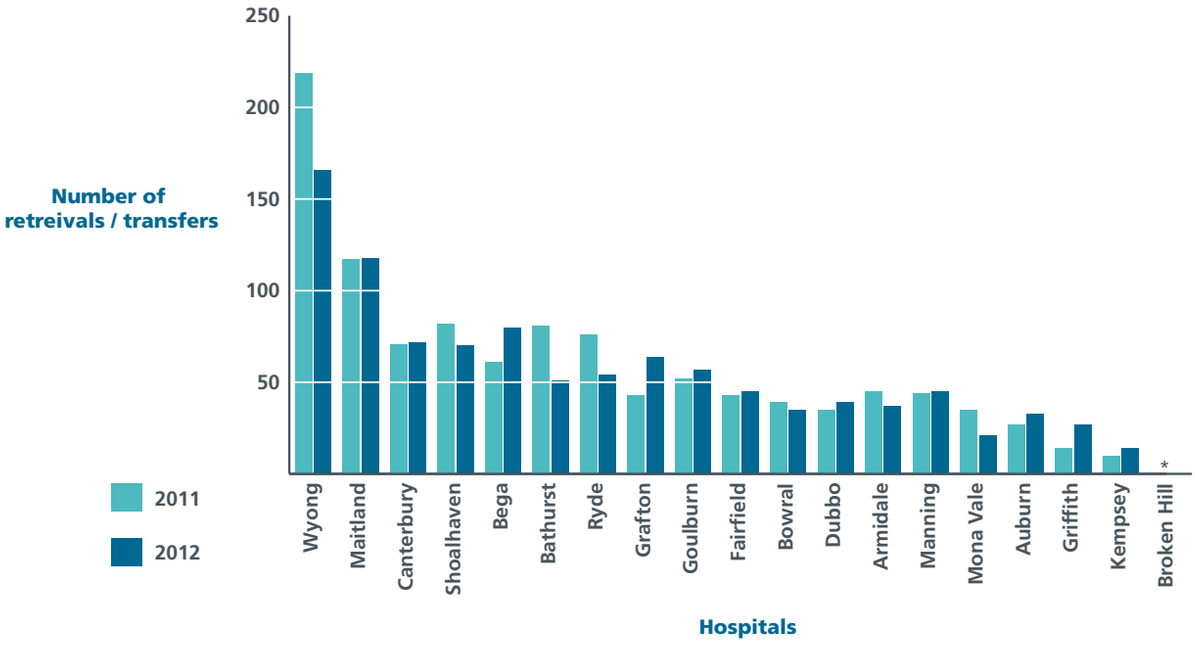
Appropriate retrievals and transfers

Timing is important for successful patient retrieval and transfer. Transfer may be unnecessary if undertaken too soon and ineffective if left too late. Review of retrieval data, suggested that a number of transfers did not improve patient outcomes. There were many examples where patients were transferred to a higher level ICU for management of end of life care.[8]

Processes to arrange transfer are inconsistent and may involve multiple telephone calls to secure a bed. This is resource intensive and warrants further investigation, given that 20% of patients are transferred to another hospital upon discharge.[7]

Appropriate governance and leadership with access to senior clinical critical care advice, can avoid unnecessary retrieval service consultations and dispatch of retrieval teams. This has potential to improve patient outcomes and experience, and more efficient utilisation of valuable retrieval resources. The cost of retrieval depends on the mode and distance. The geographical location of some units, mandates that retrievals are undertaken by helicopter or fixed wing. According to available aeromedical retrieval service (AMRS) data, between 2011 and 2012, 2,122 patients required escalation of care and transfer to higher level centres[9] (Graph 3). The cost per retrieval ranges from approximately $3,000 – $30,000 per retrieval.[13]

Graph 3: Retrieval/ transfers out by hospital 2011-12



* Data not available for Broken Hill

Source: NSW Health. Aeromedical Retrieval Data 2011-2012[7]

In 2011–2013, 32 patients were not transported because onsite review by the retrieval team deemed transfer in appropriate.[7]

Section 5

Intensive Care Service Model: NSW Level 4 Adult Intensive Care Units

Intensive care services are a precious and costly resource and admissions to Intensive Care Units are expected to continue to rise. There is significant variation in how these units are configured and deliver services. This variation stems from ambiguity around the role and function of NSW Level 3 and 4 ICUs and gaps in governance and leadership.

Best practice clinical service models require a governance structure with designated leadership roles responsible for oversight of patient care and supervision of inexperienced clinical staff.[11,12] The NSW Intensive Care Service Model recommends Level 4 Intensive Care Units[3] operate under a closed collaborative model, with coordination of individual patient care the responsibility of the intensivist or designated specialist, with support and input of the admitting consultant and team. Closed models "provide continuity and clarify admission and discharge processes."[4] It has been demonstrated that closed Intensive Care Units, staffed and led by intensivists, are associated with lower hospital and ICU mortality, decreased length of stay and improved patient outcomes[5], particularly for care delivered to critically ill patients[10].

The importance of medical and nursing governance is acknowledged in the Garling Report of Enquiry (2008)[14], the College of Intensive Care Medicine *Minimum Standards for ICU* (2011)[2] and the Australian College of Critical Care Nurses (ACCCN) *Staffing Position Statement on Intensive Care Nursing Staffing* (2003) recommendations.[15]

An intensivist/designated specialist in a gatekeeper role, has the mix of clinical skills and experience to be able to liaise with patients and their families, develop management plans for the critically ill patient, including treatment limitations, coordinate collaborative input by in-patient teams, and confer with networked higher level intensive care units. The NUM is also fundamental in leading, supervising, directing and co-ordinating patient care[17].

It is recommended, the current standalone unit focus be replaced by a networked intensive care service model, to ensure timely access to senior clinical critical care advice and a shared responsibility for intensive care service delivery for a LHD or region. Networked links between hospitals and services facilitates a reduction in inappropriate referrals, and streamlining referral processes[18] and is supported by NSW Ministry of Health Policy Directive 2010_021[19].

Mechanisms that promote formal network linkages between lower and higher level ICUs should be established, within the same LHD or region. Well-developed networks enable 24 hour access to senior clinical critical care advice, to assist in decision making, care planning and management of critically ill patients. This will result in better patient care and more efficient use of resources. Timely access to senior clinical critical care advice will also facilitate the appropriate identification of patients requiring transfer to a higher level of care. In addition, where appropriate, treatment limitations can be made earlier, enabling quality end of life care to be provided close to where patients and families live.

The premise underpinning this work, is that where appropriate and feasible, NSW residents should have access to intensive care services close to where they live.

Implementation of the NSW Intensive Care Service Model has the potential to optimise utilisation of LHD intensive care resources. The successful implementation of networked models at two sites in the Northern Sydney and Central Coast LHDs, has demonstrated improvements in patient outcomes and service provision.

1. Central Coast Intensive Care Service Model

Following redevelopment of Wyong Hospital in early 2009, a Level 3 Intensive Care Unit with six operational high dependency beds was established. Initially four beds were opened within the Gosford ICU to facilitate staff training and education, develop network linkages and standardised processes and practices across the Central Coast Intensive Care Service. In late 2009, these beds were transferred to Wyong Hospital and an additional two beds opened, making a total of 6 beds.

Establishment of the Wyong Model involved:

- development of Central Coast Intensive Care Service, incorporating clinical governance processes
- coordinated delivery of Central Coast Intensive Care Service(including a Level 5 Intensive Care Unit at Gosford and a Level 3 Intensive Care at Wyong)
- provision of onsite intensive care specialist in hours Monday to Friday, with after-hours intensive care specialist telephone support
- provision of 24 hour designated onsite medical officer
- establishment of daily ward rounds, documented management and escalation plans in the event of clinical deterioration
- standardised policies, procedures and guidelines
- formal medical and nursing orientation
- establishment of a nursing network, professional and accreditation pathways and education programs
- networked service planning, review of quality and safety activities including IIMS review and morbidity and mortality meetings.
- contribute to Australian New Zealand Intensive Care(ANZICS) CORE registry.

Establishment of this model has increased Wyong Hospital service capabilities, to provide higher acuity care to patients and undertake more complex procedures and surgery at Wyong site. It has also led to a reduction in admissions and retrievals from Wyong to Gosford Intensive Care, increasing intensive care capacity in the higher level unit. In the first year of implementation, there was a 50% reduction in retrievals from Wyong to Gosford Intensive Care. In addition, the model has enabled the reverse flow of patients not requiring a higher level of care from the Level 5 ICU at Gosford, to the Level 3 ICU at Wyong.[61]

Analysis of Standardised Mortality Rates (SMR) observed a high proportion of Wyong ICU admissions have a treatment limitation order. The unit admits a high number of patients for COPD and bacterial pneumonia, which are both associated with an increased incidence of treatment of limitation orders across the admitted patient data set. Patients requiring end of life care were able to receive treatment closer to where they lived.

2. Northern Sydney Intensive Care Service Model

The Northern Sydney; Ryde and Northern Beaches Model was implemented in January 2010, with established processes for governance and access to senior specialist management and advice, which involved:

- development of clinical governance processes
- formal daily multidisciplinary ward round by onsite Intensivist, with after-hours intensive care specialist telephone support
- daily clinical review, documented management and escalation plans in the event of clinical deterioration
- review of critically ill patients in the Emergency Department and wards and the facilitation of appropriate and timely retrieval when appropriate
- structured orientation and education programs for clinical staff
- established quality activities including IIMS review and multidisciplinary morbidity and mortality meetings.

A six month evaluation of the model demonstrated a reduction in unplanned admissions from the ward and the Emergency Department. Other improvements included a significant reduction in the numbers of patient transferred to other hospitals for higher level of care, and an improvement in the average length of stay (ALOS). Improved IIMS reporting was noted as was positive feedback from staff. All improvements have led to substantial cost savings.[62]

Section 6

Implementation of the Intensive Care Service Model

The Intensive Care Service Model provides recommended standards for the safe and efficient delivery of care in Level 4 Intensive Care Units, to improve care of the critically ill patient. The standards incorporate core principles of best practice service models and align with the CEC In Safe Hands[11] functions.

These include:

1. Governance and leadership.
2. Care planning, coordination and delivery.
3. Standard protocols and procedures.
4. Patient safety and experience, quality systems and data.
5. Education, training and supervision
6. Workforce management.
7. Equipment.

Implementation of the Intensive Care Service Model will support safe and efficient delivery of intensive care services, and compliance with various national quality and professional standards, NSW Ministry of Health policies/guidelines and other programs designed to improve the delivery of care to patients.

It is intended that this document will assist Level 3 and 4 Intensive Care Units to:

1. Undertake a structured self-assessment process, to identify gaps between the recommended standards and current practice.
2. Determine locally, which Level 3 and 4 ICU's are in scope for the proposed Service Model. For those units in scope, facilitate review of the self-assessment findings and undertake further analysis of practice as required to better understand local issues and prioritise (e.g. IIMS, retrieval and service activity data, patient and staff surveys, complaints).
3. Identify and develop solutions for gaps and service deficiencies including:
    - assess the magnitude of the solutions (including what is in and out of scope)
    - assessment of resources required (if any)
    - timeframe required to fully implement the Service Model
    - potential risks/challenges to implement and how these may be managed.
4. Develop an implementation plan.
5. Implement sustainable change through:
    - evaluation
    - ongoing monitoring of service delivery under the new service model, through the regular collection of Level 4 Intensive Care Clinical Indicators (Appendix 3), sharing achievements, innovations and new processes with key stakeholders.

Section 7

Recommended Standards for NSW Level 4 Adult Intensive Care Services (ICS) – at a glance

1. Leadership and governance

1.1	LHD/Region Intensive Care Services have a network arrangement in place between Level 4 and 5/6 ICU, which includes a nominated Director for the LHD Intensive Care Service/Stream and clearly defined roles for the Intensive Care Directors at each unit.
1.2	Designated Intensive Care Director and Nurse Unit Manager with overall responsibility for leadership and governance of the ICS, at the facility level.

2. Care planning, coordination & delivery

2.1	Arrangements in place where primary responsibility for patient management is provided by the intensivist or designated specialist, in collaboration with the inpatient teams.
2.2	Designated onsite medical officer rostered with primary responsibility for the provision of Intensive Care Services, 24 hours per day.
2.3	Minimum, daily individual management plans and clinical review by the intensivist/designated specialist for all admitted patients.
2.4	Minimum, daily combined medical/nursing ward rounds, which include multidisciplinary team members as available.
2.5	Minimum twice weekly formal multidisciplinary ward rounds.
2.6	Medical, nursing and allied health clinical handover is carried out using a standardised process that is documented at each transfer of care.
2.7	Formal process to support regular communication within the network between the Level 4 and 5/6, ICU to discuss the flow of patients requiring intensive care within the LHD/Region, including the appropriate location of at risk patients.
2.8	Documented medical/nursing/allied ICU discharge summary completed and discussed with the receiving medical/ nursing/allied teams for all patients transferred from intensive care to the ward.
2.9	Formalised process for admission and transfer of patients. After hours (6pm–8am) discharges are minimised.
2.10	Admission process to include identification and documentation of the name and contact details for the patient's substitute decision maker.

	3. Standard protocols and procedures
3.1	Formal LHD/Region Intensive Care Network agreements based on negotiated referral patterns, outlining functional linkages between the Level 4 and 5/6 ICUs.
3.2	Clearly documented escalation plan for management and upgrade of care, that is supported and endorsed by the LHD Executive.
3.3	Guidelines and procedures standardised across the LHD Intensive Care Service Network as appropriate to reduce clinical variation.
3.4	Process for the update of guidelines and procedures based on the best available evidence, with input from multidisciplinary team members.
3.5	Telehealth solutions where appropriate to support clinical decision making across networked hospitals.
	4. Patient safety & experience, quality outcomes & data
4.1	Regular local multidisciplinary Morbidity and Mortality (M&M) meetings and combined intensive care network meetings, consider quarterly.
4.2	Results of audit and incident reporting fed back to the multidisciplinary team, at minuted meetings minimum monthly.
4.3	Antimicrobial stewardship in line with the CEC Quality Use of Antimicrobials in Healthcare.
4.4	Undertake patient/carer & staff experience activities at a minimum annually.
4.5	Collection of a minimum data set, including the Level 4 Intensive Care Clinical Indicators for all Intensive Care Service patients.
4.6	Risk register developed and maintained in relation to the service model.
	5. Education, training & clinical supervision
5.1	Structured orientation and education programs available to medical and nursing staff, supported by the LHD Executive.
5.2	Medical staff responsible for the Intensive Care Service, work within a defined scope of practice, with clinical supervision requirements clearly documented and communicated.

6. Workforce management & support services

6.1	Medical officers with current credentialed airway and vascular access skills immediately available within the hospital 24 hours a day, to the Intensive Care Unit.
6.2	Nursing staff profile based on the Intensive Care Service bed base, and the patient severity of illness. Additional services provided outside the ICU to be considered.
6.3	Senior nurse in charge nurse with the appropriate skills, experience and qualifications for the clinical environment, when the NUM is not on duty.
6.4	AIM for 50% of nursing staff within the ICU to hold post graduate qualifications for the clinical environment or significant experience in critical care (optimally 75%).
6.5	Access to onsite Clinical Nurse Educator and access to an ICU Clinical Nurse Consultant.
6.6	Access to allied health clinicians including clinical pharmacist, physiotherapist, dietitian, social worker and speech pathologist.
6.7	Access to clerical and support services including data manager, biomedical engineer, information technology, wards person and cleaners.

7. Equipment

7.1	Intensive Care Services meet accepted national standards.
7.2	Essential equipment is available in the unit, and a Replacement, Maintenance and Repair (RMR) register is utilised.

Section 8

Appendices

Appendix 1

Recommended Standards for NSW Level 4 Adult Intensive Care Services (ICS) – in detail

	1. Leadership and governance
1.1	**LHD/Region Intensive Care Services have a network arrangement in place between Level 4 and 5/6 ICU, which includes a nominated Director for the LHD Intensive Care Service/Stream and clearly defined roles for the Intensive Care Directors at each Unit.**
	Supporting information and evidence • Local Intensive Care Services are networked to facilitate patient care delivery, quality and safety monitoring, and intensive care service planning across the LHD Intensive Care Service Network/Stream • Director for the LHD Intensive Care Service/Stream responsible for cross facility aspects of ICU service delivery • Consideration of co-joint appointments of senior specialist staff across the LHD Intensive Care Network, to support the rotation of specialist through the networked units to strengthen linkages, collaboration and familiarity • Executive sponsorship must be gained to support this commitment • References: [3, 18] • Aligns with in safe hands function 1[11]
1.2	**Designated Intensive Care Director and Nursing Unit Manager with overall responsibility for leadership and governance of the ICS, at the facility level.**
	Supporting information and evidence **Medical** • It is recommended that the Intensive Care Director is a Fellow of the College of Intensive Care Medicine (CICM) or other registered specialist with training and experience appropriate to the practice of intensive care medicine. The Intensive Care Director is fully committed to the role, maintaining a regular presence in the Intensive Care Unit • Role and responsibilities should include: ○ consultancy and clinical presence in the ICU (facilitating clinical rounds and handover, clinical expertise, oversight with admission/discharge of patients) ○ leadership (both locally and as part of the broader LHD network), including maintenance and promotion of functional linkages ○ quality and safety processes and initiatives (audit, incident management, guideline development and best practice, complaints) ○ education and training ○ overseeing the medical staff supervision process ○ research (participation and support) ○ medical workforce management and budget ○ involvement with information technology (IT) and data collection processes ○ other administration duties.

1.2 cont.	**Nursing**
	• It is recommended that the Nursing Unit Manager overseeing the Intensive Care, has the appropriate skills, experience and qualifications for the clinical environment
	• Role and responsibilities should include:
	  ○ clinical leadership and supervision of patients and staff
	  ○ input into broader aspects of networked Intensive Care Services, including the promotion and maintenance of functional linkages
	  ○ nursing staff management (staff appraisal, rostering, implementation of new practices, leadership, professional development)
	  ○ unit management (resource utilisation, information dissemination, safety and quality, compliance with standards, equipment)
	  ○ coordination of patient services provided by the facility Intensive Care Service (liaison with the multidisciplinary team, monitoring patient discharge and transport e.g. Rapid Response Team (RRT).
	• References: [2, 3, 14, 15, 16, 19, 20]
	• Aligns with in safe hands function 1[11]

2. Care planning, coordination & delivery

2.1	**Arrangements in place with primary responsibility for patient management provided by the intensivist or designated specialist, in collaboration with the inpatient teams.**

	Supporting information and evidence
	• Units function under a closed collaborative model, led by an intensivist or designated specialist, who has primary responsibility for patient management, with support and input of the inpatient teams
	• Intensivist or designated specialist on site Monday to Friday
	• After hour access to senior clinical critical care advise either through:
	  ○ on call intensivist/designated specialist, or
	  ○ networked intensive care consultant to provide phone advice.
	• The networked Intensive Care Units may share governance and decision making as required
	• There is evidence that closed Intensive Care Units staffed and led by intensivists, have lower hospital and ICU mortality and a decreased length of stay
	• References: [2, 4, 5]
	• Aligns with in safe hands function 3[11]

2.2	**Designated onsite medical officer rostered with primary responsibility for the provision of Intensive Care Services, 24 hours per day.**
	Supporting information and evidence • The designated onsite medical officer's primary role is to oversee the ICU, but may also take part in rapid response calls and assisting other services if ICU activity permits. This designated medical officer will have an important role in supporting inpatient critically ill patients • The designated onsite medical officer has access after-hours to an on call intensivist/designated specialist locally or by way of access to critical care phone advice from a networked intensive care consultant, to manage complex clinical situations as required • The designated onsite medical officer has access to retrieval services for potential transfers required • References: [2, 3] • Aligns with in safe hands function 3[11]
2.3	**Minimum, daily individual management plans and clinical review by the intensivist/designated specialist for all admitted patients.**
	Supporting information and evidence • An intensivist/designated specialist may be specialised in the areas of intensive care, emergency and anaesthesia • The intensivist/ designated specialist is required to be experienced in the area of intensive care and locally credentialed as outlined in recommended standards 5.2 & 6.1 • An intensive care consultant from the networked hospital may provide advice using telehealth solutions to supporting daily rounds • References: [21, 22] • Aligns with in safe hands function 3[11]
2.4	**Minimum, daily combined medical/nursing ward rounds, which include multidisciplinary team members as available.**
	Supporting information and evidence • Daily ward rounds undertaken by the intensive care team, documented in the patient record, and are approved by the supervising doctor within a specified timeframe • Referral processes to allied health as required • Consider the use of telehealth solutions to facilitate the inclusion of offsite multidisciplinary team members in the ward round • Relevant care bundles and/or checklists utilised to ensure the quality and safety of care delivered to patients, for example FASTHUG • References: [14, 22, 23] • Aligns with in safe hands function 3[11]

2.5	**Minimum twice weekly formal multidisciplinary ward rounds.**
	Supporting information and evidence • Evidence supports that a team approach to treatment (e.g. multidisciplinary ward rounds) produces the best results for patients • Consider the use of telehealth solutions to facilitate the inclusion of offsite multidisciplinary team members in the ward round • References: [14, 21, 22] • Aligns with in safe hands function 3[11]
2.6	**Medical, nursing and allied health clinical handover is carried out using a standardised process that is documented at each transfer of care.**

	Supporting information and evidence
	• Policy PD2009_060 describes the elements that need to be included in handover, as well as tools such as ISBAR to assist. Clinical handover occurs under various circumstances, for example:
	  ○ escalation of the deteriorating patient
	  ○ shift to shift change over
	  ○ patients admitted from another clinical area
	  ○ patient transfers to another ward
	  ○ patient transfers for a test or appointment
	  ○ patient transfers to another hospital
	  ○ multidisciplinary team handover
	  ○ patient transfers to, from and within the community.
	• References: (14) (24) (25)
	• Aligns with in safe hands function 3[11]

2.7	**Formal process to support regular communication within the network between the Level 4 and 5/6 ICU, to discuss the flow of patients requiring Intensive Care within the LHD/Region, including the appropriate location of at risk patients.**
	Supporting information and evidence • Level 4 intensivist/designated specialist communicates with the networked intensive care consultant at a minimum daily • Utilise telehealth or telephone as solutions to facilitate communication • A formal communication process is outlined within the Intensive Care Service networked agreement, including clear roles and responsibilities of each unit and the process to provide after hour clinical critical care advice • References: [22, 24] • Aligns with in safe hands function 3[11]
2.8	**Documented medical/nursing/allied ICU discharge summary completed and discussed with the receiving medical/ nursing/allied teams for all patients transferred from intensive care to the ward.**
	Supporting information and evidence • EMR may be utilised for this purpose if available • References: [24] • Aligns with in safe hands function 3[11]

2.9	**Formalised process for admission and transfer of patients. After hours (6pm–8am) discharge are minimised.**
	Supporting information and evidence • The intensivist/designated specialist in hours acts in a gatekeeper role. After hours the designated medical officer for the ICU takes over this responsibility • All admissions and transfers of ICU patients should occur in consultation with the intensive care team • Processes to establish the identification and acceptance of suitable patients for admission from the emergency department, wards or other facilities should be in place • Processes in-place to support the safe and timely admission to the Intensive Care Unit • When appropriate, after hours discharge from the intensive care should be avoided, as this may be linked to poor patient outcomes • References: [26] • Aligns with in safe hands function 3[11]
2.10	**Admission process to include identification and documentation of the name and contact details for the patient's substitute decision maker.**
	Supporting information and evidence • The patient's substitute decision maker may be an appointed guardian or default person responsible • The process also enquires about and documents any prior plans, treatment limitations or preferences. This may include advance care directives, advance care plans, resuscitation plans, or instructions to an appointed guardian • Units have in place a process for engaging with patients and families and other clinicians to decide how any prior plans or preferences should guide current treatment options. There should be a clear process for documenting the outcomes of these deliberations using the NSW Health Resuscitation Plan templates • References: [25, 27, 28] • Aligns with in safe hands function 3 and 4[11]

3. Standard protocols and procedures

3.1	**Formal LHD/Region Intensive Care Network agreements based on negotiated referral patterns, outlining functional linkages between the Level 4 and 5/6 ICUs.**
	Supporting information and evidence • LHD Intensive Care Networks have been identified as success factor for facilitating a reduction in inappropriate referrals and streamlining of referral processes. Functionally linked units support the critical care needs of the LHD as a service, rather than as separate entities • Some shared functions may include: governance, medical workforce, educational resources, M&M, business meetings, strategic/operational planning, standardised procedures/guidelines and equipment, telehealth processes • References: [17, 18] • Aligns with in safe hands function 4[11]
3.2	**Clearly documented escalation plan for management and upgrade of care, that is supported and endorsed by the LHD Executive.**

	Supporting information and evidence
	• Formalised intra-LHD and inter-LHD referral arrangements must exist for critically ill patients needing higher level of care
	• Referral and support processes should be transparent and effectively communicated to all staff to ensure timely access by the patient to definitive care
	• The overall responsibility for the above lies with the LHD Director of Clinical Operations
	• Aeromedical retrieval processes will be followed for critically ill patients requiring transfer
	• Patient transfer and escalation beyond a facility must be part of a local clinical emergency response system. This should include:
	  ○ outline of escalation steps to obtain expert advice and request for transfer
	  ○ the roles and responsibilities of the transferring and accepting facility
	  ○ process and procedures for 24 hour contact of the higher level networked Unit and process for transfer to another facility.
	• References: [18, 25, 29]
	• Aligns with in safe hands function 4[11]

3.3	**Arrangements in place with primary responsibility for patient management provided by the intensivist or designated specialist, in collaboration with the inpatient teams.**
	Supporting information and evidence • Guidelines should be supported by the best available evidence • Standardisation of most aspects of intensive care medicine has an enormous potential to improve patient care and outcome, reduce ICU and hospital length of stay, as well as healthcare expenditures • To include a process to support organ and tissue donation, including monitoring requirements • References: [25, 30, 31] • Aligns with in safe hands function 4[11]
3.4	**Process for the update of guidelines and procedures based on the best available evidence, with input from multidisciplinary team members.**
	Supporting information and evidence • Guidelines should be supported by the best available evidence, agreed and documented • References: [25] • Aligns with in safe hands function 4[11]

3.5	**Telehealth solutions where appropriate to support clinical decisions making across networked hospitals.**
	Supporting information and evidence • Telehealth is an example of a technological model that accelerates clinical problem solving and decision-making, resulting in faster critical care delivery and improvement in patient outcomes • Consider the use of telehealth solutions to facilitate the inclusion of offsite multidisciplinary team members in the daily ward round and weekly multidisciplinary rounds within the ICU • References: [22] • Aligns with in safe hands function 4 and 10 [11]

4. Patient safety & experience, quality outcomes & data

4.1	**Regular local multidisciplinary Morbidity and Mortality (M&M) meetings and combined Intensive Care Network multidisciplinary meetings: consider quarterly.**

	Supporting information and evidence
	• Local M&M meetings are recommended to occur at least monthly. Smaller departments however may consider meetings quarterly
	• M&M meetings ideally include all deaths in ICU as well as adverse events
	• Consider the use of telehealth solutions to support M&M meetings across the Intensive Care Service Network
	• A process for review to include the following elements:
	  ○ case identification
	  ○ case preparation and review
	  ○ case analysis
	  ○ case discussion
	  ○ case classification (severity, preventability)
	  ○ case closure and follow up (recommendations and actions should be minuted).
	• References: [14, 20, 32, 33]
	• Aligns with in safe hands function 5[11]

4.2	**Results of audit and incident reporting fed back to the multidisciplinary team, at minuted meetings minimum monthly.**
	Supporting information and evidence • Results should be further disseminated via all appropriate communication channels • Audit and feedback can be effective in improving professional practice • Timely feedback on incidents when delivered via effective communication channels promotes a safety culture • Effective feedback involves timely corrective actions that improve systems, as well as dissemination to frontline staff • All staff need to participate in the review of performance procedures either individually, or as part of a team • References: [25, 34, 35] • Aligns with in safe hands function 5[11]
4.3	**Antimicrobial stewardship in line with the CEC Quality Use of Antimicrobials in Healthcare.**
	Supporting information and evidence • Various models to assist small to medium sized hospitals in antimicrobial stewardship have been proposed such as, integration of restriction policies with a larger facility and approval via expert external advice • References: [25, 36] • Aligns with in safe hands function 5[11]

4.4	**Undertake patient/carer & staff experience activities at a minimum annually.**

	Supporting information and evidence
	• The specific activity(s) selected should align with other unit quality improvement activities, to obtain feedback and develop strategies to improve the experience of patients/carers and staff
	• Patient/carer and staff feedback activities can be used individually or as a multimodal approach and include:
	  ○ rounding
	  ○ focus groups
	  ○ surveys (paper & electronic including Patient Experience Trackers). Target response rate is a minimum of 30% for surveys, however all survey results should be contextualised to reflect the sample size captured.
	• Strategies to improve the patient/carer and staff experience may include:
	  ○ patient/carer stories or videos
	  ○ co-design.
	• Data collected from these systems are used to improve the LHD Intensive Care Service
	• References: [25, 35, 37]
	• Aligns with in safe hands function 5[11]

4.5	**Collection of a minimum data set, including the Level 4 Intensive Care Clinical Indicators for all Intensive Care Service patients.**
	Supporting information and evidence • The annual ANZICS Critical Care Resource Survey (CCR) captures data on physical resources such as the number and types of beds, admissions, beddays, ventilation, readmissions and other resource indicators; estimates of medical and nursing staffing levels; and collects data on various aspects relating to safety and quality in critical care units. It is recommended that all Intensive Care Units participate in the annual CCR survey • The Level 4 Intensive Care Clinical Indicators have been developed specifically by the ACI: Intensive Care Service Network Performance Working Group as part of the service model (Appendix 3) • References: [23, 26, 38, 39] • Aligns with in safe hands function 5[11]
4.6	**Risk register developed and maintained in relation to the Service Model.**
	Supporting information and evidence • A register will ensure that actions are taken to minimise risks to patient safety and quality of care • The register should be regularly updated and acted upon by the networked Intensive Care Service. If major risks are identified by this process, these should be escalated according to LHD guidelines • References: [25, 40] • Aligns with in safe hands function 5[11]

5. Education, training & clinical supervision

5.1	**Structured orientation and education programs available to medical and nursing staff, supported by the LHD Executive.**
	Supporting information and evidence • Structured orientation program is available, with adequate supernumerary time allocated as part of orientation • Shared education, resources and workshops should be encouraged across the network • Rotation of staff to the networked hospital may be useful to build capacity and maintain skills • Consider the use of telehealth solutions to support educational programs across the network • Competency based training and assessment of the clinical workforce is undertaken to improve patient safety • Training in the management of paediatric emergencies should remain concentrated to emergency department staff, at facilities with Level 4 ICUs. The emergency staff provide care to this patient cohort on a frequent basis • Consider intensive care specialist training to be undertaken across the network, with trainees rotating within the network to meet training requirements • Consideration to utilise the NSW Transition to Specialty Practice Intensive Care Program, for new staff transitioning into intensive care • Access to postgraduate nursing critical care tertiary education programs • References: [25, 41, 42, 43] • Aligns with in safe hands function 7[11]
5.2	**Medical staff responsible for the Intensive Care Service, work within a defined scope of practice, with clinical supervision requirements clearly documented and communicated.**
	Supporting information and evidence • All medical staff should be provided with a clear job description, outlining what they are permitted to do before seeking advice. This includes outlining the limits of procedural work and matters regarding autonomous investigative and clinical management decision making • Medical staff to have required skills and knowledge assessed through a standardised process and documented. Assessment to be ongoing so that delegation can be increased commensurate with skill and expertise • Clinical supervision of medical officers must be made explicit to staff working in this area and include avenues for escalation to more skilled and experienced clinicians when required • Formal clinical supervision process to be followed: documentation of what each staff member can do under direct supervision, indirect supervision with oversight and what are the processes by which they increase delegations • References: [14, 25] • Aligns with in safe hands function 7[11]

6. Workforce management & support services

6.1	**Medical officers with current credentialed airway and vascular access skills immediately available within the hospital 24 hours a day, to the Intensive Care Unit.**

	Supporting information and evidence
	• Minimum skill set developed via consensus process by the ACI Intensive Care Service Network: Model of Care Working Group
	• Minimum skills required:
	  ○ bag mask ventilation
	  ○ use of adjunct devices
	  ○ laryngeal mask insertion
	  ○ endotracheal intubation
	  ○ emergency surgical airway
	  ○ intravascular catheter placement (large bore) and intra osseous insertion
	  ○ central venous access device insertion (PICC and CVL)
	  ○ arterial line insertion.
	• Aligns with in safe hands function 8[11]

6.2	**Nursing staff profile based on the Intensive Care Service bed base and the patient severity of illness. Additional services provided outside the ICU to be considered.**
	Supporting information and evidence • Nurse to patient ratio is determined by a patient's severity of illness • Further consideration to be given to staffing additional services outside the ICU • References: [2, 15, 44, 45] • Aligns with in safe hands function 8[11]
6.3	**Senior nurse in charge nurse with the appropriate skills, experience and qualifications for the clinical environment, when the NUM is not duty.**

	Supporting information and evidence
	• Role required to:
	  ○ oversee the coordination and management of the multidisciplinary team and the delivery of care within the Intensive Care Service, including, management of patients, staff and resources
	  ○ provide leadership and supervision to Nursing staff and support other staff
	  ○ oversee the coordination of external services provided by the Intensive Care Service for example Rapid Response Service, Liaison Service.
	• **For consideration by facilities:** An escalation plan should be in place to manage unexpected peaks in activity or changes to the acuity of patients and workload external to the unit (e.g. Rapid Response)
	• References: [2, 15, 44]
	• Aligns with in safe hands function 8[11]

6.4	**AIM for 50% of nursing staff within the ICU to hold post graduate qualifications for the clinical environment or significant experience in critical care (optimally 75%).**
	Supporting information and evidence • Specialist trained critical care nurses are fundamental in the provision of quality care to patients and their families • Units require an appropriate skill balance within the nursing workforce to support ongoing management of the critically ill patient • References: [2, 15, 41] • Aligns with in safe hands function 8[11]

6.5	**Access to onsite Clinical Nurse Educator, and access to an ICU Clinical Nurse Consultant.**

Supporting information and evidence

- The Clinical Nurse Educator is required to deliver and evaluate clinical programs at the ward/unit level and performs the following functions at that level:
  - delivers competent nursing education in the ward/unit
  - contributes to the development of colleagues
  - supports less experienced staff and acts as preceptor for new staff
  - acts as the preceptor in orientations to the ward/unit
  - provides day to day clinical education support in the ward/unit
  - provides one on one informal education
  - provides support for skill development in clinical procedures
  - provides support for professional development
  - provides support for clinical policy development
  - provides a ward/unit based in-service program.
- The role of Clinical Nurse Consultant is to develop and oversee unit/service specific educational resources and programs, support clinical leadership and promote evidence based practice through the development/review of policy/procedures and clinical practice guidelines
- Consider the use of telehealth solutions to support the delivery of education programs across the networked Intensive Care Service
- References: [1, 2, 15, 25]
- Aligns with in safe hands function 8[11]

6.6	**Access to allied health clinicians, including clinical pharmacist, physiotherapist, dietitian, social worker and speech pathologist.**

Supporting information and evidence

- Allied health professionals play important roles in ICU with regards to patient care and family welfare
- Access to after hours allied clinicians may be required for certain clinical situations
- Consider the use of telehealth solutions to support the access to allied health clinicians

Pharmacist

- Clinical pharmacy provides a vital role in medication reconciliation, assessment of current medication management, rationalising medication therapy, antimicrobial stewardship, therapeutic drug monitoring, attendance of ward rounds to provide clinical decision support
- Critically ill patients often require complex medication regimes and are vulnerable to medication adverse effects and errors. Clinical pharmacists have been shown to reduce medication errors, improve patient outcomes by optimising and individualising medication therapy, and manage costs
- Intensive Care Services require clinical pharmacist staffing levels that are higher than general wards
- Aim for a dedicated intensive care clinical pharmacist. If not available, access to an intensive care pharmacist may occur external to the service, but within the Network/LHD
- References: [1, 2, 3, 14, 44, 46, 47]

Physiotherapist

- Physiotherapy provides early physical therapy and mobilisation of patients, which has been shown to have significant impact on the functional outcomes of critically ill patients
- This also contributes to preventing complications and has potential to reduce ICU and hospital length of stay
- An exclusively allocated physiotherapist providing evidence based care, has been shown to decrease intubation and re-intubation rates in a surgical ICU
- References: [2, 44, 45, 48, 49]

Dietitian

- Dietetics plays a vital role in guiding decisions about the delivery of nutrition support and recommending the use of enteral and parenteral products. Timely nutrition therapy may decrease morbidity and mortality rates in critically ill patients
- Access to a dietitian has been linked with early introduction of feeding and improvement in early energy balance
- References: [2, 21, 44, 45, 50]

6.6 cont.	**Social work** • Social work provide psychosocial support and counselling to patients, their carer's and staff • Social work play a pivotal role supporting families, when conflict is an issue, during end of life discussions, and are often involved in case management planning • References: [2, 44, 45] **Speech Pathologist** • Speech pathologists provide assessment and management of patients presenting with swallowing and/or communication disorders in critical care settings including post extubation • Speech pathologists facilitate and can provide a system for communication to maximise a patient's ability to communicate • Speech pathologists are an integral member of the multidisciplinary team for patients with a tracheostomy providing assessment and management of swallowing and /or communication and provide input into tracheotomy weaning plans • References: [1, 2, 3, 14, 51, 52] • Aligns with in safe hands function 8[11]
6.7	**Access to clerical and support services including data manager, biomedical engineer, information technology, wards person and cleaners**
	Supporting information and evidence • Sufficient non-clinical staff must be provided to carry out non clinical support duties • Health staff skills and experience should be used to care for patients **Data Manager** • The data manager's role is to support the collection, management, analysis and reporting of Intensive Care Service data within a LHD **Bio Medical Engineering** • Biomedical engineering services provide expert technician support, to ensure that medical equipment is functional, maintained and supplied to clinical areas **Clerical** • Clerical staff support clinicians within a department/unit through providing administrative support services **Ward Person** • The wards-person plays a pivotal role in supporting health professionals in the delivery of patient care **Cleaners** • Provide effective cleaning services to clinical and non-clinical areas, in accordance with infection control policies and procedures in order to provide a high standard of cleanliness, hygiene and safety for patients, clients, staff and visitors • References: [2, 14, 15] • Aligns with in safe hands function 9[11]

7. Equipment

7.1	**Intensive Care Services meet accepted national standards.**
	Supporting information and evidence • Units should meet National Safety and Quality Health Service Standards as outlined by the Australian Commission on Safety and Quality in Healthcare • Units should meet minimum standards as outlined in the College of Intensive Care Medicine 'Minimum Standards for Intensive Care Units' • New builds should comply with the Australasian Health Facility Guidelines • References: [2, 25, 53] • Aligns with in safe hands function 4[11]
7.2	**Essential equipment is available in the Unit, and a Replacement, Maintenance and Repair (RMR) register is utilised.**
	Supporting information and evidence • The type, size and function of the Unit will define the type of equipment required • References: [11, 2] • Aligns with in safe hands function 9[11]

Appendix 2

Intensive Care Service Model Self-Assessment Tool

Purpose

This self-assessment is designed to accompany the Intensive Care Services Model. It is intended the self-assessment tool be utilised by Level 3 and 4 Intensive Care Units, as described in the NSW Health Guide to the Role Delineation of Health Services (2002) to:

- identify gaps between the recommended standards and current practice.
- determine which 3 and 4 ICUs are in scope for the proposed Service Model.

If any safety implications are identified through this process, it is suggested that the individual hospital document issues in the form of a risk register, and escalate to local facility management or Local Health District Executive.

Hospital *(Please tick)*	
☐ Auburn	☐ Grafton
☐ Armidale	☐ Griffith
☐ Dubbo	☐ Kempsey
☐ Bathurst	☐ Maitland
☐ Bega	☐ Manning
☐ Bowral	☐ Mona Vale
☐ Broken Hill	☐ Ryde
☐ Fairfield	☐ Shoalhaven
☐ Canterbury	☐ Wyong
☐ Goulburn	

Name:	
Designation:	
Date Completed:	

Functions and Recommended Standards

FUNCTION 1: Leadership and Governance	
1.1 LHD/Region Intensive Care Services have a network arrangement in place between Level 4 and 5/6 ICU, which includes a nominated Director for the LHD Intensive Care Service/Stream and clearly defined roles for the Intensive Care Directors at each unit.	Is there a formal Intensive Care Service network arrangement between your Unit and your linked Level 5 or 6 Unit? ☐ Yes ☐ No Is there a Director for the LHD Intensive Care Service/ Stream? ☐ Yes ☐ No Are there clearly defined roles for the Intensive Care Directors at each Unit? ☐ Yes ☐ No
1.2 Designated Intensive Care Director and Nurse Unit Manager with overall responsibility for leadership and governance of the ICS at the facility level.	Is there a designated Medical Director for your ICU? ☐ Yes ☐ No Is the designated Medical Director a Fellow of CICM? ☐ Yes ☐ No Is there a NUM allocated to your ICU? ☐ Yes ☐ No Does the NUM oversee any other clinical areas? ☐ Yes ☐ No
FUNCTION 2: Care Planning, Coordination & Delivery	
2.1 Arrangements in place where primary responsibility for patient management is provided by the intensivist or designated specialist, in collaboration with the inpatient teams.	Does your Unit function under a closed model? ☐ Yes ☐ No Does the primary responsibility for patient management in your Unit lie with the intensive care team, rather than the inpatient team? ☐ Yes ☐ No Do you have an intensivist/designated specialist in hours Monday-Friday? ☐ Yes ☐ No Does the ICU have after hour access to senior critical care advise either through: • On-call intensivist/designated specialist • Networked intensive care consultant to provide phone advice? ☐ Yes ☐ No

2.2 Designated onsite medical officer rostered with primary responsibility for the provision of Intensive Care Services, 24 hours per day.	Do you have a medical officer onsite primarily responsible for the Intensive Care Service 24 hours per day? ☐ Yes ☐ No
2.3 Minimum, daily individual management plans and clinical review by the intensivist or designated specialist.	Do all patients have management plans documented daily by the intensivist or designated specialist? ☐ Yes ☐ No
2.4 Minimum, daily combined medical/nursing ward rounds, which include multidisciplinary team members as available.	Are combined medical/nursing ward rounds carried out daily? ☐ Yes ☐ No
2.5 Minimum twice weekly formal multidisciplinary ward rounds.	Do multidisciplinary ward rounds occur at least twice weekly? ☐ Yes ☐ No
2.6 Nursing, medical and allied health clinical handover is a standardised process that is documented at every transfer of care.	Handover is documented at every transfer of care? Allied Health ☐ Yes ☐ No Medical ☐ Yes ☐ No Nursing ☐ Yes ☐ No Is handover carried out using a standardised process at every transfer of care? Allied Health ☐ Yes ☐ No Medical ☐ Yes ☐ No Nursing ☐ Yes ☐ No
2.7 Formal process to support regular communication within the network between the Level 4 and 5/6 ICU, to discuss the flow of patients requiring intensive care, within the LHD/Region, including the appropriate location of at risk patients.	Is there a formalised process to support regular communication between the Level 4 Intensive Care Unit and the networked higher level Unit? ☐ Yes ☐ No
2.8 Documented medical/nursing/allied ICU discharge summary completed and discussed with the receiving medical/nursing/allied teams for all patients transferred from intensive care to the ward.	Is a nursing discharge summary completed when patients are discharged from ICU to the ward? ☐ Yes ☐ No Is a medical discharge summary completed when patients are discharged from ICU to the ward? ☐ Yes ☐ No Is an allied discharge summary completed when patients are discharged from ICU to the ward? ☐ Yes ☐ No
2.9 Formalised process for the admission and transfer of patients. After hours (6pm -8am) discharges are minimised.	Is there a formalised process in your Unit for admission and transfer of patients? ☐ Yes ☐ No

2.10 Admission process to include identification and documentation of the name and contact details for the patient's substitute decision maker.	Is there an admission process in your Unit that for documentation of the name and contact details of the patients substitute decision maker? ☐ Yes ☐ No
FUNCTION 3: Standardised Protocols & Procedures	
3.1 Formal LHD/Region Intensive Care Network agreements based on negotiated referral patterns, outlining functional linkages between the Level 4 and 5/6 ICUs.	Is there a formal agreement between your unit and the networked referral hospital outlining functional linkages? ☐ Yes ☐ No
3.2 Clearly documented escalation plan for management and upgrade of care, that is supported and endorsed by the LHD Executive.	Does your Unit have a written escalation plan for upgrade of care that is signed off at executive level? ☐ Yes ☐ No
3.3 Guidelines and procedures are standardised across the LHD Intensive Care Network as appropriate to reduce clinical variation.	Are guidelines and procedures standardised across the LHD Intensive Care Network? ☐ Yes ☐ No
3.4 Process for the update of guidelines and procedures based on the best available evidence, with input from multidisciplinary team members.	Are guidelines updated using the best available evidence? ☐ Yes ☐ No
3.5 Telehealth solutions where appropriate to support clinical decisions making across networked hospitals.	Is telehealth utilised by your Unit where appropriate? ☐ Yes ☐ No
FUNCTION 4: Patient Safety & Experience, Quality Systems & Data	
4.1 Regular local multidisciplinary Morbidity and Mortality (M&M) meetings and combined multidisciplinary meetings held with the networked hospital: consider quarterly.	Does your Unit run regular Morbidity and Mortality meetings? ☐ Yes ☐ No Does your Unit run combined multidisciplinary meetings with the networked hospital? ☐ Yes ☐ No If so how often? ☐ Annually ☐ 6 Monthly ☐ Quarterly
4.2 Results of audit and incident reporting fed back to the multidisciplinary team, at minuted meetings minimum monthly.	Are the results of incident and audit reports fed back to staff? ☐ Yes ☐ No
4.3 Antimicrobial stewardship in line with the CEC Quality Use of Antimicrobials in Healthcare.	Does your Unit take part in antibiotic stewardship? ☐ Yes ☐ No

4.4 Undertake patient/carer & staff experience activities at a minimum annually.	Are patient/carer experience surveys performed annually in your Unit? Patient/carer ☐ Yes ☐ No Staff ☐ Yes ☐ No
4.5 Collection of a minimum data set, including the Level 4 Intensive Care Clinical Indicators for all Intensive Care Service patients.	Does your Unit collect a minimum data set? (eg CCR Survey) ☐ Yes ☐ No Does your Unit collect ACHS clinical indicators? ☐ Yes ☐ No
4.6 Risk register developed in relation to the service model.	Does your Unit have a risk register that can be used in relation to the service model? ☐ Yes ☐ No
FUNCTION 5: Education, Training and Clinical Supervision	
5.1 Structured orientation and education programs available to medical and nursing staff, supported by the LHD Executive.	Does your Unit have a structured orientation program? Nursing ☐ Yes ☐ No Medicine ☐ Yes ☐ No Is supernumerary time allocated to staff as part of orientation? ☐ Yes ☐ No Does your Unit have a structured education program? Nursing ☐ Yes ☐ No Medicine ☐ Yes ☐ No
5.2 Medical staff responsible for the Intensive Care Service work within a defined scope of practice, with clinical supervision requirements clearly documented and communicated.	Are medical staff responsible for your Unit credentialed within a defined scope of practice? ☐ Yes ☐ No Are clinical supervision requirements clearly documented? ☐ Yes ☐ No Are clinical supervision requirements clearly communicated? ☐ Yes ☐ No

FUNCTION 6: Workforce Management & Support Services	
6.1 Medical officers with current credentialed airway and vascular access skills immediately available within the hospital 24 hours a day, to the Intensive Care Unit.	Do you have a medical officer onsite 24 hours per day immediately available to ICU, with current credentialed airway skills? ☐ Yes ☐ No Do you have a medical officer onsite 24 hours per day, immediately available to ICU, with current vascular access skills? ☐ Yes ☐ No
6.2 Nursing staff profile based on on the Intensive Care Service bed base and the patient severity of illness. Additional services provided outside the ICU to be considered	Is the nursing profile of your Unit based on funded bed base? ☐ Yes ☐ No Is patient severity of illness used to determine the required nursing staff per shift? ☐ Yes ☐ No Does your Unit provide additional services outside the ICU? ☐ Yes ☐ No Do these services have funded nursing positions above the ICU Nursing FTE? ☐ Yes ☐ No
6.3 Senior nurse in charge nurse with the appropriate skills, experience and qualifications for the clinical environment, when the NUM is not on duty.	Do all senior nurses in charge have post graduate qualifications in critical care? ☐ Yes ☐ No Is a senior nurse in charge with post graduate critical care qualifications rostered on when the NUM is not on duty? ☐ Yes ☐ No Is the senior nurse in charge role supernumery? ☐ Yes ☐ No
6.4 Aim for 50% post graduate qualification for the clinical environment or significant experience in critical care (optimally 75%).	Do 50% of nursing staff have post graduate qualifications in critical care? ☐ Yes ☐ No Do nursing staff without post graduate qualifications have extensive experience in critical care ≥ 5 years? ☐ Yes ☐ No
6.5 Access to onsite Clinical Nurse Educator (CNE), and access to an ICU Clinical Nurse Consultant (CNC).	Do you have access to an onsite CNE? ☐ Yes ☐ No Do you have access to an ICU CNC? ☐ Yes ☐ No

6.6 Access to allied health clinicians, including clinical pharmacist, physiotherapist, dietitian, social worker and speech pathologist.	Do you have access to: Clinical pharmacist ☐ Yes ☐ No Physiotherapy ☐ Yes ☐ No Dietitian ☐ Yes ☐ No Social work ☐ Yes ☐ No Speech pathologist ☐ Yes ☐ No
6.7 Access to clerical and support services such as biomedical engineering, wards person, cleaners and information technology(IT).	Do you have access to: Data manager ☐ Yes ☐ No Biomedical engineer ☐ Yes ☐ No Clerical support ☐ Yes ☐ No Wards person ☐ Yes ☐ No Cleaner ☐ Yes ☐ No IT ☐ Yes ☐ No

FUNCTION 7: Equipment	
7.1 Intensive Care Services meet accepted national standards	Does your Unit meet National Safety and Quality Health Service Standards? ☐ Yes ☐ No Does your Unit meet the CICM minimum standards for Intensive Care Units? ☐ Yes ☐ No Does your Unit meet ACCCN nursing staffing standards? ☐ Yes ☐ No
7.2 Essential equipment is available in the Unit, and a Replacement, Maintenance and Repair (RMR) register is utilised.	Do you have access to essential equipment in your Unit? ☐ Yes ☐ No Do you have an RMR register? ☐ Yes ☐ No
Identified gaps	
Comments	

Appendix 3

NSW Level 4 Adult Intensive Care Service Clinical Indicators

Indicator	Description	Unit Level Measure	Statewide Measure	Standard
Governance	Designated Medical Director and Nursing Unit Manager.	Numerator: number of days per year for each is available. Denominator: 365 days per year.	Number (%) of Units that have Medical Director and Nursing Unit Manager (target is 100%).	1.2
Patient care plan & clinical review	All patients have at a minimum, daily individual management plans and clinical review by a critical care consultant.	Numerator: number of patients with a documented care plan on the day of audit. Denominator: total number of applicable patients in the ICU (exclude patients temporarily out of the unit or ready for discharge) on the day of audit.	Number (%) of Units with documented care plans (target is 100%), reviewed quarterly (using monthly compliance audit data).	2.3
Ward rounds	Daily medical and nursing ward rounds.	Numerator: number of days with completed medical and nursing ward rounds. Denominator: 365 days per year.	Number (%) of Units with daily rounds completed (target is 100%), reviewed quarterly (using monthly compliance audit data).	2.4
Multidisciplinary rounds	Multidisciplinary ward rounds 2 x week.	Numerator: number of weeks with two completed multidisciplinary ward rounds. Denominator: 52 weeks per year.	Number (%) of Units with 2x weekly multidisciplinary rounds completed (target is 100%), reviewed quarterly (using monthly compliance audit data).	2.5
Clinical handover	Standardised clinical handover processes for all disciplines for transfer of care points.	Does your Unit have standardised clinical handover processes in place with compliance reviewed monthly? Specify the type of process/tools utilised.	Number (%) of Units that have at least one care bundle/checklist in place and evaluate compliance on a monthly basis(e.g. Handover tool). Collate list of handover processes/tools utilised in NSW ICUs.	2.6 2.7
Processes of care	Relevant care bundles and/or checklists are to be utilised to ensure the quality and safety of care delivered to patients. Examples include Central Venous Catheter (CVC) insertion and maintenance, FASTHUG (or similar), clinical handover. Units can select bundles/checklist that suit their needs, based on patient characteristics and service delivery model.	Does your Unit have at least one care bundle/checklist in place with compliance reviewed monthly? Specify the type of bundle/checklist and/or the care component(s) covered.	Number (%) of Units that have at least one care bundle/checklist in place and evaluate compliance on a monthly basis. Collate list of care bundles/checklists utilised in NSW ICUs.	2.6 4.2
Transfer of care	All patients transferred from ICU to the ward should have a medical and nursing discharge summary documented and discussed with the receiving medical officer/nurse.	Numerator: number of patients transferred to the ward with completed medical discharge summary (including whether it was discussed with the receiving medical officer). Denominator: number of patients transferred from ICU to the ward.	Number (%) of Units with discharge summary completed at target rate (target is 100%), reviewed quarterly (using monthly compliance audit data).	2.8
Nocturnal discharge	The aim is to encourage and support local improvement to reduce night time intensive care discharges.	Numerator: discharges between 18.01hrs and 05.59hrs. Denominator: all live Unit discharges.	Rate of night discharges for each Unit reviewed quarterly.	2.9
Advanced care planning	Each Unit has an admission process that includes identifying and documenting the name and contact details of the patient's substitute decision maker.	Numerator: admissions with documentation of substitute decision maker. Denominator: all admissions.	Number (%) of Units with documentation completed at target rate (target is 100%), reviewed quarterly (using monthly compliance audit data).	2.10
Morbidity & Mortality meetings	Units should discuss in an open forum significant critical incidents and the care of all patients who die in the ICU.	Numerator: number of ICU deaths and critical incidents (SAC 1 & 2) discussed at M&M meetings. Denominator: total number of deaths and critical incidents.	Number (%) of Units where: 1) all ICU deaths are discussed and minuted 2) all critical incidents (SAC 1 & 2) discussed and minuted	4.1
Audit/incident reporting	Units should discuss in an open forum all clinical practice audits and incident report.	Number of minuted meetings where the results of clinical practice audits and incidents are discussed. Monitor the number of clinical incidents by SAC code.	Number (%) of Units where: 1) all clinical practice audits are discussed and minuted 2) all clinical incidents are discussed and minuted	4.2

Patient/carer/staff experience	Units should undertake patient/carer & staff experience activities on at least an annual basis. Activity(s) selected should align with other unit specific quality improvement projects in progress. Patient/carer experience based activities can be used individually or using a multi-modal approach and include: • rounding • focus groups • surveys (paper & electronic including patient experience trackers) • target response rate is a minimum of 30% for surveys, however all survey results should be contextualised to reflect the sample size captured.	Data collected should be contextualised appropriately, based on the tool used and the volume of responses received. *Example 1: Two patient stories collected over a three week period; the themes that arose from these stories include coordination of care, communication and education.* *Example 2: Patient survey undertaken over two week period about their experience of care, for which X number of patients responded. Themes that can be identified from these surveys include involvement of family and friends in care decisions and patient education.*	Experience based activity completed. Unit based application of information obtained.	4.4
Infection surveillance	Units have an appropriate infection surveillance system in place to report the incidence of multi-resistant organisms (MRO), on a monthly basis to unit staff and NSW Health.	Documented evidence of surveillance systems and recent data submission to NSW Health via the Healthcare Associated Infection (HAI) database.	Number (%) of Units with documented evidence of surveillance systems, recent data submission to NSW Health, compliance with screening audit in the last quarter.	4.3
Utilisation of unit assessment system	Respond to the annual ANZICS Critical Care Resource Survey (CCRS). This aligns with ACHS reporting requirements.	Has the Unit responded to the most recent ANZICS CORE CCR survey? Note: responses need to be carefully considered, supported by local data and as complete as possible.	Number (%) of Units that responded to the ANZICS CCR survey.	4.5
ICU physical activity	Physical occupancy is a percentage of available bed hours that was occupied by a patient. Should be measured monthly. Occupancy levels should not exceed 80%, around 70-75% is considered optimal. Note: Units with less than 5 beds may need to operate at even lower occupancy levels due to issues of capacity and proximity to other facilities.	Numerator: total number of patient bed hours during the reporting period. Denominator: total number of available bed hours (excluding closed beds) during the reporting period. Numerator: total number of patient bed hours by patient type during the reporting period. Denominator: total number of patient bed hours during the reporting period.	Monthly Unit occupancy levels (total and by patient type) to be reviewed quarterly.	4.5
Orientation/education programs	All medical and nursing staff to attend formal intensive care service orientation program. Medical staff have a clearly defined scope of practice.	Numerator: no. of staff that have completed formal intensive care service orientation. Denominator: Total number of staff in the intensive care service.	Total (%) of intensive care staff across NSW completed orientation. Number (%) of Units have a formal orientation program in place.	5.1 5.2
Medical workforce	There is a designated onsite medical officer whose primary responsibility is for the provision of intensive care services, 24 hours per day.	Numerator: number of days per year there is a rostered medical officer with primary responsibility for the ICS, 24 hours per day. Denominator: 365 days per year.	Number (%) of Units that have continuous onsite medical support (target is 100%).	2.2 6.1
Nursing workforce	At least 50% (optimally 75%) post graduate qualified in critical care.	Numerator: number of rostered nurses with post-graduate qualifications in critical care. Denominator: total number of rostered nurses during the reporting period.	Percentage of critical care nurses with post-graduate qualifications (per ICS) reported annually.	6.4
Allied health workforce	Access to allied health staff: clinical pharmacist, dietician, physiotherapy and social work.	Numerator: number of days per year each allied discipline is available. Denominator: 365 days per year.	Number (%) of Units that have allied support (target is 100%).	6.6
Support staff	Access to support staff: data manager, biomedical engineering, ward person, cleaners, IT	Numerator: number of days per year for each support service category available. Denominator: 365 days per year.	Number (%) of Units that have support service (target is 100%).	6.7
Equipment	Required equipment to provide level of service is available.	Does your unit have an RMR Register?	Number (%) of Units that have an RMR Register (target is 100%).	7.1 7.2

Appendix 4

Methodology

A number of diagnostic processes were undertaken to identify themes and areas of variation, within current Level 3 and 4 Intensive Care Service Models. These included the analysis of current models through the model of care survey, review of current literature, clinical incidents (IIMS) and retrieval data, and an utilisations and cost analysis. Additionally, stakeholder consultations supported further examination of the themes and supported the development of recommendations for safe, evidence based practice in Intensive Care Services.

Survey[4]

In October 2013, an Intensive Care model of care survey was distributed to all Level 3 and 4 Units. The survey incorporated numerous aspects of health service delivery including unit configuration, leadership, referral processes and quality and safety practices. 17 of the 19 sites contributed. An online survey monkey tool was utilised to collect the data, and survey responses mapped against the Clinical Excellence Commission's In Safe Hands 10 Functions 2013.[11] The Model of Care Survey was mapped against these functions to allow a systematic review of the results, under an established framework.

Literature review[12]

ZEST Health Strategies were engaged to undertake a literature review to provide an overview of recent and relevant evidence to support discussions around the development of a Service Model for Level 3 and Level 4 ICUs[1]. A two-phase approach, consisting of a gap analysis and evidence scan, was undertaken guided questions focusing on:

- current service delivery models
- models that have shown to improve patient outcomes
- emerging approaches
- future directions in intensive care medicine and models that demonstrate integrated services between hospitals/networks.

A full methodology is available in the evidence scan document.[12]

Utilisation and cost analysis[7]

The ACI Health Economics and Evaluation Team (HEET) undertook an utilisation and cost analyses to support the case for change. The HEET team provided aggregate data and analyses of 'high-level' service utilisation associated with providing inpatient treatment for people with an admission to a Level 3 and 4 ICU/HDU in NSW public hospitals. The patient cohort included all public patients with hours in ICU or admitted to HDU who were admitted to and treated in the above level hospitals in 2006/07 to 2013/14.[7]

Incident Information Management System data (IIMS)[8]

The Clinical Excellence Commission provided 1031 de-identified clinical incidents from Level 3 & 4 Units in NSW (2012-14) via the Incident Information Management System (IIMS), to the ACI Intensive Care Coordination and Monitoring Unit. A thematic analysis was undertaken by two reviewers, identifying key areas for improvement to inform the service model.

Aeromedical Retrieval data[9]

Available Aeromedical Retrieval data for NSW Level 3 and 4 ICUs (2011-2013 inclusive) was examined to consider the number of 'transfers out' and other emerging themes.

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Section 10

Footnotes

63 This figure is indicative – further work is being undertaken to update ICU costs to take into account changes in funding and variables.

64 Poisoning/Toxic effects of drugs and other substances.

65 As it is not possible to separate out HDU costs data is presented for the entire hospitalisations that involved a stay in an level 3 or 4 ICU.