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**Title page:** A critical care pandemic staffing framework in Australia

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### **Submission declaration and verification**

The authors attest that this work has not been published previously, that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder.

**Author agreement statement** – Andrea P Marshall, on behalf of all authors, declares that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us. We understand that the Corresponding Author, Professor Marshall, is the sole contact for the Editorial process. She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs.

### **CRedit authorship contribution statement**

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript. Furthermore, each author certifies that this material or similar material has not been and will not be submitted to or published in any other publication before its appearance in *Australian Critical Care*. Specific contributions are as follows:

AP Marshall: Conceptualisation, Data curation, Formal analysis, Methodology, Project administration, Resources, Writing – original draft, Writing – review and editing.

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## **Abstract**

**Background:** Pandemics and the large-scale outbreak of infectious disease can significantly impact morbidity and mortality worldwide. The impact on intensive care resources can be significant and often require modification of service delivery, a key element which includes rapid expansion of the critical care workforce. Pandemics are also unpredictable which necessitates rapid decision-making and action which, in the lack of experience and guidance, may be extremely challenging. Recognition of the potential strain on intensive care units, particularly on staffing, a Working Group was formed for the purpose of developing recommendations to support decision making during rapid service expansion.

**Methods:** The Critical Care Pandemic Staffing Working Party (n=21) representing nursing, allied health and medical disciplines, has used a modified consensus approach to provide recommendations to inform multidisciplinary workforce capacity expansion planning in critical care.

**Results:** A total of 60 recommendations have been proposed which reflect general recommendations as well as those specific to maintaining the critical care workforce, expanding the critical care workforce, rostering and allocation of the critical care workforce, nurse-specific recommendations for staffing the ICU, education support and training during ICU surge situations, workforce support, models of care, and de-escalation.

**Conclusion:** These recommendations are provided with the intent that they be used to guide interdisciplinary decision-making and we suggest that careful consideration is given to the local context to determine which recommendations are most appropriate to implement and how they are prioritised. Ongoing evaluation of recommendation implementation and impact will be necessary, particularly in rapidly changing clinical contexts.

## **Manuscript**

### **Background**

Pandemics and the large-scale outbreak of infectious disease can significantly impact morbidity and mortality worldwide with potential to stress intensive care resources<sup>1</sup> and necessitate change to how services are usually delivered. Previous pandemics, such as H1N1, provide evidence for the need to plan well for increased nursing, allied health, medical and ancillary staff.<sup>2, 3</sup> Nevertheless, planning can be challenging owing to the unpredictable and uncertain nature of pandemics<sup>4</sup> and inability to quickly access skilled staff.

We know from experience of respiratory pandemics that pneumonia is a common complication which contributes to the development of critical illness through rapid clinical deterioration.<sup>5</sup> The impact on intensive care unit (ICU) resource can be significant, overwhelming and unpredictable. With large increases in the number of critically ill patients requiring respiratory support through invasive or non-invasive mechanical ventilation, there will be a concomitant increase in the requirements for nursing, allied health and medical staff with specific expertise in the management of critical illness. Nevertheless, adequate staffing with appropriately trained clinicians who are able to support a surge of critically ill patients can be a major challenge.<sup>6</sup> This is especially evident in the COVID-19 pandemic where it has been projected that during maximal surge in Australia, an additional 42 720 registered nursing staff (365% above baseline staffing) and 4092 senior medical staff (345% above baseline staffing) may be required.<sup>7</sup> Increases in allied health staffing requirements would also occur, commensurate with service expansion and change in patient profiles.

Australian federal and state governments' early implementation of travel restrictions and physical distancing measures were initially successful in controlling COVID-19 case numbers;<sup>8</sup> however, in the first week of July 2020, nearly 1000 new cases of COVID-19 were identified in Victoria, almost half of which may indicate community transmission.<sup>9</sup> While these increases in the rates of transmission are low compared with elsewhere in the world,<sup>10</sup> the potential for intensive care services to become overwhelmed exists and would require major adjustments in service design and delivery, potentially over a sustained period.<sup>11, 12</sup>

The purpose of this article is to provide recommendations to inform planning for expansion of multidisciplinary workforce capacity in critical care. The recommendations are provided with the understanding that they will be carefully considered by multidisciplinary teams who take into account local contextual factors and the level of ICU surge being experienced. Although developed in



the context of the COVID-19 pandemic, these recommendations are applicable to most situations in which ICU requirements exceed available resources. These recommendations provided herein are underpinned by several tenets: 1) that wherever possible, current staffing recommendations be maintained; 2) that these recommendations have been developed specifically for the context of critical care practice in Australia, but may be applicable in other clinical contexts and regions; 3) that critical care clinical practice in Australia has a strong interdisciplinary approach and it is in that spirit that these recommendations have been developed; 4) that intensive care clinical practice is characterised by rapid changes in response to evidence generation and consequently it is anticipated that these recommendations will be regularly reviewed and updated. Updates will be made available on the ACCCN Website ([accn.com.au](http://accn.com.au)).

## **Methods**

An interdisciplinary consultation process was conducted which used a range of methods to engage collaborators who were identified by key nursing, allied health and medical professional bodies, who comprised the Critical Care Pandemic Staffing Working Party (the Working Party). At the time of development, we were unable to secure the full range of allied health representation, and acknowledge the valuable contributions of Social Work, Occupational Therapy and Psychology in patient care during, and following recovery from, critical illness. Representation and a commitment to securing future input from these groups has been made. Recognising the lack of workforce data and research evidence to inform the generation of recommendations, these recommendations are based on both available evidence and expert opinion of a broad interdisciplinary team with experience in both the public and private sectors and expertise in clinical, managerial and research contexts and build on recommendations in other relevant professional documents (Table 1). Collaborators contributed to development and iterative refinement of recommendations and, where necessary, consulted more widely within their professional groups. Over a 4-week period in May-June 2020, collaborators engaged in discipline-specific discussions and wider group consultation through:

- Interactive video conferencing
- Telephone consultation
- Written submissions from individuals and organisations.

Owing to the time-sensitive nature of this exercise, broader consultation was not possible. Working Party members (n=21) initially developed and contributed recommendations (n=77). These

recommendations were reviewed by working party members (n=21) who indicated on a 5-point scale (strongly agree-strongly disagree), their level of agreement with each of the recommendations. A priori, we set the level of agreement to retain a recommendation when  $\geq 75\%$  working party members agreed or strongly agreed with the recommendation. Recommendations were also iteratively reviewed and refined to achieve clarity, avoid duplication, and determine cross-disciplinary relevance.

## **Results**

Responses were received from 15 Working Party members on or before 10 June 2020 (response rate 71%). Working Party members' level of agreement was assessed, and all 77 recommendations met the retention criteria of 75%. However, some duplication was noted and recommendations with a similar focus were grouped, resulting in 54 recommendations; an additional six new recommendations were proposed, and consensus reached for their inclusion, with 60 recommendations included overall. All 60 of the final recommendations met the retention where  $\geq 75\%$  working party members agreed or strongly agreed with the recommendation. The majority of recommendations were considered to be broadly applicable across all health professions and were grouped into nine concepts. These included service-level recommendations, maintaining the critical care workforce, expanding the critical care workforce, rostering and allocation of the critical care workforce, nurse-specific recommendations for staffing the ICU, education support and training during ICU surge situations, workforce support, models of care, and de-escalation. Specific recommendations for medical practitioners have not been added here, and are available within the ANZICS Covid-19 Guidelines (version 2),<sup>15</sup> the Minimum Standards for Intensive Care Units,<sup>16</sup> and the Statement on Managing Senior Medical Workforce in the Intensive Care during the COVID-19 Pandemic.<sup>17</sup> Within the recommendations, critical care nurses refer to registered nurses with experience working in ICU who ideally would also have a postgraduate critical care qualification. Allied health professionals are inclusive of, but not limited to, clinical dietitians, clinical pharmacists, physiotherapists, social workers, and speech pathologists.

### **Service-level recommendations**

*These general recommendations, and the more specific recommendations which follow, are provided with the intent that they be used to guide interdisciplinary decision-making and that careful consideration is given to the local context to determine which recommendations are most appropriate to implement and how they are prioritised. Ongoing evaluation of recommendation implementation and impact will be necessary, especially in rapidly changing clinical contexts.*

1. The recommendations outlined in this framework should be considered in conjunction with local, state and federal emergency response requirements and any recommendations in ICU and discipline specific guidelines to specific pandemics (see Table 1), which should be monitored frequently for updates.
2. Intensive care services should work collaboratively with hospital-wide services when planning and developing strategies to prepare the broader health service for impact associated with increased ICU admissions.
3. Not all recommendations outlined in this document will be universally relevant. When making workforce-related decisions to accommodate anticipated ICU surge capacity the local context should always be considered, and multidisciplinary consultation undertaken which examines the potential risk(s) and benefit(s) of each recommendation (ACCCN Workforce Standard 1).<sup>13</sup>
4. When making any changes to staffing, relevant industrial awards will need to be considered.
5. Health services should consider how they might accommodate redeployment of their critical care nursing and allied health professionals to intra or interstate 'hot spots'.
6. Supporting the workforce in surge ICUs or ICUs in regional areas could be assisted using new or existing telehealth strategies.

### **Maintaining the critical care workforce**

*These recommendations are made based on the understanding that experienced critical care clinicians who are familiar with their environment will be more confident, adaptable and able to safely accommodate necessary changes in work practice, including the supervision and support of an expanded critical care workforce, all which contribute to the delivery of safe patient care.*

7. Discuss with staff any potential impact they might experience which could influence their ability to attend work. For example, travel restrictions may prevent existing staff from returning to work, or newly appointed staff from travelling to the workplace. Existing employees on temporary work visas may need to have visas extended for further work, for example, if they are unable to return home.
8. Review existing and future leave allocations to ensure planned leave is maintained wherever possible in order to support workforce sustainability. With reference to specific industrial awards, any decisions to change existing and future approved leave should be undertaken in conjunction with the employee and local human resources teams. Such

decisions should take into consideration ICU surge predictions and staffing capacity, the anticipated duration of the pandemic, and need for a sustainable workforce.

9. Where possible, increase the full-time equivalent of part-time staff, ensure all vacancies are filled, revise temporary contracts and negotiate capacity of casual and agency staff to commit to regular shifts during surge periods.
10. When planning staffing, consideration should be given for the likely increase in personal, sick or carer's leave, and the potential for some staff to be quarantined. Additional strategies to maintain the workforce, such as support with childcare, should be considered.
11. Workforce planning should take into consideration the need to accommodate and support vulnerable staff, for example, by looking after non-infectious critically ill patients who are segregated in a separate clinical area, being deployed to another clinical area or temporary deployment to a non-clinical role. Recognising that the degree of vulnerability may vary, such decisions should be made in collaboration with the staff member who should seek independent health advice.

#### **Expanding the critical care workforce**

*It is recognised that ICU capacity expansion may be required through employing a number of strategies to increase staff who are able to deliver care to critically ill patients or to support care delivery and logistics in the ICU. Each strategy will have unique benefits and potential risks, the latter which should be identified and regularly monitored to optimise patient safety.*

12. Expanding the critical care workforce may be achieved through deployment of existing staff with critical care experience from non-critical care to critical care areas. Currently employed health professionals with transferrable skills (e.g. those who work in other acute clinical areas who have experience managing patients who require advanced clinical management of complex patients and who are competent in airway management and respiratory support) should be considered for cross-skilling to work in ICU. Within health services, early identification of these staff with critical care experience would be helpful, keeping in mind that deployment to the ICU will need to be mutually agreeable.<sup>15</sup>
13. Health professionals without critical care knowledge and skills could be deployed to support delivery of patient care in the ICU under the supervision of a critical care nurse or allied health professional with critical care experience.
14. Strategies to encourage, support and fast-track health professionals with critical care experience to re-enter the ICU workforce should be implemented. For example, the use of

flexible education approaches, collaborative organisation-wide workforce planning, and streamlined human resource processes.

15. Health professionals without critical care experience who re-enter the hospital workforce could be used to support lower-acuity patients in the hospital, freeing up staff with acute care experience to support patient care in the ICU.
16. Health professionals with critical care experience who are employed external to the health service (eg. University partners, private hospitals, industry, armed forces) could be approached to determine their availability to work in either clinical or non-clinical roles.
17. When expanding the ICU workforce, it is essential for the delivery of safe care to determine and communicate to others a clinician's scope of practice. Development of a systematic approach to assessment and/or self-assessment of ICU capability and competence of newly employed or deployed staff may be helpful.
18. Expansion of non-clinical roles, such as those in education, research and leadership, may be required to support staff development, service delivery and data acquisition which are fundamental to the delivery of safe and high-quality clinical care.
19. Where staff are deployed from non-clinical to clinical roles, the impact on work associated with the non-clinical role should be evaluated and strategies implemented to ensure essential aspects of the role are maintained.
20. Specific to the allied health workforce, each ICU should work collaboratively with their allied health departments to review clinical coverage and determine the degree to which expansion and extension of services is required. Opportunities for allied health workforces to support clinical care requirements and the nursing/medical workforce beyond normal responsibilities but within their scope of practice.

### **Rostering and allocation of the critical care workforce**

*We recognise that rostering and allocating the critical care workforce will require careful consideration to minimise risk for staff and patients and to safely achieve optimal patient outcomes. These may assist those responsible for workforce rostering and allocation to make decisions which are in the best interest of patient safety and staff wellbeing.*

21. Clearly communicate the processes by which rostering, and allocation decisions, are made as well as how these will be communicated. The process through which staff are able to have input into these decisions should also be communicated.
22. Where possible, make informed staffing decisions taking into account the knowledge, skills, experience, strengths and limitations of individual staff members. Knowing the strengths

and capabilities of staff will be advantageous when making staffing decisions, specifically when extending ICU services beyond what is currently provided (e.g. other areas of the hospital or temporary field hospitals). Where possible, try to maintain staff in familiar roles to maintain confidence and minimise uncertainty.<sup>13</sup>

23. Careful attention to maintaining a balanced skill mix is necessary when allocating staff to rosters.
24. Consider the shift duration and number of consecutive days worked to minimise fatigue. Any changes to the usual hours worked, whether this be number of days or hours per day, should be jointly made with the employee and employer. The aim should be to maximise rest and recuperation times with a view to maintaining the workforce throughout the pandemic.
25. Consider the duration of time health professionals are in PPE and adjust breaks, shifts, or role allocation to minimise physical effects of wearing PPE. Following the Australian Government *Guidance on the use of personal protective equipment in hospitals during the COVID-19 outbreak* is recommended as it relates to the comfortable use of PPE in the ICU.  
24,25
26. Employ strategies during shifts to minimise staff movement between work areas so that physical distancing and other transmission reduction measures are promoted to reduce the number of staff and patients to which any individual is exposed.
27. Plan rosters and shift duration to take into account prolongation of the shift changeover and breaks owing to the time required to don/doff PPE and debriefing or wellbeing support.

### **Nursing-specific recommendations for staffing the ICU**

*Registered nurses are responsible for care provision and coordination of critically ill patients. The expectation for 1:1 nurse-to-patient ratios for critically ill patients means that specific considerations for nurse staffing is required, which may be impacted during a pandemic.*

28. Where possible, existing nurse-to-patient ratios and ACCESS (Assistance, Coordination, Contingency, Education, Supervision, Support) Nurses as recommended in the ACCCN Workforce Standards for Intensive Care Nursing<sup>13</sup> should be maintained. Decisions on nurse-to-patient ratios should take into consideration patient safety, acuity, visibility, and staffing skill mix. Changes to existing nurse-to-patient ratios should only be considered with maximal surge (Tier 3 and 4 of the ANZICS ICU Pandemic Plan).<sup>15</sup> In Tier 3 or 4, the

nursing leadership team could consider how nurse-to-patient ratios might be maintained with a non-critical care nurse or health professional working under the supervision of a critical care nurse.

29. The ICU patient case mix and unit design (e.g. single rooms) must determine the appropriate nursing service, knowledge and skills required for the nursing workforce and support staffing of each unit. (ACCCN Workforce Standard 1)<sup>13</sup>
30. Any registered nurse who does not have critical care nursing experience should be adequately supported and supervised in the delivery of patient care by a critical care nurse so that patient safety and outcomes are optimised. (ACCCN Workforce Standard 6)<sup>13</sup>
31. Staffing models that incorporate direct patient care provided by a nursing student or health professionals other than a registered nurse should only be implemented in extreme situations (Tier 4 of the ANZICS ICU Pandemic Plan)<sup>15</sup> and should incorporate strategies to ensure effective patient monitoring and review by a critical care nurse.
32. Patient allocation should be done such that there are designated critical care nurses responsible for directing the nursing care of all patients in ICU. Where the critical care nurse is responsible for more than one patient, he/she should work in conjunction with, and supervise the care provided by registered nurses without critical care experience, nursing students or other health professionals who are supporting delivery of patient care. Such a model of care should be underpinned by clear communication strategies and criteria to escalate concerns to the critical care nurses so that patient safety is maximised. (ACCCN Workforce Standard 6)<sup>13</sup>
33. Experienced critical care nurses who routinely undertake collaborative roles such as ICU Liaison, ICU outreach and/or rapid response maybe required to extend their roles to work more independently in the event of medical shortages.

### **Educational support and training during ICU capacity expansion**

*Capacity expansion of the ICU which may occur during a pandemic will require focused and tailored education, support, and training to maintain high-quality and safe patient care and support optimal organisational performance of the ICU. These recommendations are made to assist ICU leaders and educators to ensure existing and new staff are appropriately supported during rapid-learning contexts.*

34. All staff must have access to and appropriate training in the use of personal protective equipment (PPE) and be aware of strategies being implemented in the workplace to minimise exposure.

35. Alongside review of professional qualifications, assessment of capability and competence should incorporate knowledge, skills, abilities and be considered across a range of different contexts and not be solely limited to provision of direct patient care. This assessment should subsequently inform decisions about where additional staff are best placed to support the work of the ICU. Situation-specific education and simulation should be provided for existing and newly recruited staff. For example, in preparation for COVID-19 education of health professionals focused on correct use of PPE and patient management strategies including prone positioning. Existing staff may also need to assume new and unfamiliar roles for which support and education may be required.
37. A wide range of education strategies should be employed to develop theoretical knowledge, skills, and clinical competency and allow for tailoring of education to individual requirements, which can be informed by self-assessment of individual learning needs.
38. Share high-quality, evidence-based, and peer-reviewed education materials and build on existing education frameworks and learning materials available locally or from regional, state and national networks, including the use of learning resources from academic and industry colleagues as well as from commercial education providers.
39. Where possible, theoretical education should be supported by supernumerary work to consolidate learning, allow for skill and competency development and ensure appropriate application of theory to practice. It should be acknowledged that in some instances learning in the workplace without the opportunity for theoretical education or supernumerary support may be required. Strategies to maximise learning during supernumerary shifts should be considered. For example, learning may be increased by ensuring exposure to different types of patients, maximising opportunistic learning, and capitalising on 'just-in-time' learning.
40. When supporting staff to begin or return to work in the ICU, consider that longer periods between upskilling and deployment may require staff to be provided opportunities for regular refreshing of newly acquired practices.

### **Workforce support**

*Rapid capacity expansion that may be required during a pandemic will necessitate support of the critical care workforce at the national, state, regional, and local level. Support will also be required for health services, hospitals, ICUs and specifically for individuals. These recommendations are provided to assist health services, hospitals, ICU leaders and clinicians to consider how organisations, ICUs and individuals might be supported to deliver high-quality and safe patient care.*



41. ICU clinical leads should ensure communication pathways are maintained or established to allow high level, open communication across all professions and staff contributing to ICU patient care. This may include ensuring all professional ICU leads are involved in planning meetings, review and contribute to pandemic plans, and receive key communications and/or updates.
42. Consider the development of mentor-mentee relationships to support clinicians new to the clinical area.
43. Increased demands on the health system and ICU occur in situations where rapid, unpredictable and ongoing change may be required, and this can create challenges for employees. Identify and make available to all staff a range of resources to support wellbeing, including self-care, managing wellbeing and improving the workplace environment. Seek additional funding to support acquisition, development and implementation of such resources, for example, funding to support individual psychological consultations.
44. Assessment of how changes in staffing, roles and models of care might disrupt or strain the existing work dynamic may be beneficial to identify areas where additional support may be required. This may be important for staff deployed from ICU to other areas, which may be required for vulnerable staff. Assessment should include evaluating the transition experience all staff undertaking new roles within the ICU to determine whether additional support is required.
45. Consider the use of formal and informal debriefing which may be offered at regular intervals (or as required) to all staff working in the ICU during the response to a pandemic; flexibility in when and how debriefing sessions are offered will be needed to maximise participation. Staff with debriefing skills should be identified and asked to provide leadership in this area.
46. As the patient load increases, consideration should be given for simultaneous adjustment to support roles to ensure the ability to maintain services such as, but not limited to, administration, support for patient care, environmental services, and supply of equipment, medications, and consumables. (ACCCN Workforce Standard 10)<sup>13</sup>
47. Assess current communication strategies and augment or modify these strategies to accommodate increased frequency of communication to a greater number of staff, ensuring information is able to be easily accessed within or external to the organisation.

48. Streamline communication by providing succinct daily updates to staff which contain key messages specific to the ICU as well as that from the broader the health service and the community.

### **Environmental management**

*In addition to existing infection prevention and control procedures, management of the workspace may be beneficial in promoting adherence to strategies designed to minimise cross contamination.*

49. Review the configuration of shared spaces such as tea rooms, locker areas, and meeting rooms to allow for appropriate physical distancing. For effective implementation, staggered shift start times and breaks might be required.
50. To minimise potential cross-contamination, consider the use and laundering of hospital-supplied uniforms and access to shower facilities in the workplace. Staggered shift finishing times will be required to avoid congestion.

### **Models of care**

*Existing models of care may require modification to support capacity expansion. It is important that any model of care maintains or improves patient safety and delivery of optimal care while also improving efficiencies.*

51. Any proposed changes in models of care should be developed through interdisciplinary collaboration and align with the tiered ICU Pandemic Plan.<sup>15</sup>
52. If implementing a team approach to specific tasks, consideration should be given to ensure team members are able to be flexible and provide support in other areas during periods of reduced workload.
53. Team approaches to specific skills or tasks could be considered if there are anticipated gains in efficiencies of care; one example could be the use of proning teams. Ensuring that members of the team have the requisite knowledge, skills and experience to contribute to the collective development of expertise may result in increases in efficiency, maximisation of patient safety and minimisation of risk to the staff.
54. Reconfiguring existing hospital teams (e.g. medical emergency teams or cardiac arrest teams) may be required to minimise workload for ICU staff.<sup>15</sup> Where ICU expertise is normally provided, this should continue, where possible.

55. Identify models of care delivery that may be implemented to minimise risk and exposure – for example use of telehealth options or other strategies for collecting information / background history which have normally been done face-to-face.
56. Protocolising the process for transferring patients between departments within the hospital may help ensure appropriately qualified staff accompany the patient when outside the ICU.<sup>26</sup>
57. A multidisciplinary team approach to follow up patients recently discharged from ICU should be considered, such as where demand for ICU beds is necessitating earlier than anticipated discharge from ICU. (ACCCN Workforce Standard 8)<sup>13</sup> This may ensure continuity of specific and/or complex cares such as tracheostomy management, ongoing complex respiratory management, continuity of rehabilitation; and may help to recognise deterioration or prevent readmission to the ICU. Follow up of patients discharged to the ward also provides an opportunity for incidental teaching of ward staff.
58. Maintaining a person-centred approach to care delivery, family support and open communication with families is essential. Dedicated support roles such as a family liaison nurse and augmentation of social work support may be helpful strategies to optimise communication with and care of families. Telehealth or online collaboration tools (e.g. Microsoft Teams, Zoom, etc) may be effective strategies to connect with families who are either at a distance or who are unable to visit owing to infection prevention and control measures.

### **De-escalation**

*Decisions to de-escalate from expanded capacity will require careful consideration, particularly where there is potential for fluctuations in capacity which are likely to occur through a pandemic.*

59. Retain a portion of the expanded workforce for a period of time to facilitate the ability of staff to access leave or to reduce hours, allowing for rest and recuperation.
60. As the pandemic eases, identify ways in which staff can be supported through access to leave or reduction in working hours.

### **Limitations**

We recognise the lack of workforce data and research evidence to underpin the development of these recommendations and this underscores the need for strong interdisciplinary health service research that is specific to the delivery of critical care. A limitation of the study was the inability to

gain representation from all allied health professions, for example by inclusion of occupational therapy, clinical psychology and social work. However, the role of these professions should similarly be considered alongside other professions contributing to ICU management. We attempted to mitigate this limitation by introducing strategies to support the development of recommendations, including the incorporation of current professional and evidence-based guidelines which underpinned some of these recommendations. These strategies include the use of a strong interdisciplinary approach to identify and develop consensus for recommendations, through independent voting, to inform intensive care pandemic staffing that is reflective of the way in which care is delivered in Australian ICUs. In developing these recommendations, we actively engaged the relevant nursing, allied health and medical professional organisations and ensured the working party members had broad experience in clinical practice, management, education and research. Representation across the public and private sectors, from metropolitan and regional areas, and from a range of States and Territories was also ensured. Future iterations of this work will be enhanced by broader professional consultation, which is inclusive of consumers.

## **Conclusion**

Pandemics, which are unpredictable, will continue to be a major global health concern. Lessons from past pandemic experiences have helped to inform our preparedness today, and it is important we leverage our learnings from current events to improve future responses. As research and experience continues to inform our understanding of optimal approaches to pandemic management, in particular, how ICUs can respond to sudden requirements for capacity expansion, it will be important to regularly reflect on, review and modify these recommendations.

**Authors' Note:** This document has been reviewed and endorsed by Australian College of Critical Care Nurses, Dietitians Australia, Society of Hospital Pharmacists Australia, and Speech Pathology Australia. The Authors' have made a commitment to regularly reviewing the recommendations; updates will be available on the Australian College of Critical Care Nurses website ([accn.com.au](http://accn.com.au)).

## References

1. Arabi YM, Murthy S, Webb S. COVID-19: a novel coronavirus and a novel challenge for critical care. *Intensive Care Med.* 2020;46(5):833-6.
2. Hasan Z, Narasimhan M. Preparing for the COVID-19 Pandemic: Our Experience in New York. *Chest.* 2020. doi: 10.1016/j.chest.2020.03.027
3. Corley A, Hammond NE, Fraser JF. The experiences of health care workers employed in an Australian intensive care unit during the H1N1 Influenza pandemic of 2009: a phenomenological study. *Int J Nurs Stud.* 2010;47(5):577-85.
4. Hota S, Fried E, Burry L, Stewart TE, Christian MD. Preparing your intensive care unit for the second wave of H1N1 and future surges. *Crit Care Med.* 2010;38(4 Suppl):e110-9.
5. Lagace-Wiens PR, Rubinstein E, Gumel A. Influenza epidemiology--past, present, and future. *Crit Care Med.* 2010;38(4 Suppl):e1-9.
6. Gabriel LE, Webb SA. Preparing ICUs for pandemics. *Curr Opin Crit Care.* 2013;19(5):467-73.
7. Litton E, Bucci T, Chavan S, et al. Surge capacity of intensive care units in case of acute increase in demand caused by COVID-19 in Australia. *Med J Aust.* 2020; 212(10): 463-476. doi: 10.5694/mja2.50596
8. McAnulty JM, Ward K. Suppressing the epidemic in New South Wales. *N Engl J Med.* 2020;382(21):e74.
9. Health and Human Services. Coronavirus update for Victoria - 9 July 2020 Melbourne: Victoria State Government; 2020 [cited 2020 9 July]. Available from: <https://www.dhhs.vic.gov.au/coronavirus-update-victoria-9-july-2020>.
10. World Health Organisation. Coronavirus Disease (COVID-19) pandemic Geneva: World Health Organisation; 2020 [cited 2020 9 July]. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>.
11. Fagioli S, Lorini FL, Remuzzi G, Covid-19 Bergamo Hospital Crisis U. Adaptations and Lessons in the Province of Bergamo. *N Engl J Med.* 2020;382(21):e71.
12. Leshem E, Klein Y, Haviv Y, Berkenstadt H, Pessach IM. Enhancing intensive care capacity: COVID-19 experience from a Tertiary Center in Israel. *Intensive Care Med.* 2020.
13. Australian College of Critical Care Nurses. Workforce standards for intensive care nursing. Melbourne, Vic: ACCCN Ltd.; 2016.
14. Chamberlain D, Pollock W, Fulbrook P, Group AWS. ACCCN Workforce Standards for Intensive Care Nursing: Systematic and evidence review, development, and appraisal. *Aust Crit Care.* 2018;31(5):292-302.

15. Australian and New Zealand Intensive Care Society. COVID-19 Guidelines, Version 2. Camberwell, Vic: ANZICS; 2020. <https://www.anzics.com.au/coronavirus-guidelines/>
16. College of Intensive Care Medicine. Minimum standards for intensive care units. Prahran, Vic: CICM; 2016. [https://www.cicm.org.au/CICM\\_Media/CICMSite/CICM-Website/Resources/Professional%20Documents/IC-1-Minimum-Standards-for-Intensive-Care-Units.pdf](https://www.cicm.org.au/CICM_Media/CICMSite/CICM-Website/Resources/Professional%20Documents/IC-1-Minimum-Standards-for-Intensive-Care-Units.pdf)
17. Covid-19 Critical Care Coordination Collaborative. Statement on managing senior medical workforce in intensive care during the Covid-19 Pandemic. College of Intensive Care Medicine of Australia and New Zealand, Australian and New Zealand Intensive Care Society, Australian and New Zealand College of Anaesthetists, Australian Society of Anaesthetists, New Zealand Society of Anaesthetists, Australasian College for Emergency Medicine; 2020.
18. Faculty of Intensive Care Medicine and the Intensive Care Society. Guidelines for the provision of intensive care services. 2e. London: Intensive Care Society; 2019. <https://www.ficm.ac.uk/standards-research-revalidation/guidelines-provision-intensive-care-services-v2>
19. Thomas P, Baldwin C, Bissett B, et al. Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations. *J Physiother.* 2020;66(2):73-82.
20. Chapple LS, Fetteplace K, Asrani V, et al. Nutrition management for critically and acutely unwell hospitalised patients with COVID-19 in Australia and New Zealand. *Aust Crit Care.* 2020. doi [10.1016/j.aucc.2020.06.002](https://doi.org/10.1016/j.aucc.2020.06.002).
21. SHPA Committee of Specialty Practice in Critical Care. SHPA Standards of practice for critical care pharmacy practice. *Journal of Pharmacy Practice and Research.* 2008;38(1):58-60.
22. Speech Pathology Australia. Speech Pathology Australia Guidance for service delivery, clinical procedures and infection control during the COVID-19 pandemic. Melbourne, Vic: Speech Pathology Australia; 2020. [https://www.speechpathologyaustralia.org.au/SPAweb/About\\_us/COVID-19\\_News\\_and\\_Information/COVID-19\\_-\\_Guidance\\_for\\_Service\\_Delivery/SPAweb/About\\_Us/COVID-19/Guidance\\_for\\_Service\\_Delivery.aspx?hkey=fc19a880-e7a8-4246-8631-a474fc43d4ae](https://www.speechpathologyaustralia.org.au/SPAweb/About_us/COVID-19_News_and_Information/COVID-19_-_Guidance_for_Service_Delivery/SPAweb/About_Us/COVID-19/Guidance_for_Service_Delivery.aspx?hkey=fc19a880-e7a8-4246-8631-a474fc43d4ae)
23. Royal College of Speech Language Therapists. COVID-19: Maximising the contribution of the speech and language therapy workforce. London: RCSLT; 2020. <https://www.rcslt.org/-/media/docs/Covid/RCSLTCOVID19-Maximising-the-contribution-of-SLT-workforce240420.pdf>
24. Australian Government. Guidance on the use of personal protective equipment (PPE) in hospitals during the COVID-19 outbreak. Version 6 ed. Canberra: Australian Government; 2020. <https://www.health.gov.au/resources/publications/guidance-on-the-use-of-personal-protective-equipment-ppe-in-hospitals-during-the-covid-19-outbreak>

25. Infection Control Expert Group. The use of face masks and respirators in the context of COVID-19. Canberra: Australian Government; 2020.  
<https://www.health.gov.au/resources/publications/the-use-of-face-masks-and-respirators-in-the-context-of-covid-19>
26. Australia College of Emergency Medicine, Australian and New Zealand College of Anaesthetists, College of Intensive Care Medicine of Australia and New Zealand. Guidelines for transport of critically ill patients. Prahran, Vic: CICM; 2015.  
[https://www.cicm.org.au/CICM\\_Media/CICMSite/CICM-Website/Resources/Professional%20Documents/IC-10-Guidelines-for-Transport-of-Critically-Ill-Patients.pdf](https://www.cicm.org.au/CICM_Media/CICMSite/CICM-Website/Resources/Professional%20Documents/IC-10-Guidelines-for-Transport-of-Critically-Ill-Patients.pdf)

**Table 1 Current critical care staffing recommendations**

Professional organisation	Professional group	Document
Australian College of Critical Care Nurses	Nursing	Workforce Standards for Intensive Care Nursing <sup>13</sup> ACCCN Workforce Standards for Intensive Care Nursing: Systematic and evidence review, development, and appraisal <sup>14</sup>
Australian and New Zealand Intensive Care Society	Nursing, Allied Health, Medicine	ANZICS COVID-19 Guidelines <sup>15</sup>
College of Intensive Care Medicine of Australia and New Zealand	Medicine and Nursing	Minimum standards for intensive care units <sup>16</sup>
Covid-19 Critical Care Coordination Collaborative <sup>^</sup>	Medicine	Statement on Managing Senior Medical Workforce in Intensive Care during the COVID-19 Pandemic <sup>17</sup>
Faculty of Intensive Care Medicine and the Intensive Care Society <sup>#</sup>	Nursing, Allied Health, Medicine	Guidelines for the provision of intensive care services <sup>18</sup>
Independent Authors	Physiotherapy	*Physiotherapy management guidelines for COVID-19 <sup>19</sup>
Independent Authors	Dietetics	*Nutrition management guidelines for COVID-19 <sup>20</sup>
Society of Hospital Pharmacists Australia	Pharmacy	SHPA Standards of practice for critical care pharmacy practice <sup>21</sup>
Speech Pathology Australia	Speech Pathology	*Speech pathology guidelines for COVID-19 <sup>22</sup>
Royal College of Speech Language Therapists	Speech Pathology	*COVID-19: Maximising the contribution of the speech and language therapy workforce. <sup>23</sup>

\* This document is a broader clinical practice guideline which contains some recommendations for staffing.

#These guidelines are developed for use in the United Kingdom. In the absence of specific allied health staffing requirements, this document is commonly used by allied health professionals in Australia.

^ Comprised of the College of Intensive Care Medicine of Australia and New Zealand, Australian and New Zealand Intensive Care Society, Australian and New Zealand College of Anaesthetists, Australian Society of Anaesthetists, New Zealand Society of Anaesthetists, Australasian College for Emergency Medicine