

Professor Michael Pervan
Chief Executive Officer
Independent Health and Aged Care Pricing Authority

Friday 14 June 2024

Dear Professor Pervan,

Subject: Collaboration on ICU Adjustment Criteria and Methodology

I am writing to express my gratitude for the Independent Health and Aged Care Pricing Authority's (IHACPA) ongoing efforts to refine the Pricing Framework for Australian Public Hospital Services. The Australian and New Zealand Intensive Care Society (ANZICS) appreciates the opportunity to contribute to the consultation process and is keen to continue our collaborative efforts to enhance the ICU adjustment criteria.

As you are aware, the landscape of intensive care is complex and ever evolving. The recent consultation paper provided a platform for us to voice our recommendations and highlight the need for a more nuanced approach to ICU adjustments. We believe that incorporating broader criteria - such as the use of Non-Invasive ventilation, Renal Replacement Therapy, Vasoactive Medications, and Extracorporeal Membrane Oxygenation - will allow for a more accurate representation of ICU complexities and resource requirements.

ANZICS is committed to supporting IHACPA in this review process. To this end, we have established a working group comprising key stakeholders from various sectors within our community. This group is dedicated to assisting IHACPA by providing data-driven insights and expert opinions to inform the adjustment methodology.

We are hopeful that a partnership will lead to enhancements in the ICU adjustment framework that reflect current practices and ensure equitable, effective resource allocation across all ICUs, regardless of their size or location. Our goal is to facilitate improvements that will ultimately benefit patient care and outcomes across Australia and New Zealand.

I would like to propose a meeting at your earliest convenience to discuss our submission in detail and explore ways we can further assist the review process. Please let us know your available times, and we will do our best to accommodate.

Again, Thank you for your leadership and commitment to improving the healthcare system. ANZICS looks forward to your response and a fruitful collaboration.

Warm regards,

Mark Nicholls
President, Australian and New Zealand Intensive Care Society (ANZICS)



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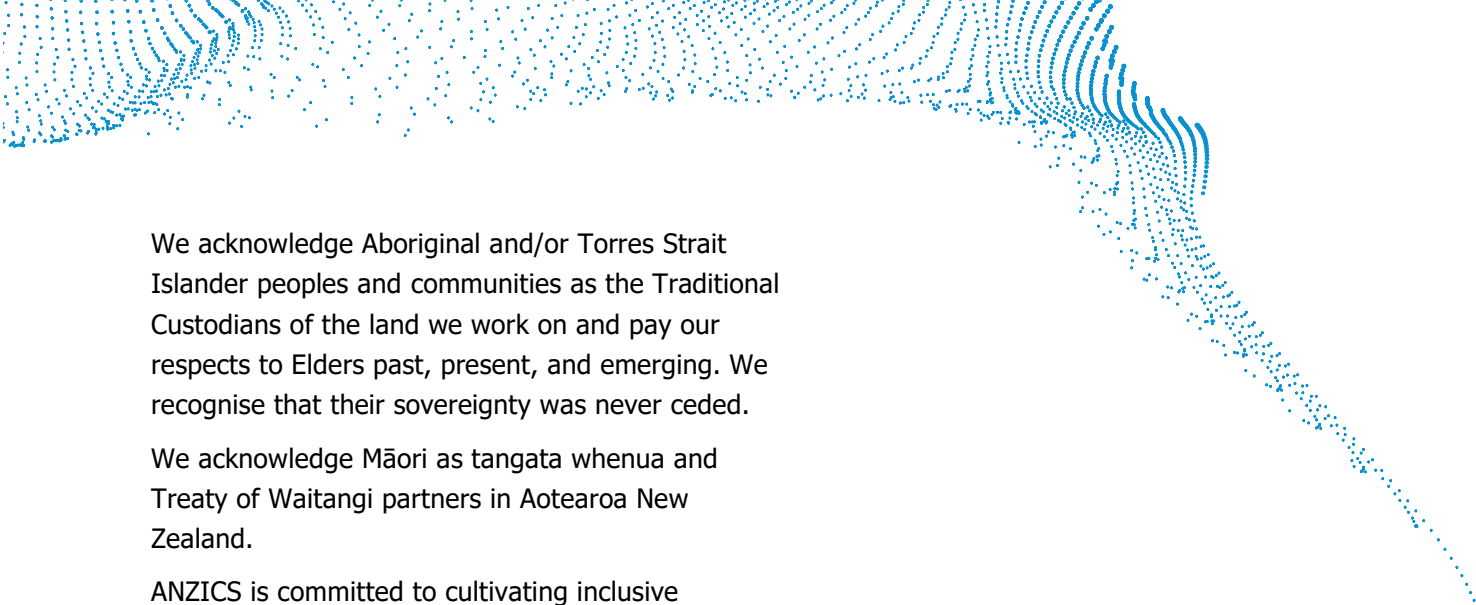
ANZICS SUBMISSION TO THE CONSULTATION PAPER ON THE PRICING FRAMEWORK FOR AUSTRALIAN PUBLIC HOSPITAL SERVICES 2025-26

The Australian and New Zealand Intensive Care Society

11th June 2024

A/Prof Mark Nicholls

President, ANZICS



We acknowledge Aboriginal and/or Torres Strait Islander peoples and communities as the Traditional Custodians of the land we work on and pay our respects to Elders past, present, and emerging. We recognise that their sovereignty was never ceded.

We acknowledge Māori as tangata whenua and Treaty of Waitangi partners in Aotearoa New Zealand.

ANZICS is committed to cultivating inclusive environments for staff and members to celebrate, value and include people of all backgrounds, genders, sexualities, cultures, bodies and abilities.

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The Australian and New Zealand Intensive Care Society (ANZICS)

Submission to the Consultation Paper on the Pricing Framework for Australian Public Hospital Services 2024-25

Context

Currently, the Independent Health and Aged Care Pricing Authority (IHACPA) incorporates an ICU adjustment within the National Efficient Price (NEP) for Specified Intensive Care Units where there is a minimum of 24,000 hours of ICU activity annually, with at least 20% of those hours involving mechanical ventilation.

In this year's consultation, IHACPA plans to reevaluate the ICU adjustment by reviewing the eligibility criteria for classification as a specified ICU, exploring the underlying factors that drive cost variations across different ICU types, assessing the significance of these cost variations, and determining their inevitability.

ANZICS values the opportunity to collaborate with IHACPA and has established a working party to contribute effectively to the ongoing review of ICU adjustments, aiming to enhance the representation and understanding of ICU complexities.

Overview

In this document, ANZICS is committed to:

1. Highlight key concerns and potential shortcomings within the current ICU adjustment model.
2. Suggest viable data sources that could enhance the development of future eligibility criteria.
3. Offer preliminary data and examples to illustrate the diversity and scope of ICUs that could meet anticipated future criteria.

Executive Summary

ANZICS utilises several key information sources to enhance its understanding and management of intensive care units (ICUs) across Australia and New Zealand. These resources are pivotal for providing data-driven insights and supporting effective decision-making in ICU care:

1. **ANZICS Adult Patient Database:** This extensive database encompasses over 3.5 million patient episodes and is a crucial tool for assessing ICU performance. It provides detailed reports to individual units and health departments, offering valuable feedback and benchmarks for improving care standards.
2. **ANZICS Critical Care Resources (CCR) Survey:** Conducted annually, this survey gathers comprehensive data on critical care resources available across regions. The insights gained from the CCR survey are instrumental in guiding resource allocation, strategic planning, and research initiatives in critical care.
3. **Australian and New Zealand Paediatric Intensive Care Registry (ANZPICR):** Focused on specialised paediatric ICUs and select general ICUs, ANZPICR collects vital data that inform paediatric intensive care practices and research. This registry helps understand trends, outcomes, and resource utilisation specific to paediatric critical care.
4. **Critical Health Resources Information System (CHRIS):** Providing real-time updates on ICU patient numbers, resource needs, and COVID-19 cases, CHRIS is essential for day-to-day management and strategic planning. This system ensures that resource allocation is responsive to the dynamic needs of ICUs, enhancing the capability to manage crises and routine care efficiently.

Together, these tools enable ANZICS to maintain high oversight and support for ICUs, ensuring that the care provided is based on the latest and most comprehensive data.

ANZICS proposes initiatives to enhance funding decisions for ICUs, which include:

- Joint Analysis of ICU Data
- Exploring Additional Criteria
- Regular Communication and Feedback

The current criteria for ICU adjustments, based primarily on hospitals reporting over 24,000 ICU hours annually and a minimum of 20% of those hours involving mechanical ventilation, may only partially capture the complexities and varied cost structures of intensive care units. As part of ongoing efforts to refine these criteria, IHACPA collaborates with jurisdictions to determine hospitals' eligibility for ICU adjustments. However, ANZICS proposes that additional measures be considered in the eligibility criteria to ensure a more accurate reflection of ICU complexity. These include:

- **Renal Replacement Therapy (RRT):** Including RRT as a criterion acknowledges the significant resources and expertise required to manage acute kidney injuries or chronic kidney conditions in critically ill patients.
- **Use of Vasoactive Medications:** Vasoactive medications, crucial for managing shock and other critical conditions, indicate a higher level of care complexity and patient acuity, suggesting that their use should factor into ICU adjustment considerations.
- **Extracorporeal Membrane Oxygenation (ECMO):** ECMO support, used in the most severe cases of cardiac and respiratory failure, represents a significant level of technological and staffing resources that should be recognised in ICU classifications.

By expanding the criteria to include these treatments, the eligibility for ICU adjustments can better align with the actual demands and cost implications of providing high-level intensive care where it is provided, leading to more equitable and appropriate funding allocations. It is crucial to accurately capture costs in smaller rural and remote ICUs and the provision of care outside the ICU.

Collaboration between ANZICS and the Independent Health and Aged Care Pricing Authority (IHACPA) may assist in optimising resource allocation and enhancing the quality of care in ICUs. This partnership allows for a data-driven approach to understanding and addressing the complexities of intensive care services, enabling more strategic and efficient use of resources. By pooling their expertise and data, ANZICS and IHACPA may develop more precise ICU adjustment criteria and funding models that reflect the actual needs and challenges of ICU care.

This collaborative effort ensures that resource distribution is equitable and effective, benefiting patient outcomes. Enhanced resource allocation leads to better-equipped ICUs, where high standards of care and advanced treatments are more accessible. Ultimately, this partnership improves the operational aspects of ICU management and contributes significantly to improved clinical outcomes, reducing morbidity and mortality rates among critically ill patients. (IS THIS TO MUCH OF A SELL MN)

Background information

Relevant observations about Intensive Care practice from data available to ANZICS

Using our clinical registries, we have looked at the number of ICUs in Australia reporting to ANZICS which meet specific criteria in 2018/19 and 2021/22. Tables 1, 2 and 3.

- Previous work undertaken by ANZICS to measure ICU costs within Australia, using a 'top-down' approach, indicated that the mean cost per patient bed-day was \$4375 in 2013/14. This was similar to costs estimated by IHPA. The ANZICS study also suggested that daily costs were higher in smaller

ICUs with lower occupancy, such as rural/regional ICUs, compared to larger tertiary ICUs. (Hicks, P. *et al.* (2019) 'The financial cost of intensive care in Australia: A multicentre registry study', *Medical Journal of Australia*, 211(7), pp. 324–325. doi:10.5694/mja2.50309.)

- In keeping with best clinical practice, the use and duration of invasive mechanical ventilation have decreased. At the same time, the use of non-invasive ventilation, renal replacement therapy, and ECMO has increased. These are resource-intensive therapies that can only be delivered in an ICU.
- Regarding Tables 1 and 2, in the 2018/19 period, there were 169 Intensive Care Units (ICUs) in Australia that reported to the Australian and New Zealand Intensive Care Society (ANZICS). Of these, 140 (82.8%) were ICUs that had operational hours greater than 24,000 in the year. This data demonstrates that most ICUs operated for more than 24,000 hours regardless of location or nature in 2018/19.
- In the 2021/22 period, 178 Intensive Care Units (ICUs) in Australia reported to the Australian and New Zealand Intensive Care Society (ANZICS). Among these, 148 ICUs (83.1%) had operational hours greater than 24,000 that year. This data indicates that, similar to the 2018/19 period, most ICUs, regardless of their location or category, operated for more than 24,000 hours in the year 2021/22. Notably, there was a significant increase in the proportion of metropolitan ICUs operating for more than 24,000 hours, from 90.6% in 2018/19 to 97.0% in 2021/22.
- The total number of ICUs in Australia reporting to ANZICS increased from 169 in 2018/19 to 178 in 2021/22, indicating a growth in the number of intensive care facilities and the proportion of units submitting data over the years.
- The proportion of ICUs with more than 24,000 hours of operation and over 20% of those hours on ventilators significantly increased from 31.0% in 2018/19 to 38.6% in 2021/22.
- The data suggests that the percentage of ICUs with over 24,000 hours and more than 20% of patients ventilated also increased from 52.7% in 2018/19 to 59.6% in 2021/22.
- The data suggest a higher prevalence of ventilator usage in Metropolitan and Tertiary ICUs compared to Rural/Regional and Private ICUs.
- The percentage of ICUs with over 24,000 hours and more than 20% of patients undergoing ventilation, non-invasive ventilation (NIV), renal replacement therapy (RRT), extracorporeal membrane oxygenation (ECMO), or receiving vasoactive agents also increased over the years.
- All Metropolitan and Tertiary ICUs reported over 24,000 hours, and more than 20% of patients undergoing ventilation, NIV, RRT, ECMO, or receiving vasoactive agents in 2021/22.
- If applied to ANZICS data from hospitals reporting in 2021/22, the present IHACPA criteria would result in fewer hospitals being eligible for the ICU adjustment despite increased demand for ICU services overall. (Table 3). In detail, 79 ICUs (74%) meet the criteria of having more than 24,000 hours and more than 20% of hours ventilated based on IHACPA data. In comparison, 58 ICUs (57.4%) meet the same criteria according to ANZICS data.

Advantages and limitations of ventilator hours

Ventilator hours as a measure in ICU can be informative as it directly correlates with the intensity of patient care. Patients on ventilators require more resources, including personnel time, equipment, and supplies, which can significantly increase the cost of care. Therefore, the use of ventilator hours can provide a basis for allocating resources and adjusting for variations in patient complexity within a funding model. However, it is important to acknowledge potential limitations associated with using ventilator hours as a primary measure:

1. **Variability in Practice:** Different ICUs may vary in their practice regarding the use of non-invasive ventilation prior to the decision to intubate or extubate a patient. Relying solely on (invasive) ventilator hours may not account for these differences and could lead to misleading comparisons.
2. **Patient Complexity:** Using ventilator hours does not fully capture the complexity and acuity of the patient's condition. An increasing number of patients are being managed in intensive care units without ventilators. Many of these non-mechanically ventilated patients have similar or sometimes greater care needs than an otherwise straightforward, invasively ventilated patient and often require more nursing supervision.
3. **Incentive:** There is a risk that using ventilator hours as the main criterion could inadvertently incentivise longer ventilation times, which may not always align with optimal patient care.
4. **Non-Ventilated ICU Care:** Other intensive forms of care provided in the ICU, such as extracorporeal membrane oxygenation (ECMO), renal replacement therapy (RRT), complex inhalational therapy (e.g. inhaled nitric oxide or prostacyclin), or vasoactive medication can significantly impact patient outcomes and resource utilisation.

Considering these limitations, it is essential to use a comprehensive approach that takes into account various factors, including patient acuity, complexity, and the range of intensive care interventions provided, to ensure accurate assessments and comparisons among ICUs.

Overall, while ventilator hours can be a useful measure, it might be beneficial to consider it in conjunction with other criteria to represent the broad spectrum of care delivered in ICUs more accurately. These could include measures such as ICU length of stay, patient acuity scores, or specific high-cost, high-intensity interventions such as those mentioned above.

Furthermore, relying solely on mechanical ventilation as a patient-level measure does not capture the costs associated with ICU services that manage patients not admitted to the ICU. These services include rapid response teams, ICU liaison, and retrieval. These components are crucial in providing critical care expertise and support outside the traditional ICU setting. Therefore, it is important to consider the broader scope of ICU services and associated costs beyond mechanical ventilation when evaluating the overall cost and value of ICU care.

Consultation Questions

Question 1:

Should the ICU adjustment be restricted to a list of eligible hospitals? If so, what factors should be considered in determining the level of ICU complexity required to be eligible for the ICU adjustment, noting that individual units cannot be identified in the current national data collections?

The current approach to ICU adjustments, which restricts them to a list of eligible hospitals based on mechanical ventilation and admission volumes, needs to be more representative of the complexities and varied needs across different ICUs. Our considerations are influenced by recent feedback and awareness of evolving practices within intensive care across Australia. We recommend expanding the criteria beyond a restrictive list based solely on metrics like mechanical ventilation hours. The current practice of delineating ICUs based on such criteria needs to adequately capture the diversity of complexities encountered in different ICU settings, particularly as clinical practices and technologies evolve.

While we recognise the challenges in identifying individual ICU units in current national data collections and while we do not advocate for a strictly restrictive list of eligible hospitals for ICU adjustments, we understand the need for criteria that can be applied uniformly. We also acknowledge the challenges posed by the inability to identify individual ICU units in the current national data collections. Should a list be considered necessary, the following factors should be included to determine the level of ICU complexity, ensuring a comprehensive reflection of an ICU's capability and the demands it faces:

1. **Range of Services Provided:** Beyond mechanical ventilation, consider the types and complexities of services offered, such as the availability and frequency of advanced therapies like ECMO (Extracorporeal Membrane Oxygenation), CRRT (Continuous Renal Replacement Therapy), and specialised care for conditions like severe burns or trauma.
2. **Patient Acuity Levels:** Include patient severity and acuity measures, which could be derived from standardised scores such as APACHE (Acute Physiology and Chronic Health Evaluation) or SAPS (Simplified Acute Physiology Score). Higher average scores could indicate more complex ICU needs.
3. **Technological Capabilities:** Evaluate the technological infrastructure available in the ICU, such as the capability for continuous monitoring and support systems, which play a crucial role in treating critically ill patients.
4. **Geographical and Population Considerations:** Account for ICUs operating in rural or remote areas, where, despite possibly lower volumes, the complexity of care remains high.

Utilising these factors would create a framework that more accurately reflects an ICU's complexity than traditional metrics such as operational hours or mechanical ventilation usage alone. This approach would also allow for the inclusion of ICUs that provide high levels of care but may not meet traditional high-volume thresholds, ensuring a fair and equitable allocation of resources. It's important to continue refining these

criteria through dialogue with stakeholders to ensure they are implemented effectively and represent the diverse capabilities and needs of ICUs across the healthcare system.

Question 2:

Are there any barriers to a tiered adjustment that would allow for different ICU adjustment prices to apply based on the characteristics of eligible hospitals or episodes of care within those hospitals?

Implementing a tiered ICU adjustment system based on the characteristics of eligible hospitals or specific episodes of care within those hospitals presents several potential barriers:

1. **Data Quality and Uniformity:** One significant barrier is the quality and availability of data across hospitals and jurisdictions. Reliable, comprehensive data collection on ICU activities and patient outcomes is crucial for accurately assigning ICUs to different funding tiers. However, disparities in data collection methods and capabilities among hospitals could lead to inconsistencies in how ICUs are classified.
2. **Complexity in Defining ICU Complexity:** Establishing clear, universally accepted definitions of what constitutes different levels of ICU complexity poses a challenge. This complexity includes factors such as the types of services provided, patient acuity, and the range of technologies and treatments used. Standardising these factors to fit a tiered model can be difficult, given the diverse nature of ICU operations across different hospitals and regions.
3. **Administrative and Operational Challenges:** Implementing a tiered adjustment system would significantly increase the administrative burden on hospitals and jurisdictions.
4. **Potential for Incentive Misalignment:** A tiered system could inadvertently create perverse incentives, such as emphasising certain types of care that are reimbursed at higher rates, regardless of patient-specific needs. Hospitals may alter their clinical practices to fit the funding model rather than based on the best interest of patients.
5. **Equity and Access:** There is a concern that a tiered pricing system might lead to inequities in healthcare delivery. Hospitals in rural or less affluent areas might struggle to qualify for higher tiers due to fewer resources, which could exacerbate disparities in health outcomes between different regions and populations.
6. **Stakeholder Consensus:** Developing a tiered adjustment model that satisfies all stakeholders may be challenging.
7. **Cost of Implementation:** Setting up and maintaining a tiered system would require increased data, which will have associated costs.

For IHACPA to successfully implement a tiered ICU adjustment system, these barriers need to be carefully considered and addressed through collaborative efforts with all stakeholders. This approach should involve iterative testing and refinement of the model, transparent communication, and a commitment to adjusting the system based on real-world impacts and feedback.

Question 3:

Are there any barriers to including a fixed national weighted activity unit (NWAU) adjustment for eligible hospitals, regardless of activity levels?

Implementing a fixed national weighted activity unit (NWAU) adjustment for eligible hospitals, regardless of activity levels, poses several challenges and barriers:

1. **Equity and Fairness:** One of the main concerns is equity. A fixed NWAU adjustment might not accurately reflect the actual resource consumption or the complexity of care provided by different hospitals. Hospitals with higher activity levels and more complex cases could be underfunded if a uniform rate is applied, potentially leading to resource constraints and impacting the quality of care.
2. **Disincentivising Efficiency:** A fixed adjustment could disincentivize hospitals from improving efficiency or managing resources effectively. If funding is assured regardless of the volume or efficiency of services provided, there may be less motivation for hospitals to optimise operations or innovate in care delivery.
3. **Resource Allocation:** Allocating resources effectively across a healthcare system with varying needs can be challenging with a fixed adjustment. It might lead to oversupply in areas with lower demand and shortages in higher-demand areas, affecting the overall balance and functionality of the health service.
4. **Impact on Small or Rural Hospitals:** While a fixed NWAU adjustment might seem to benefit smaller or rural hospitals by providing stable funding, it could also fail to address the specific challenges these hospitals face, such as higher costs for certain types of care or difficulty attracting specialised staff.
5. **Responsiveness to Changes:** Fixed adjustments are typically less responsive to rapid changes in healthcare needs, such as those arising from public health emergencies or demographic shifts. This could result in funding arrangements that are out of step with actual healthcare requirements over time.
6. **Complexity in Setting Rates:** Determining the appropriate level for a fixed NWAU adjustment involves complex calculations and assumptions about average costs and needs across diverse hospital settings. Getting this wrong could lead to widespread issues with underfunding or excessive costs.
7. **Stakeholder Opposition:** Implementing a system that significantly changes funding models will likely face opposition from various stakeholders, including hospitals that may lose funding under the

new model, insurance companies, and patient advocacy groups concerned about the impact on care quality.

Addressing these barriers would require careful planning, including thorough consultations with all stakeholders, detailed analyses of potential impacts, and possibly the implementation of transitional arrangements to mitigate negative effects on some hospitals. Additionally, regular reviews and adjustments to the fixed NWAU rates would be necessary to ensure they remain aligned with evolving healthcare needs and costs.

Conclusion

ANZICS recognizes the critical role of the Independent Health and Aged Care Pricing Authority (IHACPA) in setting and applying the National Efficient Price for public hospital services. We recognise that the ICU classification criteria have significant implications for hospital funding and care.

Given the significant implications of ICU classification criteria on hospital funding and care quality, ANZICS sees a valuable opportunity to strengthen our collaboration with IHACPA. This partnership would enable the sharing of crucial insights, supporting the development of more nuanced and contextually appropriate funding strategies. ANZICS has established a working group to assist

1. **Joint Analysis of ICU Data:** ANZICS proposes to work closely with IHACPA to conduct a detailed analysis and interpretation of ICU data collected by ANZICS. This joint effort aims to identify and understand the diverse factors that influence cost variations in advanced ICUs. Through this collaborative analysis, we hope to deepen our understanding of the determinants of ICU costs and enhance the foundation of ICU funding decisions.
2. **Exploring Additional Criteria:** ANZICS suggests that we consider adding new or supplementary criteria to the current eligibility metrics for ICU classification, such as beyond just mechanical ventilation hours. We recommend setting up a joint working group or initiating joint research initiatives to explore these possibilities. Expanding the criteria will help capture the full scope of complexity and variety in ICU care, leading to more precise and equitable funding distributions.
3. **Regular Communication and Feedback:** ANZICS advocates for establishing routine interactions and feedback mechanisms between ANZICS and IHACPA. These regular exchanges will support the ongoing refinement of the ICU funding model, ensuring it remains aligned with current trends and incorporates the latest data. By fostering continuous communication, we can swiftly address new challenges, integrate fresh insights, and adjust the funding model as needed to optimize both patient care and resource use in ICUs.

ANZICS is exceptionally well-positioned to contribute to the evolution of ICU classification and funding models, thanks to our comprehensive registry data and staffing. This comprehensive and trusted data repository enables ANZICS to provide valuable insights into patient outcomes, treatment effectiveness, and

care patterns across different ICUs. ANZICS has established a dedicated IHACPA working group with ANZICS and jurisdictional representation to assist in ICU classification criteria and funding models.

In addition to leveraging its registry data, ANZICS recognizes that certain critical data points like Continuous Renal Replacement Therapy (CRRT), vasoactive drugs, and non-invasive ventilation might not be easily accessible to health departments. This limitation could restrict the breadth of information available for thorough analysis and informed decision-making. Consequently, part of our collaborative efforts with health authorities and stakeholders could involve identifying and implementing strategies to enhance the accessibility and transparency of such data. By improving data availability, ANZICS aims to ensure that ICU classification and funding models are based on the most comprehensive and detailed information possible, thereby enhancing the precision and effectiveness of resource allocation in intensive care settings.

By collaborating closely, ANZICS and the Independent Health and Aged Care Pricing Authority (IHACPA) can effectively identify and address potential barriers to data access. Together, they can develop strategies to surmount these challenges, which may include optimizing data collection processes, creating data-sharing agreements, or introducing advanced technological solutions to enhance data exchange. By improving data accessibility, both organizations will enable a deeper, more comprehensive analysis of ICU services. This, in turn, will lead to more informed decisions regarding ICU classifications and funding, ensuring that resources are allocated efficiently, and that care provided in ICUs align with the most current and complete data available.

Appendix 1 - Current approach to determining ICU adjustment level and deduct associated costs (National Pricing Model 2024-25. Technical Specifications)

The National Pricing Model for 2024-25 employs patient-level cost data from hospitals with eligible Intensive Care Units (ICUs) and Paediatric Intensive Care Units (PICUs) to calculate the average cost per ICU hour. Eligibility is determined by hospitals that report over 24,000 ICU hours annually, with at least 20% of those hours involving mechanical ventilation.

Calculation of Average Cost per ICU Hour:

1. **Data Analysis:** The model analyses patient-level cost data to compute the average cost per ICU hour.
2. **Eligibility Criteria:** Only ICUs and PICUs within hospitals that meet the specified operational hours and mechanical ventilation usage are considered.
3. **Regression Analysis:** Costs per ICU hour are determined state-by-state through linear regression, adjusting for outliers using Difference in Fits (DFFITS) statistics to ensure data integrity and reliability.
4. **National ICU Rate:** A national rate of \$250 per hour is established based on the weighted mean of hourly ICU costs across all states.

ICU Adjustment Calculation:

- **Calculation Basis:** The ICU adjustment for billing and funding purposes is calculated based on the estimated cost per hour multiplied by the total number of ICU hours recorded for each patient episode.
- **Inclusion in Financial Models:** This ICU cost adjustment factors into the hospital's overall compensation, affecting various billing components such as AR-DRG, and outlier costs.
- **Operational Data Use:** Entire ICU days are subtracted from the patient's total length of stay for precise billing and funding accuracy.

Distribution of Eligible ICUs: The document also specifies the distribution of eligible ICUs across Australian states and territories, reflecting regional capacities and specializations in intensive care services:

- **New South Wales:** 26 adult ICUs, 2 paediatric ICUs
- **Victoria:** 16 adult ICUs, 1 paediatric ICU
- **Queensland:** 18 adult ICUs, 1 paediatric ICU
- **South Australia:** 5 adult ICUs
- **Western Australia:** 7 adult ICUs, 1 paediatric ICU
- **Tasmania:** 2 adult ICUs
- **Northern Territory:** 2 adult ICUs
- **Australian Capital Territory:** 1 adult ICU

This methodology ensures a standardized and equitable approach to ICU funding across the country, aligning with the intensity of care provided and reflecting the actual costs incurred by hospitals for delivering ICU services.

Specified Intensive Care Units meeting IHACPA criteria (>24,000 ICU hours including at least 20% ventilated – extracted from Appendix D of the National Efficient Price Determination 2022-23:

NSW	Bankstown-Lidcombe Hospital
NSW	Blacktown Hospital
NSW	Calvary Mater Newcastle
NSW	Campbelltown Hospital
NSW	Children’s Hospital Westmead
NSW	Coffs Harbour Health Campus
NSW	Concord Repatriation General Hospital
NSW	Gosford Hospital
NSW	Hornsby Ku-Ring-Gai Hospital
NSW	John Hunter Hospital
NSW	Lismore Base Hospital
NSW	Liverpool Hospital
NSW	Nepean Hospital
NSW	Northern Beaches Hospital
NSW	Orange Base Hospital
NSW	Port Macquarie Base Hospital
NSW	Prince of Wales Hospital
NSW	Royal North Shore Hospital
NSW	Royal Prince Alfred Hospital
NSW	St George Hospital (NSW)
NSW	St Vincent’s Hospital (Darlinghurst)
NSW	Sydney Children’s Hospital
NSW	Tamworth Hospital
NSW	The Sutherland Hospital

NSW	The Tweed Hospital
NSW	Wagga Wagga Base Hospital
NSW	Westmead Hospital
NSW	Wollongong Hospital
Vic	Austin Health - Austin Hospital
Vic	Ballarat Health Services (Base Hospital)
Vic	Barwon Health - Geelong Hospital Campus
Vic	Bendigo Health Care Group - Bendigo Hospital
Vic	Box Hill Hospital
Vic	Dandenong Hospital
Vic	Frankston Hospital
Vic	Maroondah Hospital
Vic	Monash Medical Centre - Clayton Campus
Vic	Peter MacCallum Cancer Centre
Vic	Royal Melbourne Hospital - City Campus
Vic	St Vincent's Hospital (Melbourne) Ltd
Vic	Sunshine Hospital
Vic	The Alfred
Vic	The Northern Hospital
Vic	The Royal Children's Hospital
Vic	The Royal Women's Hospital
Vic	Western Hospital
Qld	Bundaberg Base Hospital
Qld	Caboolture Hospital
Qld	Cairns Base Hospital
Qld	Gold Coast University Hospital
Qld	Hervey Bay Hospital
Qld	Ipswich Hospital

Qld	Logan Hospital
Qld	Mackay Base Hospital
Qld	Mater Adult Hospital
Qld	Princess Alexandra Hospital
Qld	Queen Elizabeth II Jubilee Hospital
Qld	Queensland Children's Hospital
Qld	Redcliffe Hospital
Qld	Robina Hospital
Qld	Rockhampton Hospital
Qld	Royal Brisbane & Women's Hospital
Qld	Sunshine Coast Public University Hospital
Qld	The Prince Charles Hospital
Qld	Toowoomba Hospital
Qld	Townsville University Hospital
SA	Flinders Medical Centre
SA	Lyell McEwin Hospital
SA	Royal Adelaide Hospital
SA	The Queen Elizabeth Hospital
SA	Women's and Children's Hospital
WA	Armadale Kelmscott Memorial Hospital
WA	Bunbury Hospital
WA	Fiona Stanley Hospital
WA	Joondalup Health Campus
WA	Perth Children's Hospital
WA	Rockingham General Hospital
WA	Royal Perth Hospital
WA	Sir Charles Gairdner Hospital
Tas	Launceston General Hospital

Tas	Royal Hobart Hospital
NT	Alice Springs Hospital
NT	Royal Darwin Hospital
ACT	Canberra Hospital and Health Services

Table 3 provides information on the total public Intensive Care Units (ICUs) in each region and the percentage of ICUs meeting specific criteria based on IHACPA and ANZICS data for 2021/22. An interpretation of the table shows:

- ACT: There are two total public ICUs in the ACT. Of these, one ICU (50%) meets the criteria of having more than 24,000 hours and more than 20% of hours ventilated, according to IHACPA and ANZICS data.
- NSW: There are 40 total public ICUs in NSW. Based on IHACPA data, 26 ICUs (65%) meet the criteria of having more than 24,000 hours and more than 20% of hours ventilated. According to ANZICS data, 20 ICUs (52.6%) meet the same criteria.
- NT: There are two total public ICUs in NT, and both ICUs (100%) meet the criteria of having more than 24,000 hours and more than 20% of hours ventilated, according to both IHACPA and ANZICS data.
- QLD: There are 20 total public ICUs in QLD. Based on IHACPA data, 19 ICUs (95%) meet the criteria of having more than 24,000 hours and more than 20% of hours ventilated. According to ANZICS data, 16 ICUs (80%) meet the same criteria.
- SA: There are five total public ICUs in SA, and all (100%) meet the criteria of having more than 24,000 hours and more than 20% of hours ventilated, according to IHACPA data. Based on ANZICS data, three ICUs (75%) meet the same criteria.
- TAS: There are three total public ICUs in TAS. Based on IHACPA data, two ICUs (67%) meet the criteria of having more than 24,000 hours and more than 20% of hours ventilated. According to ANZICS data, two ICUs (66.7%) meet the same criteria.
- VIC: There are 28 total public ICUs in VIC. Based on IHACPA data, 17 ICUs (61%) meet the criteria of having more than 24,000 hours and more than 20% of hours ventilated. According to ANZICS data, 11 ICUs (42.3%) meet the same criteria.
- WA: There are seven total public ICUs in WA, and all (100%) meet the criteria of having more than 24,000 hours and more than 20% of hours ventilated, according to IHACPA data. Based on ANZICS data, three ICUs (50%) meet the same criteria.

Out of the total 107 public ICUs considered, 79 ICUs (74%) meet the criteria of having more than 24,000 hours and more than 20% of hours ventilated, according to IHACPA data. According to ANZICS data, 58 ICUs (57.4%) meet the same criteria. These percentages provide an overview of the proportion of ICUs meeting the specific criteria in each region based on the IHACPA and ANZICS data provided.

Appendix 2 – Background Information

The Australian and New Zealand Intensive Care Society (ANZICS)

The Australian and New Zealand Intensive Care Society (ANZICS) is a not-for-profit organisation that collaborates closely with crucial healthcare stakeholders, including regulatory bodies, government and non-government agencies, and healthcare providers. Through its committees and specialist interest groups, ANZICS supports various activities, including clinical quality registries, clinical research, and implementing health initiatives in areas with limited resources.

The ANZICS Clinical Quality Registry

The ANZICS Clinical Quality Registry (run by the ANZICS Centre for Outcomes and Resource Evaluation) has provided a peer review and quality assurance program for ICUs across Australia and New Zealand since 1992. This program serves for audit and benchmarking services and extends to regional, state, national and international jurisdictions. The data is reported back to the submitting ICUs and jurisdictional funding bodies. The primary objectives of the ICU Registries Program include providing benchmarking reports, identifying and analysing outlier ICUs, conducting data quality training workshops, and assisting researchers in identifying potential improvements in intensive care practices and patient outcomes. Presently 98% of ICUs in Australia submit data to ANZICS. Non-submitting ICUs are small rural/regional or private ICUs. All public metropolitan and tertiary hospital ICUs contribute. The collected data supports research on various Intensive Care topics, including disease patterns, critical care interventions, workforce, outcomes and planning for emerging issues like pandemics or biosecurity threats.

The following four datasets are the major sources of information collected about Australian ICUs:

1. The ANZICS Adult Patient Database

The Adult Patient Database (APD) is a comprehensive compilation of data from over 3.5 million patient episodes, establishing it as one of the world's most extensive repositories of intensive care data. This database amasses data quarterly from over 98% of ICUs in Australia and 67% of ICUs in New Zealand. The collected data is employed to assess and compare the performance of each contributing unit. Findings are reported back to contributing ICUs and jurisdictional health departments. Reports are also made publicly accessible.

2. The ANZICS Critical Care Resources (CCR) Survey

The Critical Care Resources (CCR) Survey collects data annually pertaining to the availability and usage of critical care resources in Australia and New Zealand, such as the number of beds per ICU, staffing numbers and profiles, occupancy rates, ventilation hours and details related to ICU safety and quality indicators. The

data collected is vital for clinicians and policymakers to assist in future planning and health services research. ICUs are also invited to contribute data about the costs of providing services. Approximately half the ICUs provide costing information.

3. Australian and New Zealand Paediatric Intensive Care Registry (ANZPICR)

The Australian and New Zealand Paediatric Intensive Care Registry collects data from all specialist Paediatric Intensive Care Units (PICUs) and over 20 general ICUs, which provide care for both adults and children, also contribute data. These include three units in New South Wales, two in Victoria, and one each in Queensland, South Australia, Western Australia, and Tasmania. New Zealand has a single centre, the Starship Children's Hospital in Auckland. Findings are reported back to contributing ICUs and jurisdictional health departments.

4. Critical Health Resources Information System (CHRIS)

The Critical Health Resources Information System (CHRIS) was a federally funded initiative in response to the COVID-19 pandemic. This collaboration was between the Australian Commonwealth Government, ANZICS and Ambulance Victoria. CHRIS provides daily information about the number of patients in every Australian ICU, the number requiring 1:1 ICU nursing, invasive ventilation, non-invasive ventilation, renal replacement therapy, ECMO and the number of patients within each ICU isolated for COVID-19. This gives an almost immediate view of the daily resource requirements for each ICU.

Previous estimates of the costs of ICU in Australia undertaken by ANZICS

ANZICS previously examined the financial costs of providing care in ICUs across Australia, considering variables such as bed number, unit occupancy, and type of ICU (tertiary, metropolitan, rural/regional public hospitals, or private hospitals). The data utilised for this analysis was sourced from the Australian and New Zealand Intensive Care Society (ANZICS) Centre for Outcomes and Resources Evaluation (CORE) Critical Care Resources (CCR) registry. In the 2013/2014 data analysis, 36 ICUs provided complete costing data, comprising about 25% of the total ICU beds in Australia. The finding indicated that the mean cost per patient bed-day was \$4375, with a decreasing trend in costs with an increase in ICU bed numbers and occupancy rates. The estimated total annual operational cost for ICU care in Australia was \$2119 million, accounting for approximately 0.15% of the GDP and 1.4% of total healthcare costs. Staffing costs constituted around 80% of the ICU operational costs. (Hicks, P. *et al.* (2019) 'The financial cost of intensive care in Australia: A multicentre registry study', *Medical Journal of Australia*, 211(7), pp. 324–325. doi:10.5694/mja2.50309.)

Table 1: Number of adult ICUs in Australia reporting to ANZICS which meet specific criteria in 2018/19

	Total (Public)	Rural/regional	Metropolitan	Tertiary	Private
	N=102	N=37	N=32	N=33	N=67
ICUs with >24,000 hrs	89 (87.3%)	31 (83.8%)	29 (90.6%)	29 (87.9%)	51 (76.1%)
ICUs >24K hrs & >20% hrs ventilated ^a	40 (46.0%)	6 (17.6%)	13 (50.0%)	21 (77.8%)	4 (7.3%)
ICUs >24K hrs & >20% patients ventilated	67 (65.7%)	13 (35.1%)	22 (68.8%)	32 (97.0%)	22 (32.8%)
ICUs >24K hrs & (>20% hours OR >20% patients ventilated)	68 (66.7%)	13 (35.1%)	23 (71.9%)	32 (97.0%)	22 (32.8%)
ICUs >24K hrs & >20% pts vent, NIV, RRT, ECMO, vasoactives	93 (91.2%)	29 (78.4%)	31 (96.9%)	33 (100.0%)	41 (61.2%)
ICUs >20% pts ventilated, RRT, ECMO	72 (70.6%)	16 (43.2%)	23 (71.9%)	33 (100.0%)	26 (38.8%)
ICUs >20% pts vent, NIV, RRT, ECMO or vasoactives	93 (91.2%)	29 (78.4%)	31 (96.9%)	33 (100.0%)	41 (61.2%)

a Not all ICUs provided information about hours of ventilation, so the denominators for this row are Rural/regional 35, Metropolitan 26, Tertiary 27, Private 55

Table 2: Number of adult ICUs in Australia reporting to ANZICS which meet specific criteria in 2021/22

	Total (Public)	Rural/regional	Metropolitan	Tertiary	Private
	N=107	N=41	N=33	N=33	N=71
ICUs with >24,000 hrs	96 (89.7%)	34 (82.9%)	32 (97.0%)	30 (90.9%)	52 (73.2%)

ICUs >24K hrs & >20% hrs ventilated ^a	58 (57.4%)	10 (25.6%)	20 (62.5%)	28 (93.3%)	3 (5.3%)
ICUs >24K hrs & >20% patients ventilated	80 (74.8%)	19 (46.3%)	29 (87.9%)	32 (97.0%)	26 (36.6%)
ICUs >24K hrs & (>20% hrs OR >20% patients ventilated)	84 (78.5%)	21 (51.2%)	31 (93.9%)	32 (97.0%)	26 (36.6%)
ICUs >24K hrs & >20% pts vent, NIV, RRT, ECMO, vasoactives	100 (93.5%)	34 (82.9%)	33 (100.0%)	33 (100.0%)	48 (67.6%)
ICUs >20% pts ventilated, RRT, ECMO	85 (79.4%)	21 (51.2%)	31 (93.9%)	33 (100.0%)	29 (40.8%)
ICUs >20% pts vent, NIV, RRT, ECMO or vasoactives	100 (93.5%)	34 (82.9%)	33 (100.0%)	33 (100.0%)	48 (67.6%)

a Not all ICUs provided information about hours of ventilation, so the denominators for this row are Rural/regional 39, Metropolitan 32, Tertiary 30, Private 56

Table 3: Adult public ICUs within each jurisdiction – comparison of number of ICUs meeting specific criteria

		IHACPA ^a	ANZICS 2021/22 ^b	ANZICS 2021/22 ^c	ANZICS 2021/22 ^d	ANZICS 2021/22 ^e	ANZICS 2021/22 ^f	ANZICS 2021/22 ^g	ANZICS 2021/22 ^h
	Total public ICUs	ICUs >24K hrs & >20% hrs ventilated	ICUs >24K hrs & >20% hrs ventilated	ICUs with >24,000 hrs	ICUs >24K hrs & >20% pts ventilated	ICUs >24K hrs & (>20% hrs OR >20%pts ventilated)	ICUs >24K hrs & >20% pts vent, NIV, RRT, ECMO, vasoactives	ICUs >20% pts ventilated, RRT, ECMO	ICUs >20% pts vent, NIV, RRT, ECMO or vasoactives
ACT	N=2	1 (50%)	1 (50.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)
NSW	N=40	26 (65%)	20 (52.6%)	36 (90.0%)	26 (65.0%)	28 (70.0%)	39 (97.5%)	27 (67.5%)	39 (97.5%)
NT	N=2	2 (100%)	2 (100.0%)	2 (100.0%)	1 (50.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)

QLD	N=20	19 (95%)	16 (80.0%)	18 (90.0%)	18 (90.0%)	19 (95.0%)	19 (95.0%)	19 (95.0%)	19 (95.0%)
SA	N=5	5 (100%)	3 (75.0%)	4 (80.0%)	4 (80.0%)	4 (80.0%)	5 (100.0%)	5 (100.0%)	5 (100.0%)
TAS	N=3	2 (67%)	2 (66.7%)	3 (100.0%)	2 (66.7%)	2 (66.7%)	3 (100.0%)	3 (100.0%)	3 (100.0%)
VIC	N=28	17 (61%)	11 (42.3%)	25 (89.3%)	21 (75.0%)	21 (75.0%)	23 (82.1%)	21 (75.0%)	23 (82.1%)
WA	N=7	7 (100%)	3 (50.0%)	6 (85.7%)	6 (85.7%)	6 (85.7%)	7 (100.0%)	6 (85.7%)	7 (100.0%)
Total	N=107	79 (74%)	58 (57.4%)	96 (89.7%)	80 (74.8%)	84 (78.5%)	100 (93.5%)	85 (79.4%)	100 (93.5%)

a Number of adult ICUs in each region reported by IHACPA as meeting present ICU criteria (as a proportion of total public adult ICUs reporting to ANZICS).

b Number of adult ICUs in each region meeting present IHACPA criteria for consideration as an ICU using presently available data from 2021/22

c Number of adult ICUs in each region with more than 24,000 patient hours in 2021/22

d Number of adult ICUs in each region with more than 24,000 patient hours in 2021/22 and with more than 20% of ventilated patients

e Number of adult ICUs in each region with more than 24,000 patient hours in 2021/22 and with more than 20% of ventilated patients, or >20% ventilation hours

f Number of adult ICUs in each region with more than 24,000 patient hours in 2021/22, with more than 20% of patients receiving one or more of invasive/non-invasive ventilation, renal replacement therapy, intravenous vasopressors or ECMO

g Number of adult ICUs in each region with more than 20% of patients receiving one or more of invasive ventilation, renal replacement therapy or ECMO

h Number of adult ICUs in each region with more than 20% of patients receiving one or more of invasive/non-invasive ventilation, renal replacement therapy, intravenous vasopressors or ECMO