



Centre for Outcome and Resource Evaluation

20
23

REPORT

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ANZICS CORE acknowledges the First Nations People of Australia and Aotearoa New Zealand as the original inhabitants of these lands respectively.

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Executive Summary

COVID-19 continued to dominate the workload of the ANZICS registries as 2022 came to an end. Thanks to all the diligent data collectors, clinicians and ICU managers, along with maintaining routine registry activities, ANZICS was able to release the ANZICS COVID-19 Summary Report describing the course of the whole COVID-19 Pandemic in Australia.

Throughout the pandemic, ANZICS collaborated closely with Jurisdictional and Commonwealth Health Departments as well as data agencies to provide insight into the activity and outcomes not only of patients with COVID-19 but also the overall impact on all critically ill patients, and on the health care system. These are collaborations and services ANZICS is eager to maintain as we move past the pandemic period.

At the 2023 ANZICS-ACCCN Conference in Adelaide, there was much to celebrate as this marked 30 years of ANZICS CORE. The ANZICS Registry has grown progressively since the first meeting of the ANZICS Computer Interest Group in 1993. The success and longevity of ANZICS CORE today was built on the work of dedicated enthusiasts in the late 1990s and is now continued by the whole ICU sector, supported by Jurisdictional funders throughout Australia and New Zealand.

Along with maintaining our 5 registries, much of this financial year has been spent designing the Patient Reported Outcomes and Experiences Measures (PROEMs) system, building the IT infrastructure and getting 22 sites recruited for the pilot project. We have continued to maintain the Critical Health Resource Information System (CHRIS) platform and the ANZICS CORE Registry Public Report platform.

Impact of the ANZICS CORE Registry Program 2022-2023



97% (178/184) of Australian and **60% (18/30)** of New Zealand ICUs contributed to the APD.



100% (52/52) Tertiary ICUs contributed to the ANZICS Registries.



196,221 admissions from 196 ICUs reported to the ANZICS APD. Average annual growth rate of **4%**.



13,101 admissions from 40 ICUs reported to the ANZPICR. Average annual growth rate of **2.1%**.



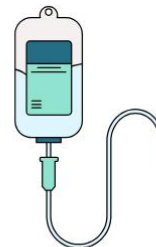
172,360 (92%) adult ICU patients left hospital alive.
12,813 (97%) paediatric ICU patients left hospital alive.



Critical Care Resources Survey showed a **1.4%** increase in available ICU beds (2334 to 2367 beds) across 193 Australian ICUs, and a **5.2%** increase (269 to 283 beds) across 31 New Zealand ICUs.



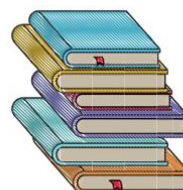
551 ECMO episodes reported to the ANZICS Registries.
58,384 (32%) received Invasive Ventilation.
7,798 (4.3%) received Renal Replacement Therapy.



Total of **145** Central Line Associated Bloodstream Infections (CLABSI) were reported with the CLABSI Rate of **0.56** per 1000 line days.



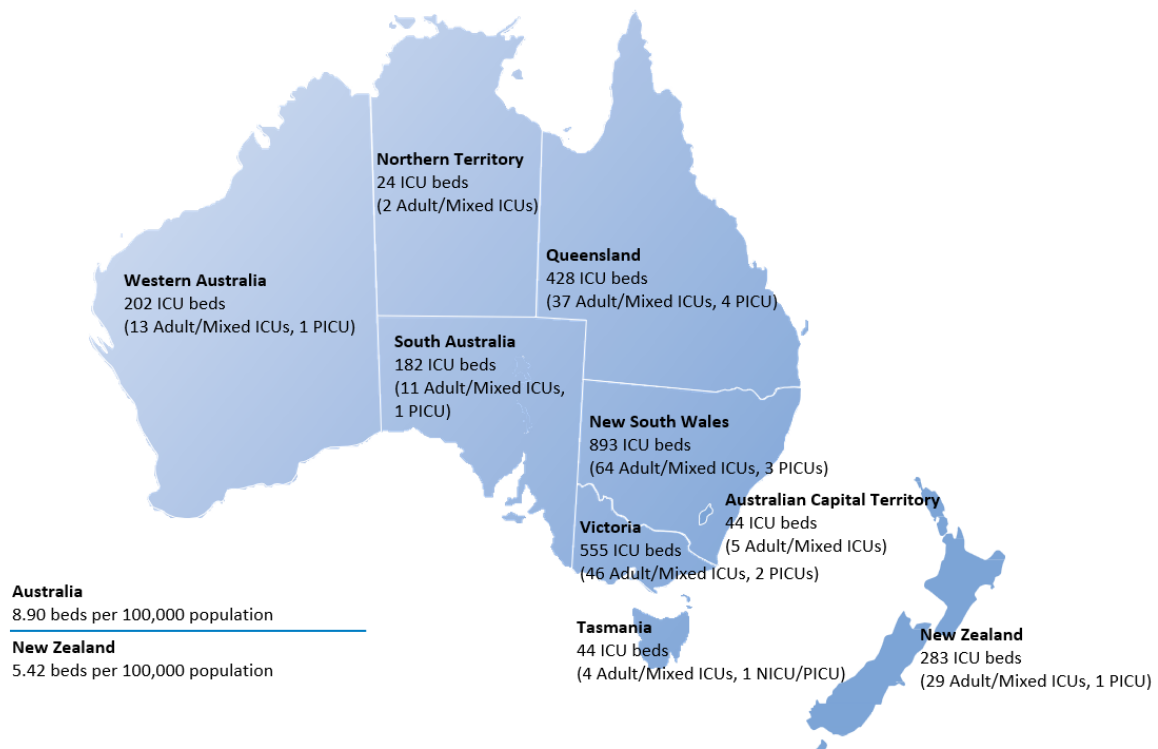
10% increase in ICU expenditure reported by 95 consistently contributing Australian and New Zealand ICUs.



26 Publications in peer-reviewed journals.
88 Completed data requests.

Profile of Intensive Care Services across Australia and New Zealand

Figure 1 Profile of Intensive Care Services in 2022-2023

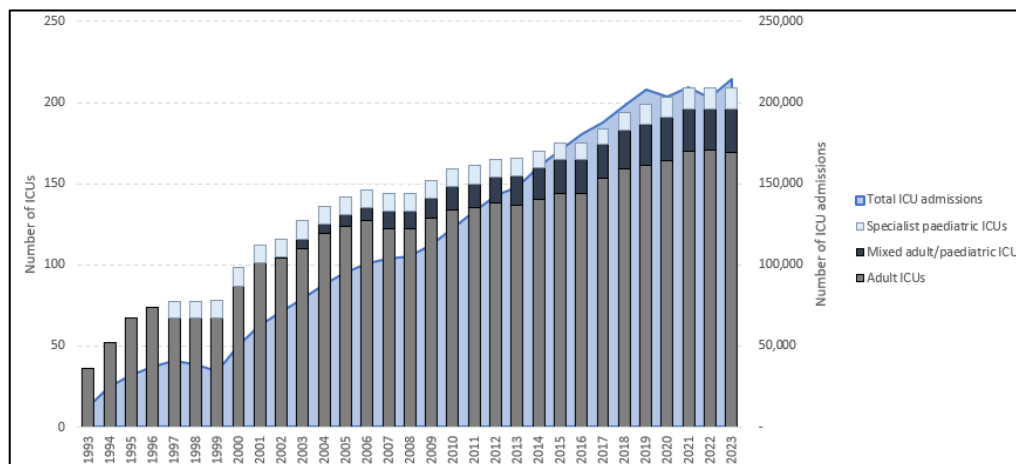


Source: CCR Registry and follow-up of sites by phone to obtain remaining bed numbers not reported
Population was 26,658,948 for Australia and 5,223,100 for New Zealand.

[Stat Data Explorer \(BETA\) • Quarterly Population Estimates \(ERP\), by State/Territory, Sex and Age \(abs.gov.au\)](https://www.abs.gov.au/StatDataExplorer/BETA/QuarterlyPopulationEstimates(ERP),byStateTerritorySexandAge(abs.gov.au))
<https://www.stats.govt.nz/information-releases/national-population-estimates-at-30-june-2023/>

As the ICUs have grown in number and size, so has the number of ICU admissions, as evident in Figure 2. Over the past 30 years ANZICS has continued to grow with the ICU community providing more reporting, continually improving platforms, and reporting tools. In 2023, ANZICS has had the opportunity to reflect on how far the community has come over the past 3 decades and how much our growing registries have contributed to that growth.

Figure 2 The number of ICUs and ICU admissions over the past 30 years.



ANZICS Centre for Outcome and Resource Evaluation (CORE)

Governance

The ANZICS ICU Registries are managed by the ANZICS CORE Committee with representation from the ANZICS Safety and Quality Committee, the Clinical Trials Group and the Paediatric Committee. The Outlier and Research Publication Working Groups provide representation and clinical context from the broader Intensive Care community.

The ANZICS CORE Jurisdictional Advisory Group represents the interests of all Jurisdictional Funding bodies, the Australian Commission on Quality and Safety in Health Care and the Commonwealth Department of Health making recommendations related to activities for monitoring or benchmarking of Intensive Care outcomes across the health system.

ANZICS CORE Offers

ANZICS CORE has been providing ICU registry services for benchmarking and auditing of Intensive Care outcomes across Australia and New Zealand since 1992. The well recognised success of ANZICS CORE is achieved through enduring partnerships and commitment from Jurisdictional health departments, The NZ Health Quality Commission and the ICU clinical community. ANZICS CORE provides:

- An overview of Intensive Care practice across regional, state, federal and international boundaries
- Comprehensive analysis of potential outlier ICUs through a structured governance framework
- Savings of \$4 to the healthcare sector for every \$1 spent on ANZICS registries, through its outlier program alone.

This report provides an overview of ANZICS CORE Registry activities up to June 2023 Detailed Registry activity reports are available on the ANZICS website <https://www.anzics.org/>

The ANZICS CORE Intensive Care Registries

- The **Adult Patient Database (APD)**, quarterly benchmarking reports for General ICUs from 1992.
- **Australian New Zealand Paediatric Intensive Care Registry (ANZPICR)**, quarterly reports for Paediatric ICUs and those mixed Adult/Paediatric units that contribute to (ANZPICR), from 1997.
- **Critical Care Resources (CCR) Registry**, survey data on ICU resources and activity (admissions, bed numbers, workforce and cost data) from General and Paediatric ICUs, from 1992.
- **Central Line Associated Bloodstream Infection (CLABSI) Registry**, monitoring the Central Line Associated Blood Stream Infections in General and Paediatric ICUs, from 2012.
- **Extra Corporeal Membrane Oxygenation (ECMO) Dataset**, monitoring the practice and outcomes of ECMO from 2019.
- **Patient Reported Outcome and Experience Measures**, development commenced in 2021.

Supporting High Quality Data Submission

Maintaining strong engagement with individual units particularly those directly involved in data collection is an important factor to support high quality data collection.

CORE Registry Education Program

During COVID-19 travel was limited with the Registry Training provided virtually ranging from Webinars to on-demand training for new sites and those sites requesting refresher training. The Webinars are available at:

- [*ANZPIC Registry: Ask the experts – Your coding questions answered \(over 1K views\)*](#)
- [*The Critical Care Resources Survey and how it can help the intensive care community*](#)
- [*From one early clinician to another – Dredging the data swamp and making informatics great again*](#)
- [*CORE Update at the ANZICS CTG 23rd Annual Meeting. Watch the data Ninjas in action!*](#)
- [*Ask the experts – Challenging APD data variables: your coding questions answered.*](#)

The CORE Registry Communication Channel

The online SLACK forum provides an important forum for communication and supporting the network of over 400 clinicians and data collectors from across the Intensive Care community. Discussions vary from clarification of data variables, issues related to assigning diagnoses with their peers or checking in with the ANZICS CORE team on any queries they may have. The discussion forum also enables the ANZICS CORE team to communicate updates directly to all the units in a timely manner.

Registry Data Supporting Research

Requesting Registry data for research is encouraged and considered important by CORE to further the body of knowledge that contributes to improved patient outcomes for critically ill patients through policy or practice change.

There has been a doubling of data requests from 44 to 90 over this reporting period. Many were related to COVID-19 and the growing interest in data linkage. 70% of these data requests were from individual units to support a local unit-based research project or activity. The full publication list is provided on Page 32.

ANZICS CORE Partnerships & Collaborators



Collaborating Universities and Research Institutes

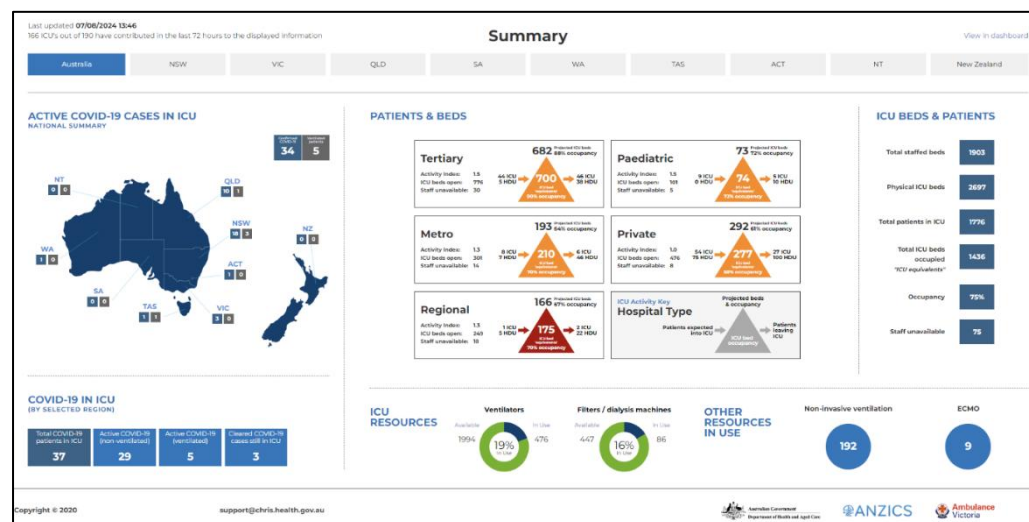
- Monash University, VIC
- Melbourne University, VIC
- University of New South Wales, NSW
- The George Institute, NSW
- University of Queensland, QLD
- Queensland University of Technology, QLD
- University of Western Australia, WA
- Flinders University, SA
- Medical Research Institute of New Zealand, NZ
- National University of Singapore

Moving Past the Pandemic

Critical Health Information System (CHRIS) Platform

The Critical Health Resource Information System (CHRIS) platform provided clinicians, hospital administrators, retrieval agencies and jurisdictional health departments with crucial data during the pandemic. It enabled them to monitor the impact of COVID-19 ICU admissions on beds, staffing and resources. As we move out of the pandemic, the CHRIS Platform continues to capture COVID-19 data including active cases and ventilated patients. However, it now also displays resourcing data such as patient and bed numbers, staffing and recourse use including ventilators, dialysis and ECMO. This platform continues to provide a real-time overview of state and national information on ICU demand, staffing, beds and resources.

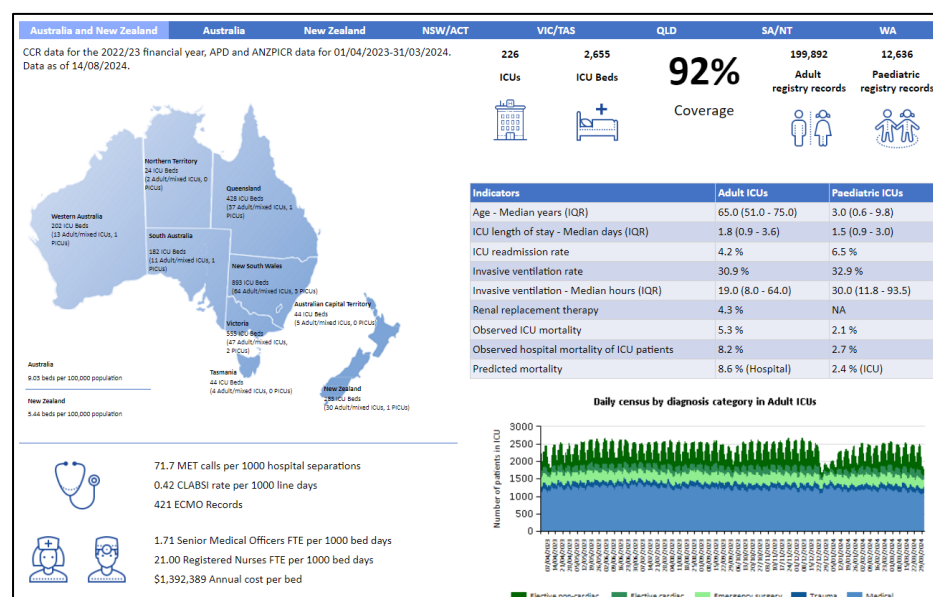
Figure 3 Critical Health Resource Information System (CHRIS) Summary Report



ANZICS CORE Registry Public Reporting

In 2022 ANZICS launched the ANZICS CORE Registry Public Report. Located on the ANZICS website at <https://www.anzics.org/core-reports/>. This platform provides a summarised overview of registry data that. It is updated quarterly and available to the general public.

Figure 4 The ANZICS CORE Registry Public Report



Patient Reported Outcomes and Experience Measures (PROEMS)

The Adult PROEMs project reached a significant milestone when ethics approvals were obtained from the Alfred Hospital Ethics Committee for 16 Australian ICUs, and from the New Zealand Health and Disability Ethics Committees for 2 New Zealand ICUs during the 2022/23FY. Development of the PROEMs web application commenced immediately post-ethics approval involving rigorous testing of the system with inputs from consumers and project committee members. Survey scripts, participant information and consent form, brochure and poster were refined and governance approval for each study site was sought.

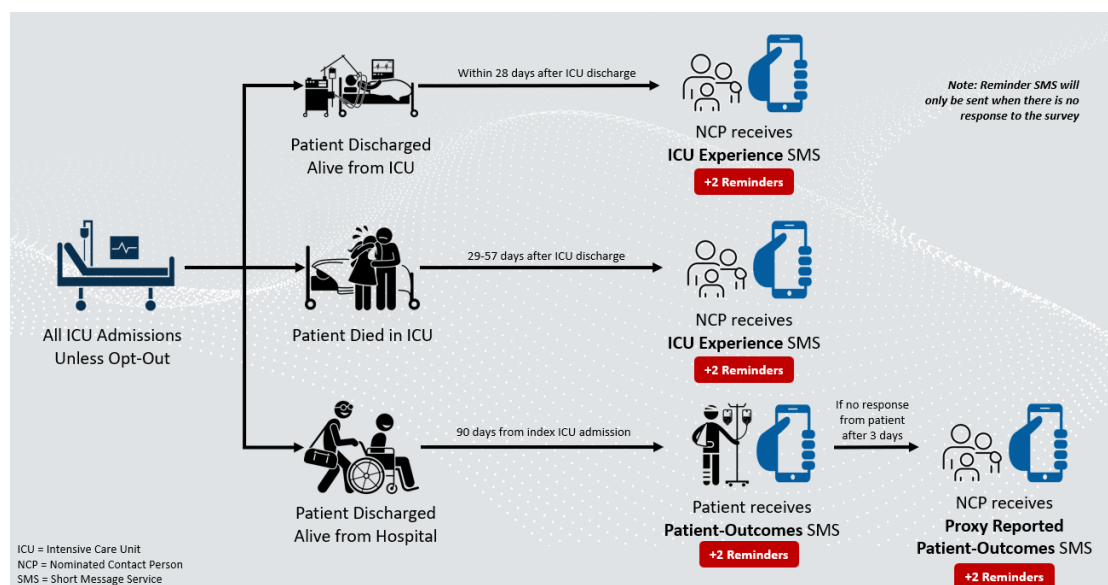


Twenty-one Australian and New Zealand sites confirmed intention to participate in the pilot study by July 2023. See Figure 5 below that illustrates the adult PROEMs survey flow.

The launch was delayed until late 2023, due to changes required to the online survey questionnaire after the first round of internal system testing. Alice Springs Hospital was the first ICU to start together front-page headlines in the Northern Territory News.

Paediatric PROEMs progressed its ethics application with the Children's Health Queensland HREC, with 8 sites participating.

Figure 5 Adult PROEMs Survey Administration Flow

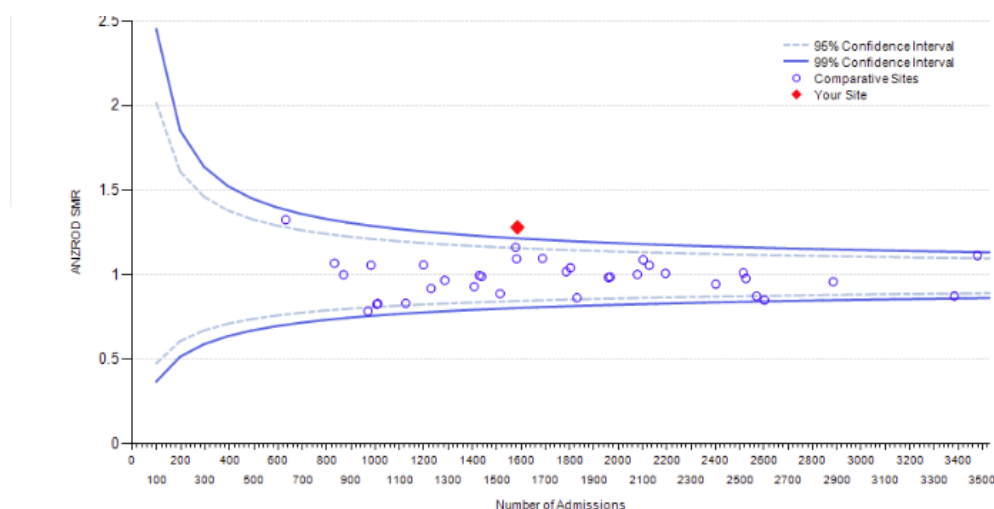


Benchmarking Intensive Care Outcomes

The role of the ANZICS ICU Registries is to monitor clinical performance by comparing risk adjusted outcomes with peer group ICUs based on hospital type. This benchmarking activity contributes to the ongoing high standard of intensive care delivered across Australia and New Zealand.

Figure 6 shows standardised mortality ratios (SMRs) for ICUs in Australia and New Zealand plotted against number of ICU admissions. The potential outlier site is shown in red, triggering a formalised review of the data submitted by that ICU. The results are reported back to the unit and jurisdiction for action.

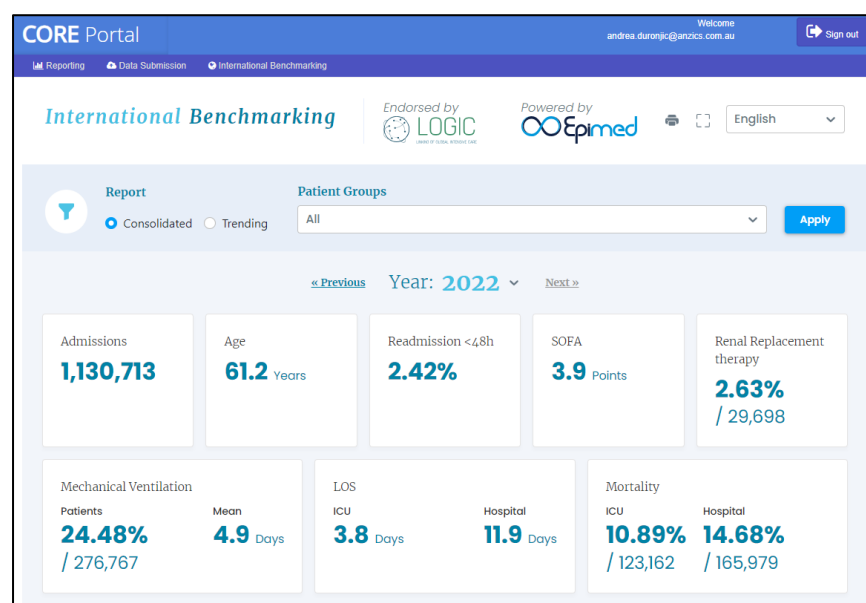
Figure 6 Funnel plot of SMRs showing a potential ICU outlier



Contributing to International Benchmarking

ANZICS is one of 10 registries collaborating with LOGIC (Linking of Global Intensive Care) to provide an independent consortium of ICU registries. This worldwide initiative provides an insightful platform encouraging research and benchmarking in an effort to improve ICU care. This platform includes more than 2,500 individual ICUs in 16 countries.

Figure 7 Linking of Global Intensive Care (LOGIC) Report



Monitoring Potential Outlier ICUs

Figure 8 shows the number of outlier reviews undertaken since the Outlier Management Program commenced in 2010 until 2023. Factors that influence potential outlier status are data quality, case mix and issues related to processes of care or resources. Data Quality is the predominant factor contributing to an Outlier status as depicted in Figure 9.

Figure 8 Number of Potential Outliers identified from 2010 – 2023

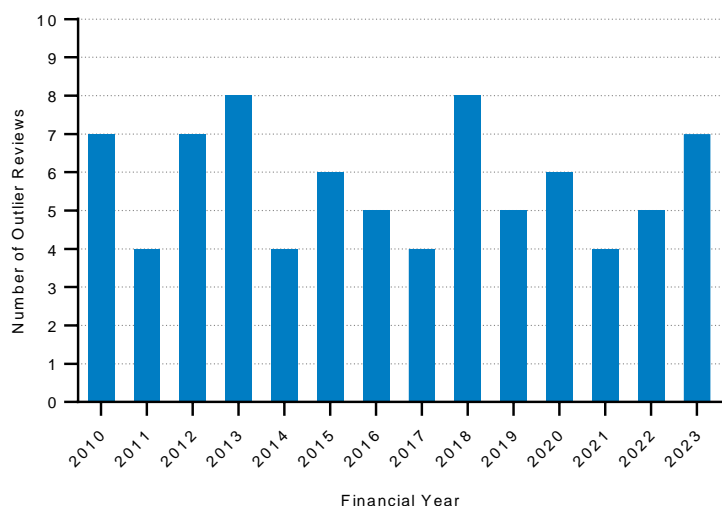
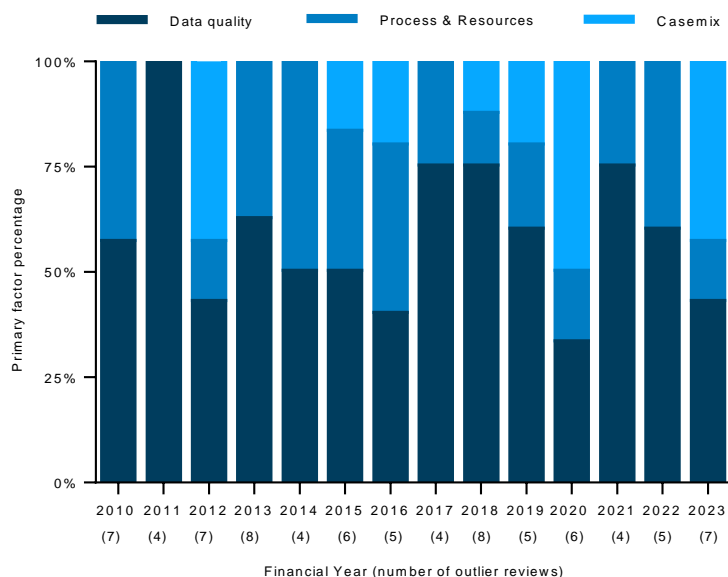


Figure 9 Predominant factors influencing Outlier Status



Long-term Survival Outcomes

Older patients are expected to have a higher morbidity and mortality post-ICU admission. The Kaplan Meier plot shown in Figure 10 demonstrates patients 75 years and older have a 55% probability of survival 2 years after ICU admission whilst those aged less than 60 have approximately an 85% probability of survival. Similarly, higher frailty scores demonstrate a significantly lower survival probability as seen in Figure 11.

Figure 10 Long-term survival of patients post-ICU admission over 2 years by age

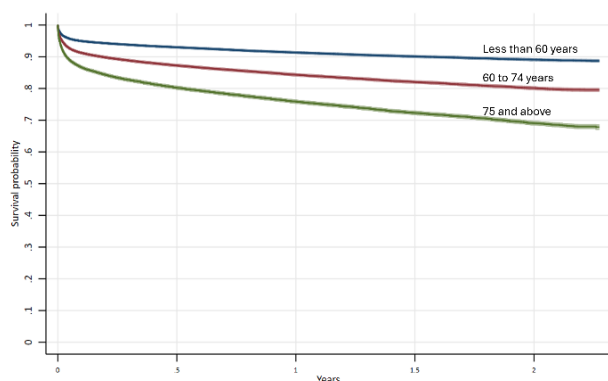
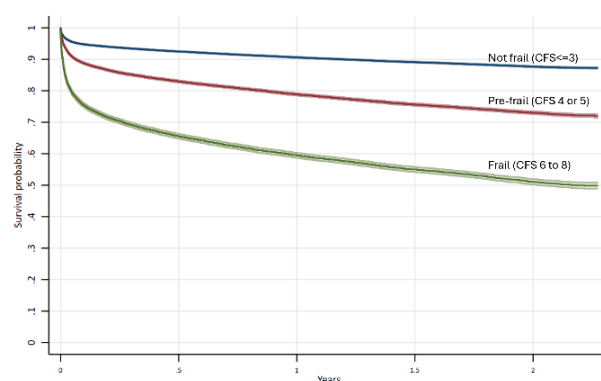
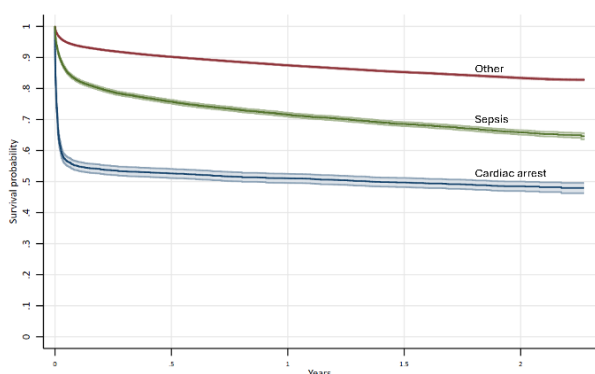


Figure 11 Long-term survival of patients post-ICU admission over 2 years by frailty before admission



The cause of admission to ICU has a major effect on long-term survival. Compared to all other cohorts, patients admitted with sepsis or cardiac arrest have a much lower immediate and long-term survival probability as seen in Figure 12.

Figure 12 Long-term survival of patients post ICU admission over 2 years by diagnosis



The Kaplan-Meier plots above show the probability of survival at specific time-intervals after ICU admission. They are not 'risk-adjusted'. Survival estimates are affected by underlying patient characteristics such as age, frailty and diagnosis. They are also dependent on the integrity and completeness of the linkage to the National Death Index Registers in Australia and New Zealand. Comparative Kaplan Meier plots showing the survival of your ICU patients compared to peer group hospitals, are in development at ANZICS CORE.

ANZICS CORE Registries Update 2022/23

Adult Patient Database (APD)

Contribution to Adult Patient Database (APD)

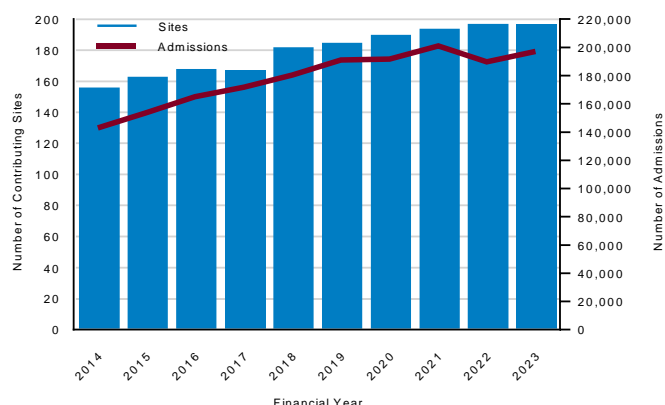
96.7% (178/184) of Australian and **60.0% (18/30)** of New Zealand ICUs contributed to the APD in 2022/23. This includes:

- **100.0%** (40/40) of Tertiary ICUs
- **97.4%** (37/38) of Metropolitan ICUs
- **83.9%** (47/56) of Rural/Regional ICUs
- **90.0%** (72/80) of Private Hospital ICUs

Summary (Adult ICUs)

- Total adult admissions to the APD: **196,211** (180,125 from Australia, 16,086 from New Zealand).
- Observed hospital mortality in adult patients was **7.9%** in Australia and **10.7%** in New Zealand.
- Predicted risk of death in hospital for adult patients was **7.9%** in Australia and **9.8%** in New Zealand (based on the Australian and New Zealand Risk of Death (ANZROD) mortality prediction algorithm).
- There has been no change to observed mortality, with a slight increase in predicted mortality since last year.
- The median ICU length of stay was 1.8 days in Australia and 1.7 days in New Zealand.

Figure 13 Contributions to the APD by sites and admissions 2013/14 – 2022/23



Source: APD (All ANZ admissions reported to the APD)

Source of Admission to Adult ICUs

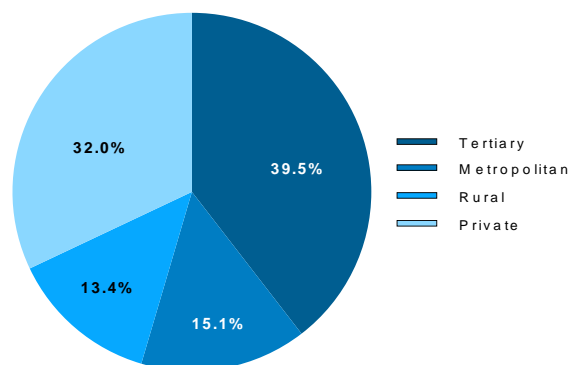
ANZICS APD compares ICUs by hospital classifications: tertiary, metropolitan, rural/regional and private. The classifications are based on hospital location, the level of services available and similarity of casemix (Figure 14). For instance, tertiary hospital ICUs provide support to cardiothoracic or neurosurgical patients.

In 2022/23 private ICUs had a higher proportion of patients admitted from the operating theatre or recovery. Most of these were planned admissions following elective surgery.

Metropolitan and rural hospitals had the highest proportion of ICU admissions from emergency departments. Of the public hospitals (tertiary, metropolitan and rural), tertiary ICUs had the highest proportion of admissions from operating theatre and recovery (Figure 15).

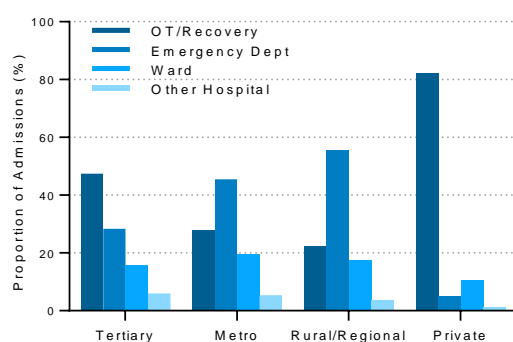
Adult Patient Database (APD)

Figure 14 Admissions to adult ICUs by hospital classification 2022/23



Source: APD

Figure 15 Source of admission by hospital classification 2022/23



Source: APD

Admission Diagnoses (Adult ICUs)

In Australia in New Zealand, coronary artery bypass grafts (CABG) was the most common admission diagnosis. The 5 most common diagnoses are shown in Table 1.

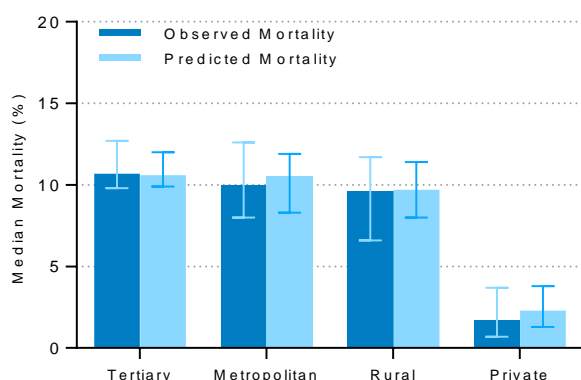
Table 1 Top 5 Admission Diagnoses for Patients Admitted to Adult ICUs

Australia	Number	Percentage (%)
Coronary artery bypass grafts	9,852	5.5
Orthopaedic surgery	9,242	5.1
Other GI diseases	8,472	4.7
Laminectomy/Spinal cord surgery	6,979	3.9
Sepsis with shock, other than urinary	6,507	3.6
New Zealand	Number	Percentage (%)
Coronary artery bypass grafts	1,130	7.0
Drug overdose	644	4.0
Sepsis, other than urinary	642	4.0
Cardiac arrest	596	3.7
Sepsis, other than urinary	580	3.6

Observed and Predicted Mortality (Adult ICUs)

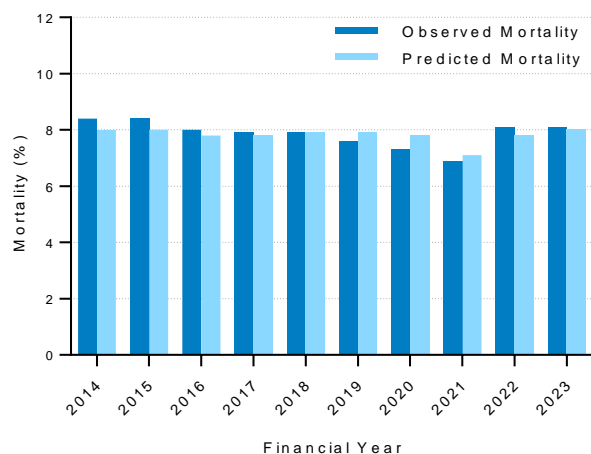
Figure 16 shows the observed and predicted mortality by hospital classification. Figure 17 demonstrates that both observed and predicted mortality steadily declined from 2014/15 until 2015/16 then remaining constant between 2016/17-2017/18. This is followed by a lower observed mortality to predicted mortality in 2018/19-2020/21 until we see a spike in both predicted and observed mortality in 2021/22.

Figure 16 Observed and predicted hospital mortality by Classification 2022/23



Source: APD

Figure 17 Observed and predicted hospital mortality – 10-year trend



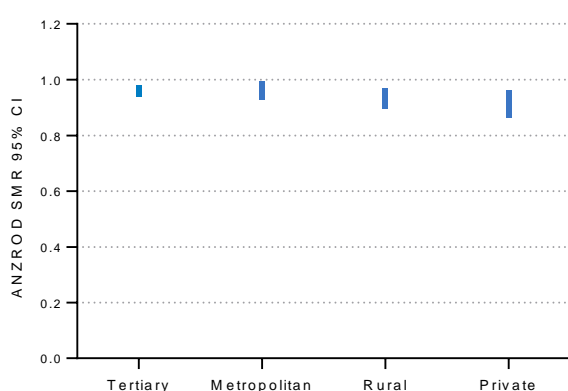
Source: APD, predicted mortality for 2020/21 - 2022/23 is derived from ANZROD re-calibrated in 2020/21, figures for earlier years are based on the previous version of ANZROD.

ANZROD Standardised Mortality Ratio (Adult ICUs)

The Standard Mortality Ratio (SMR) is commonly used as a key indicator of quality and safety to monitor and benchmark ICU performance. The SMR is a ratio of the actual number of deaths divided by the predicted number of deaths at each ICU. The predicted number of deaths in adult ICUs is derived from the Australian and New Zealand Risk of Death (ANZROD) model.

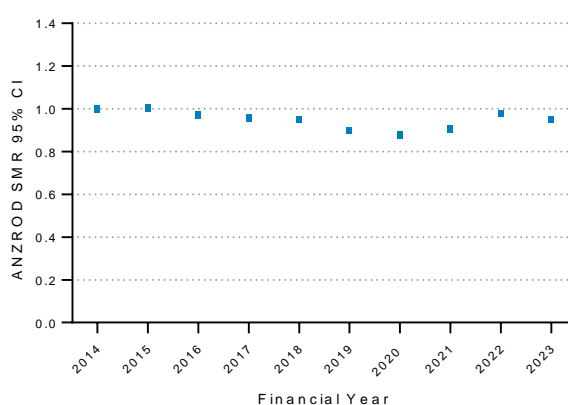
Figure 18 shows SMR for each hospital classification in 2022/23. Figure 19 illustrates the downward trend in SMR since 2014/15 until 2019/20 when SMR started to rise during the COVID-19 pandemic. SMR for 2020/21 - 2021/23 is calculated based on ANZROD recalibrated in 2020/21, SMR figures for earlier years are based on the previous version of ANZROD.

Figure 18 ANZROD SMR (95% CI) for ICUs by hospital classification 2022/23



Source: APD

Figure 19 ANZROD SMR (95% CI) – 10-year trend (FY)



Source: APD, SMR for 2020/21 - 2022/23 from ANZROD re-calibrated in 2020/21

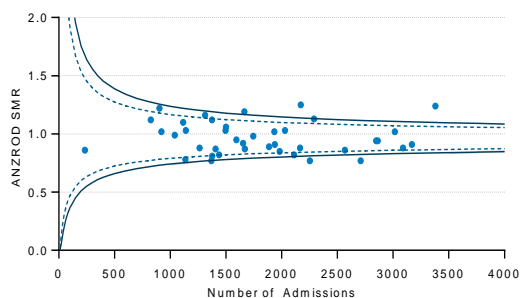
Adult Patient Database (APD)

Benchmarking Adult ICU outcomes

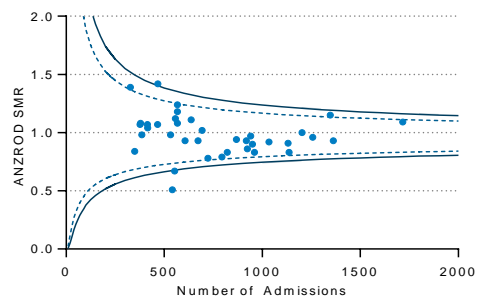
To identify units with outcomes that are potentially significantly different to their peer group, SMRs are presented on a funnel plot. Control lines, taking the shape of a funnel, are based on the mean SMR of the group. Figure 20 shows the 2022/23 funnel plots for each hospital classification.

Figure 20 ANZROD SMR funnel plots 2022/23

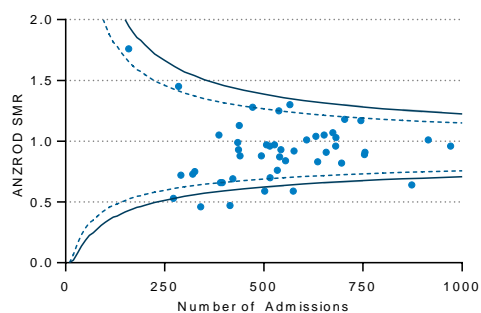
Tertiary Hospital



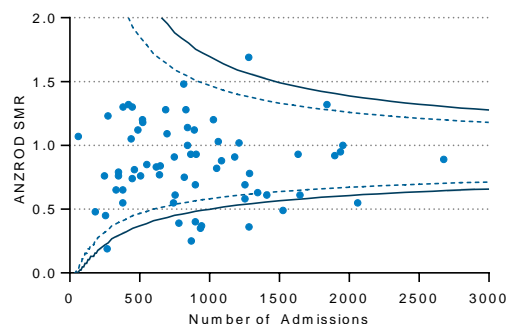
Metropolitan Hospitals



Rural Hospitals



Private Hospitals



Adult Patient Database (APD)

Table 2 Characteristics for Admissions to Adult ICUs from APD

	Australia	New Zealand	Australia and New Zealand	Explanation / Exclusions
Patient Characteristics				
Total Adult Admissions	180,125	16,086	196,211	Excludes age < 16.
Median Age in years (IQR)	66 (52 – 76)	63 (48 – 73)	65 (51 – 75)	Excludes age < 16.
Male	56.2%	58.9%	56.4%	Excludes age < 16. Reported as % of total.
Elective Admissions	46.3%	30.1%	44.9%	Excludes age < 16. Reported as % of total.
Median Length of Stay in ICU in days (IQR)	1.8 (0.9 – 3.7)	1.7 (0.9 – 3.1)	1.8 (0.9 – 3.6)	Excludes ICU LOS is null and age < 16.
After-Hours Discharge to Ward (6pm – 6am)	19.0%	17.8%	18.9%	Reported as % of adult live discharges (excludes records with ICU outcome other than ward).
Readmitted patients (during the same hospital episode)	4.0%	4.2%	4.0%	Reported as % of adult patients who survive their first admission to ICU
Source of Admission				
Ward	14.8%	15.3%	14.8%	Excludes records with missing ICU source and age < 16.
Operating Theatre/Recovery	52.7%	46.3%	52.2%	
Accident & Emergency	26.7%	31.2%	27.1%	
Other Hospital or ICU	5.5%	7.1%	5.6%	
Direct ICU Admission	0.2%	0.1%	0.2%	
Interventions				
Invasively ventilated (day 1)	27.6%	37.5%	28.4%	Adult admissions invasively ventilated during first 24 hours of ICU reported as % of total.
Invasively ventilated in ICU	30.6%	42.5%	31.6%	Adult admissions invasively ventilated anytime during ICU stay reported as % of total.
Invasive ventilation hours in ICU#	69; 20 (9 – 73)	62; 19 (7 – 56)	68; 20 (9 – 67)	Excludes records with invasively ventilated hours = 0 and age < 16.
Non-invasively ventilated	11.9%	8.6%	11.6%	Adult admissions non-invasively ventilated anytime during ICU stay reported as % of total.
Non-invasive ventilation hours in ICU#	26.5; 12 (5 – 32)	23.0; 12 (5 – 28.5)	26.3; 12 (5 – 32)	Excludes records with non-invasively ventilated hours = 0 and age < 16.
Inotropes/vasopressors	39.2%	54.8%	40.5%	Adult admissions with inotropes/vasopressors administered during ICU stay reported as % of total.
Renal replacement therapy	4.3%	4.9%	4.3%	Adult admissions with renal replacement therapy provided during ICU stay reported as % of total.
Tracheostomy	1.1%	2.2%	1.2%	Adult admissions with tracheostomy done anytime during ICU stay reported as % of total.
ECMO	0.3%	0.3%	0.3%	Adult admissions with ECMO provided anytime during ICU stay reported as % of total.
Thromboprophylaxis	96.6%	95.5%	96.6%	% Adult admissions with VTE prophylaxis given (excludes codes 3-contraindicated, 4-not indicated and NULL-not reported).
Severity of Illness – APACHE Scores				
Median APACHE III Score (IQR)	47 (35 – 63)	50 (37 – 68)	48 (35 – 64)	Excludes age < 16, ICU LOS < 4 hrs and admissions where all APACHE III physiology is missing.
Median APACHE II Score (IQR)	14 (10 – 19)	15 (11 – 20)	14 (10 – 20)	Excludes age < 16, ICU LOS < 8 hrs and admissions where all APACHE II physiology is missing.
Severity of Illness – ANZROD Predicted Risk of Death				
Predicted Risk of Death#	7.9%; 1.4% (0.4 – 6.3)	9.8%; 2.1% (0.6 – 8.9)	8.0%; 1.4% (0.4 – 6.5)	Excludes readmissions, age < 16, missing hospital outcome, all physiology missing, patients admitted to ICU for palliative care or organ donation.
Outcomes				
ICU Mortality	5.2%	7.7%	5.4%	Excludes missing ICU outcome and age < 16.
Hospital Mortality	7.9%	10.7%	8.1%	Excludes readmissions, age < 16 and missing hospital outcome.
ANZROD SMR (95% CI)	0.94 (0.93 – 0.96)	1.00 (0.96 – 1.06)	0.95 (0.93 – 0.97)	Excludes readmissions, age < 16, missing hospital outcome, all physiology missing, patients admitted to ICU for palliative care or organ donation.
Survivors discharged home or hospital in the home	79.7%	78.6%	79.6%	Excludes age < 16 and missing hospital outcome. Reported as % of live hospital discharges or transfers.
Survivors transferred to Nursing home/Chronic care/Palliative care	1.6%	2.0%	1.6%	Excludes age < 16 and missing hospital outcome. Reported as % of live hospital discharges or transfers.
Survivors transferred to the Rehabilitation facility	7.0%	4.0%	6.8%	Excludes age < 16 and missing hospital outcome. Reported as % of live hospital discharges or transfers.

Source: APD; # Mean (Median, IQR)

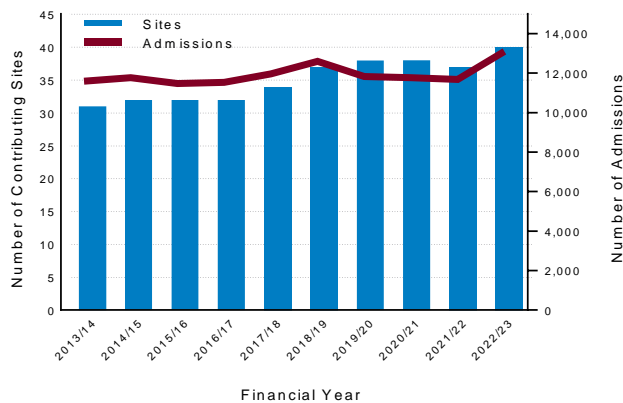
Australian & New Zealand Paediatric Intensive Care Registry (ANZPICR)

Contribution to ANZPICR

- **100%** of PICUs in children's hospitals (**9**), 4 PICUs in general hospitals and **27** general ICUs bi-nationally.
- **13,101** admissions reported to the ANZPIC Registry.
- About **95%** of all paediatric ICU admissions in Australia & New Zealand.

Figure 21 shows the number of contributing units to the ANZPIC Registry and the number of admissions over the past ten years.

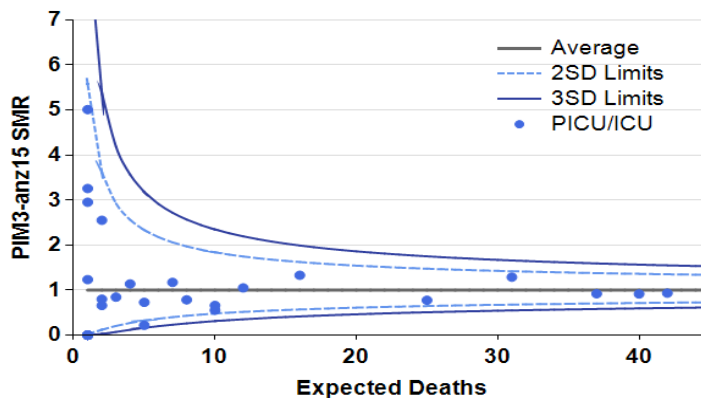
Figure 21 Contributions to the ANZPIC Registry by number of sites and admissions 2013 – 2023



Clinical Outcomes for Paediatric Patients

- Hospital mortality **3.1%**
- ICU mortality **2.3%**
- Predicted ICU mortality **2.2%** (PIM3-anz15 mortality prediction model).

Figure 22 PIM3-anz15 SMR Funnel Plot for ANZPICR Contributing Units 2022/23



ICU Activity and Resources in Paediatric ICUs

- **46,848** bed days used in the treatment of patients in 2022/23.
- **4.0%** admissions had an ICU length of stay more than 14 days, accounting for **35.7%** bed days.
- **33.2%** admissions were intubated during the admission, **44.9%** of admissions required invasive or non-invasive mechanical ventilation.

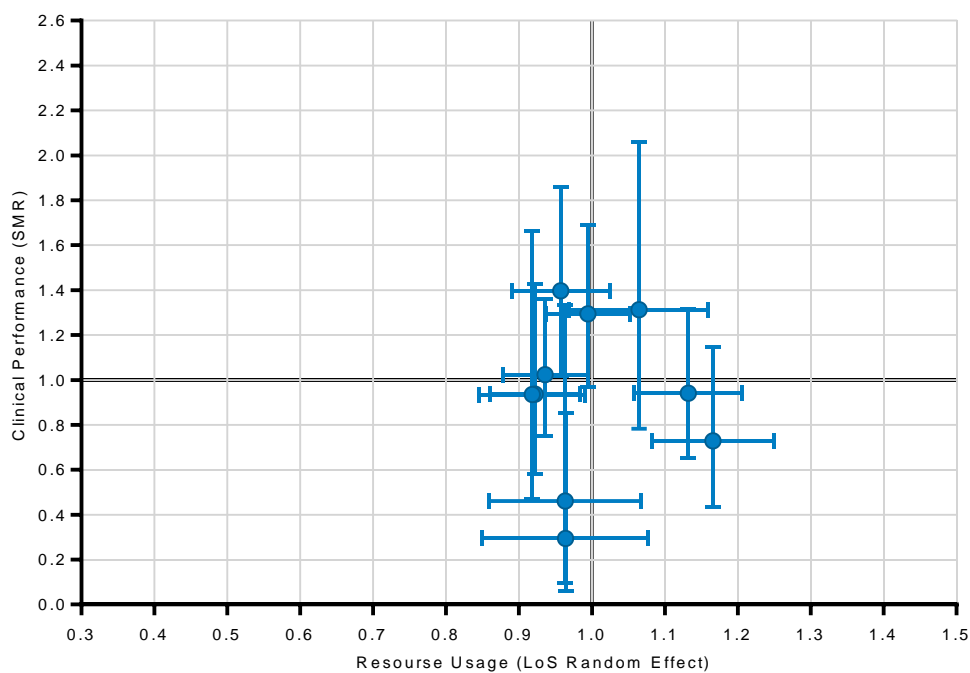
Australian & New Zealand Paediatric Intensive Care Registry (ANZPICR)

Monitoring Outcomes in Paediatric ICUs

ANZPIC Registry Clinical Advisory Committee (ARCAC) review all data and reports. Risk-adjusted outcomes of contributing units in 2022/23 were within acceptable limits.

The Paediatric Registry also reports ICU efficiency, where the SMR¹ based on PIM3-anz15 score (Figure 22) is used as the indicator of clinical performance, and a risk-adjusted length of stay model is used as a marker of resource use (Figure 23). The units in specific quadrants can be described as most efficient (bottom left), least efficient (top right), effective but at the expense of high resource use (bottom right), and SMR greater than 1.0 with lower resource use (top left).

Figure 23 Efficiency Plot for PICUs in 2022/23



¹ Straney L, Clements A, Alexander J, Slater A, for the ANZICS Paediatric Study Group (2010) Measuring Efficiency in Australian and New Zealand Paediatric Intensive Care Units. *Intensive Care Medicine*, 36(8): 1410-1416.

Critical Care Resources (CCR) in Adult & Paediatric ICUs

The CCR Survey provides data on critical care resources and activities. It includes data on clinical indicators, ventilation, workforce, medical emergency teams, allied health, safety and quality, research infrastructure, and costing. Reported changes over 2 or 5 years are based on consistently contributing ICUs.

A few additional questions were added to the 2022/23 CCR survey, seeking to reflect changes in contemporary practice. These provide important reference points in maintaining or improving care moving forwards. Of the new questions, access to Aboriginal and/or Torres Strait Islander or Māori Healthcare Liaison/Support Officers was high outside of private healthcare facilities and responses to the new Australian Commission on Safety and Quality in Health Care sepsis indicators suggest that most ICUs have access to a hospital sepsis guideline or protocol, but low availability of either sepsis-specific information for survivors or a sepsis care coordinator.

CCR Survey Contribution

The 2022/23 CCR survey was sent to 225 ICUs across Australia and New Zealand with a response rate of 81.8% (184/225). The data includes 83.5% (162/194) of Australian and 71.0% (22/31) of New Zealand ICUs.

- Tertiary ICUs: **98.1%** (51/52)
- Metropolitan ICUs: **94.7%** (36/38)
- Rural/Regional ICUs: **80.4%** (45/56)
- Private ICUs: **65.8%** (52/79)

Analysis of bed numbers includes data from all Australian and New Zealand ICUs (n=225). Total admission data includes data from 193 Australian and 27 New Zealand ICUs (n=220).

- **3,359** physical and **2,655** available beds: across 225 Australian and New Zealand.
- **223,034** adult and paediatric admissions reported from 220 ICUs.
- **624,856** ICU bed days were reported from 178 ICUs.

Changes in Critical Care Resources & Activity from the previous financial year

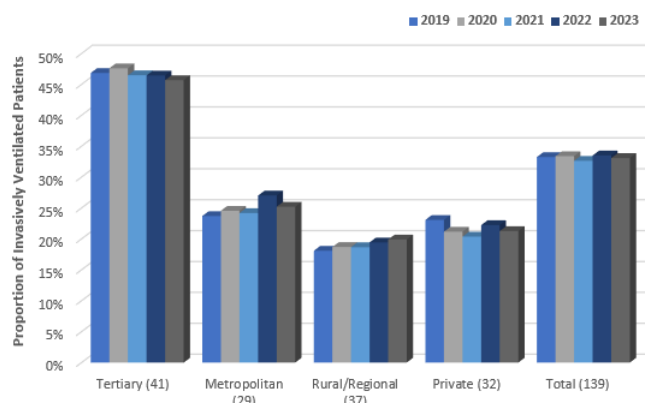
- **1.6%** growth in physical beds (52 beds, n=224)
- **1.8%** increase in available beds (47 beds, n=224)
- **3.9%** increase in admissions (n=218)
- **3.5%** increase in ICU bed days (n=158)
- **40.2%** of invasively ventilated patients (n=160)
- **4.8%** increase in MET calls resulting in an ICU admission (n=161)
- **3.0%** increase in SMO FTE (n=123)
- **5.3%** increase in permanent RN FTE (n=155)
- **0.4%** decrease in Critical Care Qualified RN FTE (n=115)
- **10%** increase in total ICU expenditure (n=95)
- **8.1%** increase in total ICU expenditure per available bed (n=95).

Ventilation

Figure 24 shows that in 2022/23, the overall proportion of invasively ventilated patients was 33.1%, this has mildly decreased from 33.5% in 2021/22. There remains a notable large number of ventilated patients at tertiary sites compared to metropolitan, rural and private sites.

Critical Care Resources (CCR) in Adult & Paediatric ICUs

Figure 24 Proportion of Invasively Ventilated Patients over 5 years, by Classification



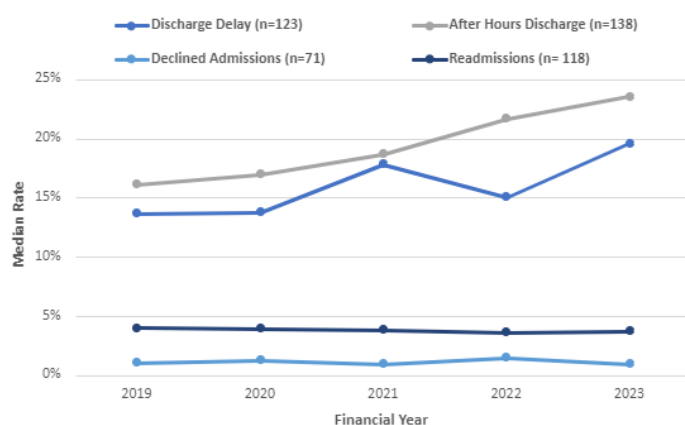
Data from 139 consistently contributing sites.

Readmissions, Declined Admissions, Discharge Delay and After-Hours Discharge

CCR data is used for reporting ICU clinical indicators to the Australian Council for Health Standards (ACHS) for hospital accreditation. Figure 25 shows the median rate for discharge delay (exit block), declined admissions, readmissions and after-hours discharge over 5 years. Discharge delay and after hours discharge rate showed an absolute increase of 4.6% and 1.8% respectively, from 2019/20. Readmissions and declined admissions remain relatively constant. Median rate for discharge delay showed an absolute increase of 4.6% from 2021/22.

Note: Discharge delay indicator was updated in 2018/19 from 6 to 12 hours to conform with the ACHS Exit Block indicator.

Figure 25 Clinical Indicators over 5 years



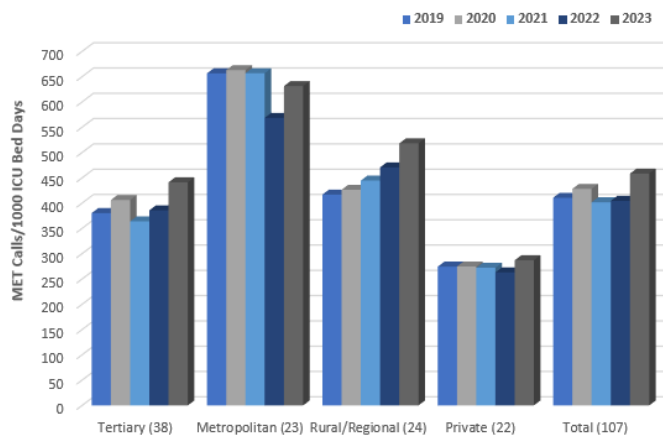
Consistently contributing ICUs for each clinical indicator (n= No. of ICUs).

Medical Emergency Teams - Activity

Figure 26 shows an increasing number of MET calls per 1000 ICU bed days across all tertiary, metropolitan, rural/regional and private units in 2022/23. The overall number of MET calls per 1000 ICU days reported has increased by 11.7% over the last 5 years. Rural/Regional units reported the greatest change with a 24.3% increase in MET call per 1000 ICU days from 2018/19.

Critical Care Resources (CCR) in Adult & Paediatric ICUs

Figure 26 MET Calls per 1000 ICU Days over 5 years, by Classification



Data from 107 consistently contributing ICUs.

Workforce

Senior Medical Officers (SMO)

- The total SMO Established FTE (includes vacancies) per 1000 ICU bed day remained consistent at 1.7 FTE as reported in 2021/22 (n=117).
- The total SMO vacancy rate for 2022/23 was 7.1%, lower than the 8.4% reported in 2021/22 (n=85).

Senior Medical Officers – Gender balance

- 82.3 (135/164) ICUs reported one or more practising female intensivists totalling 369 female intensivists with a total of 222.2 FTE (n=121).

Registered Nurses (RN)

- The total RN Established FTE (includes vacancies) per 1000 ICU bed days showed a 1.2% increase from 2021/22 (n=147).
- The total RN vacancy rate of 8.4% decreased slightly from 8.9% in 2021/22 (n=155).

Registered Nurses - Critical Care Qualification

- Median proportion of RN FTE with critical care qualification for each ICU (n=135) was 51.1% (IQR 38.5-64.0).
- Total FTE for permanent RN with critical care qualification per 1000 ICU bed days reported showed a 3.6% decrease, from 10.5 FTE in 2021/22 to 10.1 FTE in 2022/23 (n=109).

Indigenous Liaison/Support Officer

- 79.4% (127/160) of ICUs have access to an Aboriginal and/or Torres Strait Islander Officer or Kaimahi Hauora Māori (Māori Health Worker).

Sepsis Clinical Care

- 94.6% (157/166) of ICUs have a documented protocol, policy or guideline for identification and management of Sepsis.
- 17.4% (27/155) of ICUs have a Sepsis care co-ordinator.
- 22.6% (35/155) of ICUs have written information on Sepsis and Sepsis Survivorship for patients and families.

Central Line Associated Bloodstream Infections (CLABSI) Registry

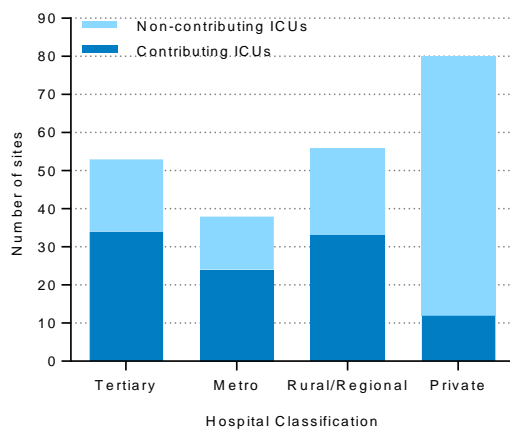
Data Collection

The ANZICS CORE CLABSI Registry commenced in 2012 to monitor CLABSI rates in Australian ICUs and is reported by hospitals. The data submitted includes the number of central line days and number of CLABSIs per month. The definitions for these variables were established by the Australian Commission on Safety and Quality in Health Care (ACSQHC) to support national conformity⁵.

Data is submitted via the CLABSI Registry online tool, predominantly by jurisdiction surveillance bodies, but also by hospital infection control departments or by individual ICU staff.

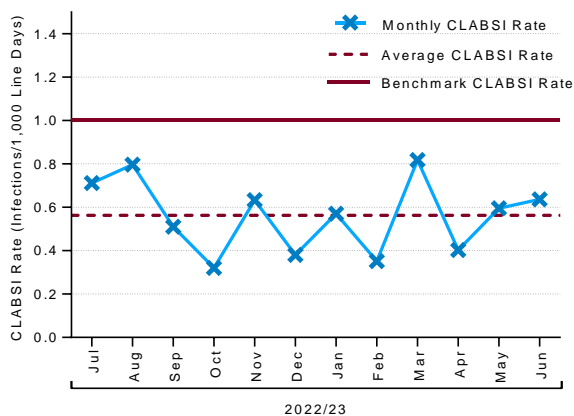
- From July 2022 – June 2023 there were **1,202** surveillance entries and **259,090**-line days reported from 103 Australian ICUs, seven of which were PICUs. Figure 27 shows the number of contributing ICUs to the CLABSI Registry by hospital classification for the financial year 2022/23.
- The average CLABSI rate was **0.56 per 1,000-line days**, well below the benchmark rate of 1 per 1,000-line days. Figure 28 shows the monthly CLABSI rate, the national average, and the benchmark rate. Sites with less than six months of data submitted are excluded from Figure 28 and Figure 29.

Figure 27 Contribution to CLABSI Registry by Hospital Classification for 2022/23



**Several hospitals have more than one ICU*

Figure 28 Monthly Total CLABSI Rates 2022/23



Central Line Associated Bloodstream Infections (CLABSI) Registry

Figure 29 shows a funnel plot of CLABSI rate and the number of line days for each contributing ICU. Larger units are likely to have a greater number of line days. Units with high or low CLABSI rates will fall outside the 95% confidence intervals. Four outliers were identified in 2022/23.

Figure 29 CLABSI Funnel Plot for 2022/23

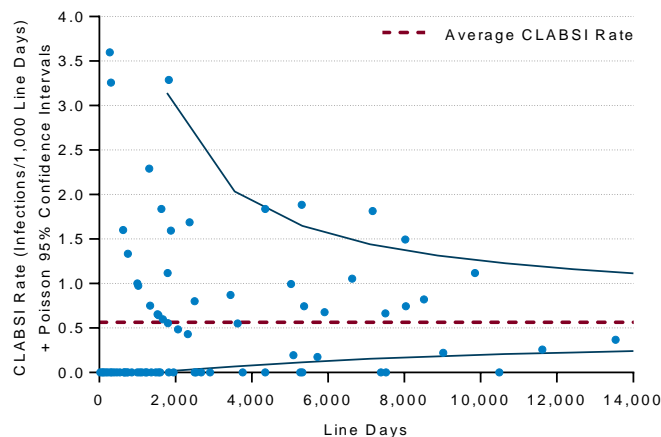
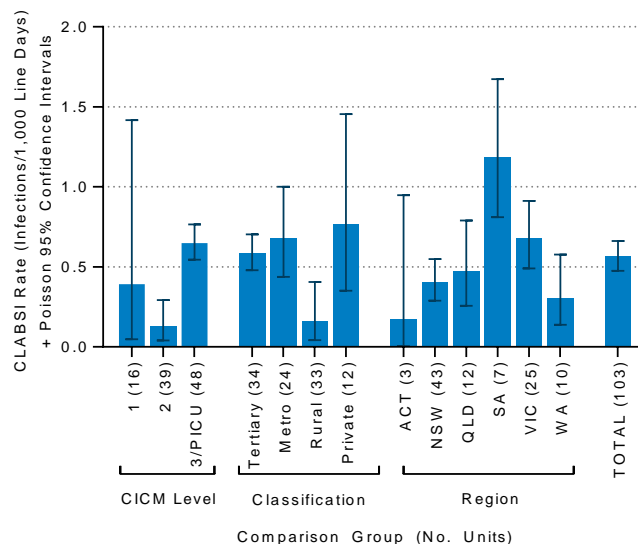


Figure 30 shows comparative rates of CLABSI across ICU levels as described by the College of Intensive Care Medicine (CICM), hospital classification, and regions. Data are only shown where there are three or more contributing units to avoid site identification.

Figure 30 Comparative CLABSI Rates for 2022/23



Central Line Associated Bloodstream Infections (CLABSI) Registry

Trends over time 2018/19 – 2022/23

Figures 31 and 32 show the comparative CLABSI rate over 5 years by region and classification. South Australia has had a steady increase in CLABSI rates over the past 5 years whilst the Australian Capital Territory has had a steady decline in CLABSI rates over the past 5 years. CLABSI rates by classification have been rather fluctuant over the past 5 years with no discernible steady trends.

Figure 31 CLABSI Rates by Region 2018/19 – 2022/23

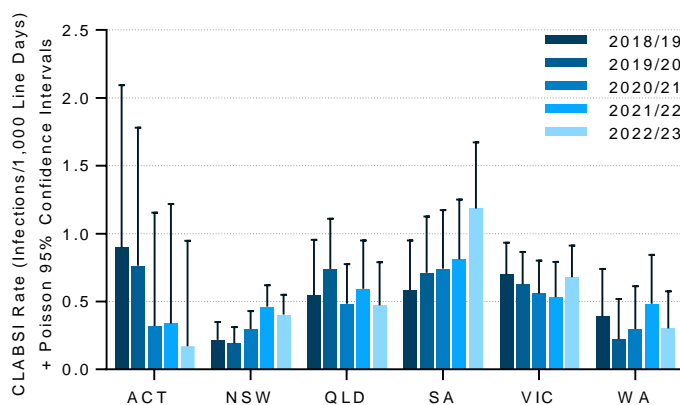
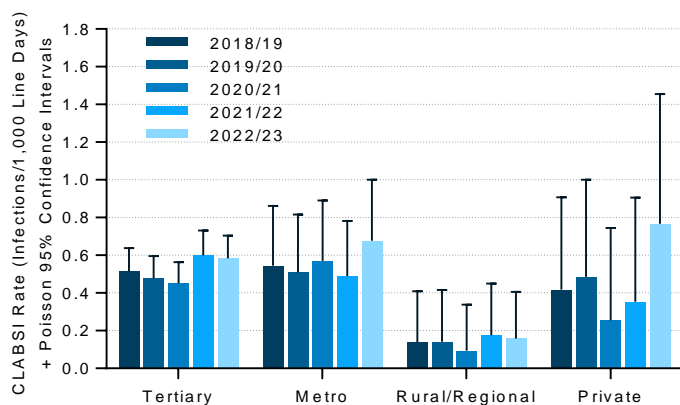


Figure 32 CLABSI Rates by Classification 2018/19 – 2022/23



Extracorporeal Membrane Oxygenation (ECMO) Registry

The Extracorporeal Membrane Oxygenation (ECMO) Registry commenced in 2019 to measure variation in a low volume, high-cost procedure.

2022 – 2023 Results

- From July 2022 – June 2023 there were a total of **511** ECMO episodes reported to the Registries, of whom **222** episodes (**220** unique patients) had additional data collected from across 13 adult ICUs and 2 Paediatric ICUs.
- Of the **220** patients, males aged between 40 to 70 years make up the highest proportion of ECMO cases with Veno-Arterial(VA) ECMO being the most common ECMO type used for **81.1%** of the patients.
- Ventricular Tachycardia Fibrillation was the most common primary diagnoses attributed to ECMO usage in adults, and Septic Shock for paediatric patients.
- The main complications observed included bleeding (at cannula site and other bleeding) and circuit exchange due to clot/failure, however other complications were also common.
- Median SAVE score for adult VA ECMO patients (n=140) was **-4** with inter quartile range of **-6 to -1**.
- Median RESP score for respiratory survival of all adult VV ECMO patients (n=35) was **0** with inter quartile range of **-2.5 to 1**.

Table 3 and 4 below describe the length of stay and mortality for ECMO cases. Overall median ECMO duration was **4.7** days with ICU stay of **19.1** days and hospital stay of **28.8** days, however paediatric patients had a longer hospital stay compared to adult patients.

Adult and paediatric subgroups show similar ECMO, ICU and Hospital mortality.

Table 3 Length of Stay for ECMO Patients

Length of Stay (Median days, IQR)	ECMO duration	ICU Stay	Hospital Stay
All ECMO Patients	4.7 (1.8 - 7.8)	19.1 (7.6 - 42.2)	28.8 (11.5 - 63.4)
Adult ECMO Patients	4.7 (1.7 - 8.1)	18.4 (7.1 - 38.9)	27 (10.5 - 54.9)
Paediatric ECMO Patients	4.5 (2.8 - 6.8)	46 (20.8 - 172.4)	57.3 (28 - 223.5)

Table 4 Mortality for ECMO Patients

Mortality	ECMO Mortality	ICU Mortality	Hospital Mortality
All ECMO Patients	23.4% (52/222)	25.7% (57/222)	26.1% (58/222)
Adult ECMO Patients	24.0% (42/175)	29.1% (51/175)	29.7% (52/175)
Adult Veno-Arterial ECMO Patients	27.6% (37/134)	32.1% (43/134)	32.8% (44/134)
Adult Veno-Venous ECMO Patients	10.6% (5/47)	17.0% (8/47)	17.0% (8/47)
Paediatric ECMO Patients	21.3% (10/47)	12.8% (6/47)	12.8% (6/47)

Extracorporeal Membrane Oxygenation (ECMO) Registry

Long term survival of ECMO patients

A key strength of the ECMO registry is the ability to link with existing data within the ANZICS adult and paediatric databases, as well as the Australian National Death Index. This allows estimation of long-term survival for patients who require ECMO up to two years as demonstrated in the figures 33-34 below. Figure 34 compares VV-ECMO survival probability (in red) to VA-ECMO survival probability (in blue) which is notable lower.

Figure 33 Long term survival for all patients who receive ECMO

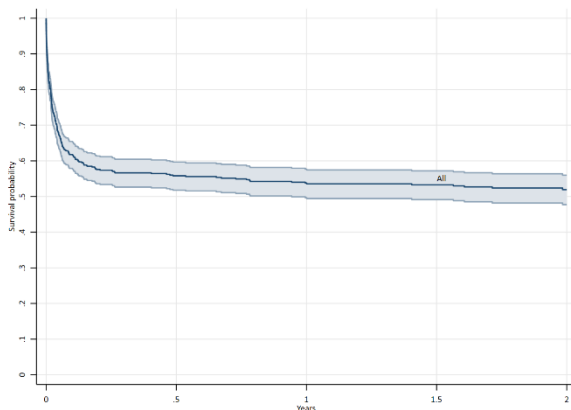
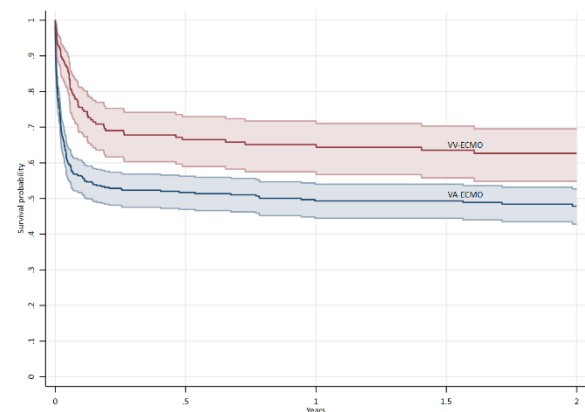
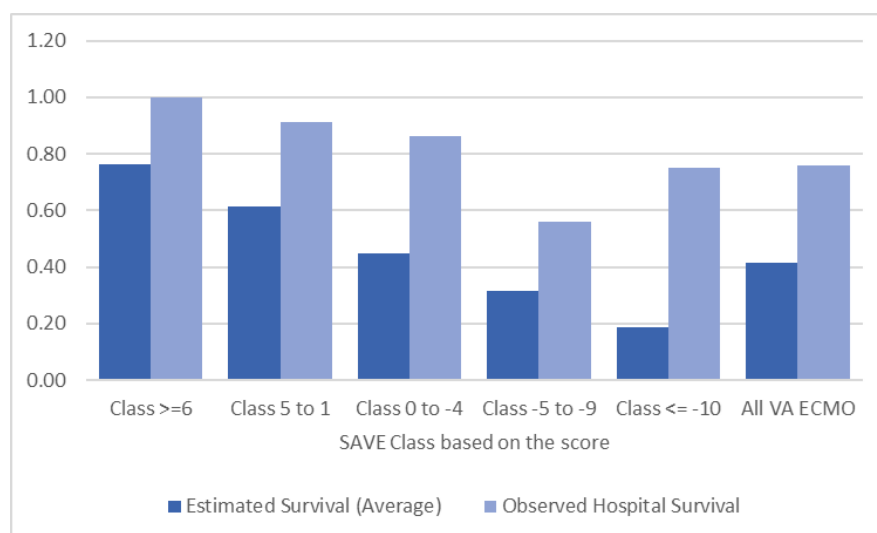


Figure 34 Long term survival for patients requiring VA-ECMO compared to those who require VV-ECMO



The SAVE (Survival After Veno-arterial-ECMO) score is used to predict survival in adult patients who receive venoarterial ECMO for cardiogenic shock or cardiac arrest. Estimated and observed average survival is depicted in Figure 35 based on the SAVE Scores.

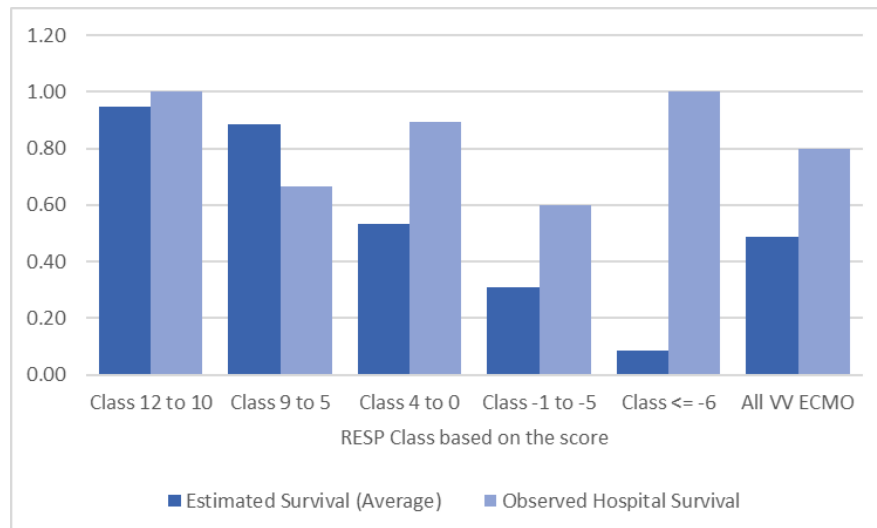
Figure 35 Estimated and observed average survival probabilities based on SAVE scores



Extracorporeal Membrane Oxygenation (ECMO) Registry

The RESP (Respiratory Extracorporeal membrane oxygenation Survival Prediction) score is used to predict survival for adult patients who receive veno-venous ECMO for respiratory failure. Estimated and observed average survival is depicted in Figure 36 based on the RESP Scores.

Figure 36 Estimated and observed average survival probabilities based on RESP scores



Into the future...

Looking into the next 12 months, the registry will be onboarding new sites across Australia and New Zealand to achieve binational total capture rate of ECMO cases. As case ascertainment increases, further linkage and research can be explored.

Appendix 1: Publications 2022/23

Barreto, S. G., Kaambwa, B., Venkatesh, K., Sasson, S. C., Andersen, C., Delaney, A., Bihari, S., & Pilcher, D. (2023). **Mortality and costs related to severe acute pancreatitis in the intensive care units of Australia and New Zealand (ANZ), 2003–2020.** *Pancreatology*. <https://doi.org/10.1016/j.pan.2023.04.0062>.

Pilcher, D. V., & Reilly, J. R. (2022). **Predicting morbidity in colorectal surgery: one step on the way to improving outcomes?** *Anaesthesia*, 77(12), 1332–1335. <https://doi.org/10.1111/anae.15872>

Darvall, J. N., Bellomo, R., Bailey, M., Young, P. J., & Pilcher, D. (2022). **Frailty in the ICU: information is the required first step.** *Intensive Care Medicine*, 48(9), 1260–1261. <https://doi.org/10.1007/s00134-022-06837-4>

Doherty, Z. B., Fletcher, J. A., Fuzzard, K. L., Leach, M. J., O'Sullivan, B. G., Panozzo, L. E., Pound, G. M., Saka, E., & Kippen, R. J. (2022). **Functional outcomes following an in-hospital cardiac arrest: A retrospective cohort study.** *Australian Critical Care: Official Journal of the Confederation of Australian Critical Care Nurses*, 35(4), 424–429. <https://doi.org/10.1016/j.aucc.2021.07.002>

Doherty, Z., Savage, N., Milne, C., & Pilcher, D. (2022). **Vascular surgery patients in intensive care: a bi-national cohort study over 15 years.** *ANZ Journal of Surgery*. <https://doi.org/10.1111/ans.18080>

Duronjic, A., Ku, D., Chavan, S., Bucci, T., Taylor, S., & Pilcher, D. (2023). **The impact of language barriers & interpreters on critical care patient outcomes.** *Journal of Critical Care*, 73, 154182. <https://doi.org/10.1016/j.jcrc.2022.154182>

Gilholm, P., Gibbons, K., Brüningk, S., Klatt, J., Vaithianathan, R., Long, D., Millar, J., Tomaszewski, W., Schlapbach, L. J., Ganeshalingam, A., Sherring, C., Erickson, S., Barr, S., Raman, S., Long, D., Schlapbach, L., Gibbons, K., George, S., Singh, P., ... the Australian and New Zealand Intensive Care Society (ANZICS) Centre for Outcomes & Resource Evaluation (CORE) and ANZICS Paediatric Study Group (ANZICS PSG). (2023). **Machine learning to predict poor school performance in paediatric survivors of intensive care: a population-based cohort study.** *Intensive Care Medicine*. <https://doi.org/10.1007/s00134-023-07137-1>

Ishii, E., Nawa, N., Hashimoto, S., Shigemitsu, H., & Fujiwara, T. (2023). **Development, validation, and feature extraction of a deep learning model predicting**

in-hospital mortality using Japan's largest national ICU database: a validation framework for transparent clinical Artificial Intelligence (cAI) development. *Anaesthesia Critical Care & Pain Medicine*, 42(2), 101167. <https://doi.org/10.1016/j.accpm.2022.101167>

Jones, D., Moran, J., Udy, A., Pilcher, D., Delaney, A., Peake, S. L., & ARISE-TRIPS study investigators. (2022). **Temporal changes in the epidemiology of sepsis-related intensive care admissions from the emergency department in Australia and New Zealand.** *Emergency Medicine Australasia: EMA*, 34(6), 995–1003. <https://doi.org/10.1111/1742-6723.14034>

Kumar, A., Doola, R., Zahumensky, A., Shaikh, A., Tabah, A., Laupland, K. B., & Ramanan, M. (2023). **Association between Elevated Lactate and Clinical Outcomes in Adults with Diabetic Ketoacidosis** (SSRN Scholarly Paper No. 4423409). <https://doi.org/10.2139/ssrn.4423409>

Lu, P., Burrell, A., Bailey, M., Moore, E., Pilcher, D., & Cleland, H. (2022). **Performance of BEAMS Risk of Death Score for Mortality Prediction in Australian and New Zealand Burns Patients.** *Journal of Burn Care & Research: Official Publication of the American Burn Association*, 43(6), 1434–1439. <https://doi.org/10.1093/jbcr/irac053>

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- Okahara, S., Snell, G. I., Levvey, B. J., McDonald, M., D'Costa, R., Opdam, H., & Pilcher, D. V. (2022). **A prediction model to determine the untapped lung donor pool outside of the DonateLife network in Victoria.** *Anaesthesia and Intensive Care*, 50(5), 380–387. <https://doi.org/10.1177/0310057X211070011>
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All scientific publications listed above have been undertaken as self-funded research by clinicians with in-kind support and guidance from the ANZICS CORE Team making data available under a collaborative governance framework.

Appendix 2: Sites Contributing to ANZICS CORE Registries

Sites listed are those that contributed data to the specific ANZICS CORE Registries for the period 2022/23. All sites and Data Review Committees receive reports after each data submission or have access to online reporting.

Australian Capital Territory	APD	ANZPICR	CCR	CLABSI
Calvary Hospital (Canberra) ICU	✓			
Calvary John James Hospital ICU	✓		✓	✓
Canberra Hospital ICU	✓	✓	✓	✓
National Capital Private Hospital ICU	✓		✓	✓
North Canberra Hospital ICU	✓		✓	

New South Wales	APD	ANZPICR	CCR	CLABSI
Bankstown-Lidcombe Hospital ICU	✓		✓	✓
Bathurst Base Hospital ICU	✓			✓
Blacktown Hospital ICU	✓			✓
Bowral Hospital HDU	✓			✓
Broken Hill Base Hospital & Health Services ICU	✓			✓
Calvary Mater Newcastle ICU	✓		✓	✓
Campbelltown Hospital ICU	✓			✓
Canterbury Hospital ICU			✓	✓
Coffs Harbour Health Campus ICU	✓		✓	✓
Concord Hospital (Sydney) ICU	✓		✓	✓
Dubbo Base Hospital ICU	✓		✓	✓
Fairfield Hospital ICU	✓		✓	✓
Gosford Hospital ICU	✓		✓	✓
Gosford Private Hospital ICU	✓		✓	
Goulburn Base Hospital ICU	✓			✓
Grafton Base Hospital ICU	✓		✓	
Griffith Base Hospital ICU	✓	✓	✓	✓
Hawkesbury District Health Service ICU			✓	
Hornsby Ku-ring-gai Hospital ICU	✓		✓	✓
Hurstville Private Hospital ICU	✓		✓	
John Hunter Children's Hospital PICU		✓	✓	
John Hunter Hospital ICU	✓		✓	✓
Kareena Private Hospital ICU	✓			
Lingard Private Hospital ICU	✓			
Lismore Base Hospital ICU	✓		✓	✓
Liverpool Hospital ICU	✓		✓	✓
Macquarie University Private Hospital ICU	✓		✓	
Maitland Hospital ICU	✓		✓	✓
Maitland Private Hospital ICU	✓			
Manning Rural Referral Hospital ICU	✓		✓	✓
Mater Private Hospital (Sydney) ICU	✓		✓	
Nepean Hospital ICU	✓		✓	✓
Nepean Private Hospital ICU	✓		✓	
Newcastle Private Hospital ICU	✓			
North Shore Private Hospital ICU	✓		✓	

Appendix 2: Sites Contributing to ANZICS CORE Registries *continued*

New South Wales	APD	ANZPICR	CCR	CLABSI
Northern Beaches Hospital ICU	✓		✓	
Norwest Private Hospital ICU	✓		✓	
Orange Base Hospital ICU	✓			✓
Port Macquarie Base Hospital ICU	✓		✓	✓
Prince of Wales Hospital ICU	✓		✓	✓
Prince of Wales Private Hospital ICU	✓		✓	
Royal North Shore Hospital ICU	✓		✓	✓
Royal Prince Alfred Hospital ICU	✓		✓	✓
Ryde Hospital and Community Health Services ICU	✓		✓	✓
Shoalhaven Hospital ICU	✓		✓	✓
South East Regional Hospital ICU	✓			✓
St George Hospital (Sydney) ICU	✓		✓	✓
St George Private Hospital (Sydney) ICU	✓			
St Vincent's Hospital (Sydney) ICU	✓		✓	✓
St Vincent's Private Hospital (Sydney) ICU	✓		✓	
Strathfield Private Hospital ICU			✓	
Sutherland Hospital & Community Health Services ICU	✓		✓	✓
Sydney Adventist Hospital ICU	✓		✓	
Sydney Children's Hospital PICU		✓		✓
Sydney Southwest Private Hospital ICU	✓		✓	
Tamworth Base Hospital ICU	✓	✓	✓	✓
The Children's Hospital at Westmead PICU		✓	✓	✓
The Chris O'Brien Lifehouse ICU	✓		✓	
Tweed Valley Hospital ICU	✓		✓	✓
Wagga Wagga Base Hospital & District Health ICU	✓		✓	✓
St Vincent's Private Hospital (Sydney) ICU	✓		✓	
Strathfield Private Hospital ICU			✓	
Sutherland Hospital & Community Health Services ICU	✓		✓	✓
Westmead Hospital ICU	✓		✓	✓
Westmead Private Hospital ICU	✓		✓	
Wollongong Hospital ICU	✓		✓	✓
Wollongong Private Hospital ICU	✓			
Wyang Hospital ICU	✓		✓	✓

Northern Territory	APD	ANZPICR	CCR	CLABSI
Alice Springs Hospital ICU	✓	✓	✓	
Royal Darwin Hospital ICU	✓	✓	✓	✓

Appendix 2: Sites Contributing to ANZICS CORE Registries *continued*

Queensland	APD	ANZPICR	CCR	CLABSI
Brisbane Private Hospital ICU	✓		✓	
Buderim Private Hospital ICU	✓			
Bundaberg Base Hospital ICU	✓			
Caboolture Hospital HDU	✓		✓	
Cairns Hospital ICU	✓	✓	✓	✓
Gold Coast Private Hospital ICU	✓		✓	
Gold Coast University Hospital ICU	✓	✓	✓	✓
Gold Coast University Hospital ICU - Paeds		✓	✓	
Greenslopes Private Hospital ICU	✓		✓	
Hervey Bay Hospital ICU	✓		✓	
Ipswich Hospital ICU	✓		✓	
John Flynn Private Hospital ICU	✓		✓	
Logan Hospital ICU	✓		✓	✓
Mackay Base Hospital ICU	✓	✓	✓	✓
Mater Adults Hospital (Brisbane) ICU	✓		✓	
Mater Health Services (Townsville) ICU	✓			
Mater Private Hospital (Brisbane) ICU	✓		✓	
Mount Isa Hospital ICU	✓		✓	
Noosa Hospital ICU	✓		✓	
North West Private Hospital ICU	✓			
Pindara Private Hospital ICU	✓		✓	
Princess Alexandra Hospital ICU	✓		✓	✓
Queen Elizabeth II Jubilee Hospital ICU	✓		✓	
Queensland Children's Hospital PICU		✓	✓	
Redcliffe Hospital ICU	✓	✓	✓	
Robina Hospital ICU	✓		✓	✓
Rockhampton Hospital ICU	✓	✓	✓	✓
Royal Brisbane and Women's Hospital ICU	✓		✓	
St Andrew's Hospital Toowoomba ICU	✓		✓	
St Andrew's Private Hospital (Ipswich) ICU	✓			
St Andrew's War Memorial Hospital ICU	✓			
St Vincent's Private Hospital Northside ICU	✓		✓	
St Vincent's Hospital (Toowoomba) ICU	✓		✓	
Sunnybank Hospital ICU	✓			
Sunshine Coast University Hospital ICU	✓		✓	✓
Sunshine Coast University Hospital ICU - Paeds		✓	✓	✓
Sunshine Coast University Private Hospital ICU	✓		✓	
The Prince Charles Hospital ICU	✓		✓	
The Wesley Hospital ICU	✓			
Toowoomba Hospital ICU	✓		✓	
The Townsville University Hospital ICU	✓		✓	
The Townsville University Hospital ICU - Paeds		✓	✓	

Appendix 2: Sites Contributing to ANZICS CORE Registries *continued*

South Australia	APD	ANZPICR	CCR	CLABSI
Ashford Community Hospital ICU	✓		✓	
Calvary Adelaide Hospital ICU	✓		✓	✓
Calvary North Adelaide Hospital ICU	✓		✓	✓
Flinders Medical Centre ICU	✓		✓	✓
Flinders Private Hospital ICU	✓		✓	
Lyell McEwin Hospital ICU	✓		✓	✓
Royal Adelaide Hospital ICU	✓		✓	✓
St Andrew's Hospital (Adelaide) ICU	✓		✓	
The Memorial Hospital (Adelaide) ICU	✓		✓	
The Queen Elizabeth (Adelaide) ICU	✓		✓	✓
Western Hospital (SA)	✓			
Women's and Children's Hospital PICU	✓	✓	✓	✓

Tasmania	APD	ANZPICR	CCR	CLABSI
Calvary Hospital (Lenah Valley) ICU	✓			
Launceston General Hospital ICU	✓	✓	✓	✓
North West Regional Hospital (Burnie) ICU	✓		✓	
Royal Hobart Hospital ICU	✓		✓	
Royal Hobart Hospital NICU/PICU		✓	✓	✓

Victoria	APD	ANZPICR	CCR	CLABSI
Albury Wodonga Health ICU	✓	✓	✓	✓
Alfred Hospital ICU	✓	✓	✓	✓
Angliss Hospital ICU	✓		✓	
Austin Hospital ICU	✓		✓	✓
Ballarat Health Services ICU	✓		✓	✓
Bendigo Health Care Group ICU	✓	✓	✓	✓
Box Hill Hospital ICU	✓		✓	✓
Cabrini Hospital ICU	✓		✓	
Casey Hospital ICU	✓		✓	
Central Gippsland Health Service ICU	✓		✓	✓
Dandenong Hospital ICU	✓		✓	✓
Echuca Regional Hospital HDU	✓			
Epworth Eastern Private Hospital ICU	✓		✓	
Epworth Freemasons Hospital ICU	✓		✓	
Epworth Geelong ICU	✓		✓	
Epworth Hospital (Richmond) ICU	✓		✓	
Footscray Hospital ICU	✓		✓	✓
Frankston Hospital ICU	✓		✓	✓
Goulburn Valley Health ICU	✓		✓	✓
Grampians Health Horsham ICU	✓		✓	✓
Holmesglen Private Hospital ICU	✓		✓	✓
John Fawkner Hospital ICU	✓			
Knox Private Hospital ICU	✓		✓	

Appendix 2: Sites Contributing to ANZICS CORE Registries *continued*

Victoria	APD	ANZPICR	CCR	CLABSI
Latrobe Regional Hospital ICU	✓		✓	✓
Maroondah Hospital ICU	✓		✓	✓
Melbourne Private Hospital ICU	✓		✓	
Mildura Base Hospital ICU	✓	✓	✓	✓
Monash Children's Hospital PICU		✓	✓	
Monash Medical Centre-Clayton Campus ICU	✓		✓	✓
Mulgrave Private Hospital ICU	✓			
Northeast Health Wangaratta ICU	✓		✓	✓
Peninsula Private Hospital ICU	✓		✓	
Royal Children's Hospital (Melbourne) PICU		✓	✓	✓
Royal Melbourne Hospital ICU	✓		✓	✓
South West Healthcare (Warrnambool) ICU	✓		✓	✓
St John Of God Hospital (Berwick) ICU	✓			
St John Of God Hospital (Ballarat) ICU	✓		✓	
St John of God Hospital (Bendigo) ICU	✓		✓	
St John Of God Hospital (Geelong) ICU	✓		✓	
St Vincent's Hospital (Melbourne) ICU	✓		✓	✓
St Vincent's Private Hospital Fitzroy ICU	✓		✓	
Sunshine Hospital ICU	✓		✓	
The Bays Hospital ICU	✓			
The Northern Hospital ICU	✓	✓	✓	✓
The Victorian Heart Hospital ICU	✓			
University Hospital Geelong ICU	✓	✓	✓	✓
Warringal Private Hospital ICU	✓		✓	
Werribee Mercy Hospital ICU	✓		✓	
Western District Health Service (Hamilton) ICU	✓		✓	✓

Western Australia	APD	ANZPICR	CCR	CLABSI
Armada Health Service ICU	✓		✓	✓
Bunbury Regional Hospital ICU	✓			✓
Fiona Stanley Hospital ICU	✓		✓	✓
Hollywood Private Hospital ICU	✓		✓	
Joondalup Health Campus ICU	✓		✓	✓
Mount Hospital ICU	✓		✓	
Perth Children's Hospital PICU		✓	✓	
Rockingham General Hospital ICU	✓		✓	✓
Royal Perth Hospital ICU	✓			✓
Sir Charles Gairdner Hospital ICU	✓		✓	✓
St John Of God Health Care (Subiaco) ICU	✓		✓	✓
St John Of God Hospital (Murdoch) ICU	✓		✓	✓
St John of God Midland Public & Private ICU	✓			✓

Appendix 2: Sites Contributing to ANZICS CORE Registries *continued*

New Zealand	APD	ANZPICR	CCR	CLABSI
Auckland City Hospital CV ICU	✓		✓	
Auckland City Hospital DCCM	✓		✓	
Braemar Hospital SCU	✓		✓	
Christchurch Hospital ICU	✓	✓	✓	
Dunedin Hospital ICU	✓		✓	
Hawkes Bay Hospital ICU	✓	✓	✓	
Hutt Hospital ICU	✓		✓	
Middlemore Hospital ICU	✓	✓	✓	
Nelson Hospital ICU	✓	✓	✓	
North Shore Hospital ICU	✓		✓	
Rotorua Hospital ICU	✓	✓	✓	
Southland Hospital ICU			✓	
Starship Children's Hospital PICU		✓	✓	
Taranaki Health ICU	✓	✓	✓	
Tauranga Hospital ICU	✓	✓	✓	
Timaru Hospital ICU	✓			
Waikato Hospital ICU	✓	✓	✓	
Wairarapa Hospital HDU			✓	
Wairau Hospital ICU	✓		✓	
Wakefield Hospital (NZ) ICU			✓	
Wellington Hospital ICU	✓	✓	✓	
Whakatane Hospital ICU	✓		✓	
Whangarei Area Hospital, Northland Health	✓	✓	✓	

Abbreviations

ACSQHC	Australian Commission on Safety and Quality in Health Care
AIHW	Australian Institute of Health and Welfare
ANZIC-RC	Australian and New Zealand Intensive Care Research Centre
ANZPICR	Australian and New Zealand PEDIATRIC Intensive Care Registry
ANZROD	Australian and New Zealand Risk of Death
APD	Adult Patient Database
ARCAC	ANZPIC Registry Clinical Advisory Committee
CHRIS	Critical Health Resources Information System
CI	Confidence Interval
CICM	College of Intensive Care Medicine
CLABSI	Central Line Associated Blood Stream Infections
ECMO	Extra Corporeal Membrane Oxygenation
FTE	Full Time Equivalent
RESP	Respiratory ECMO Survival Prediction
RN	Registered Nurse
SAVE	Survival After Veno-Arterial ECMO
SMO	Senior Medical Officer
SMR	Standardised Mortality Ratio

Glossary

After Hours Discharge	Discharge of a patient from ICU between 1800 and 0600.
Available bed	A bed with advanced life support capability that is fully staffed and funded.
Delayed Discharge	When discharge from ICU to the ward cannot proceed due to lack of resources including availability of beds.
Elective Admission	A planned admission to ICU following elective surgery.
Emergency Admission	An unplanned admission to ICU. An admission to the ICU for urgent care or treatment.
Extracorporeal Membrane Oxygenation	Extracorporeal membrane oxygenation, also known as extracorporeal life support, is an extracorporeal technique of providing prolonged cardiac and respiratory support to persons whose heart and lungs are unable to provide an adequate amount of gas exchange or perfusion to sustain life.
Hospital Mortality	Proportion of patients with an ICU admission that died in the same hospital admission.
ICU Mortality	Proportion of patients that died in ICU.
Intensivist	Medical practitioners who have completed the CICM certification and training program and attained a Fellowship of the College of intensive Care Medicine of Australia and New Zealand.
Observed Mortality	Proportion of patients who died in hospital following a stay in ICU and only includes admissions that meet the criteria for an SMR. <i>Note: SMR exclusions differ depending on the predictive model being used.</i>
Predicted Mortality	Proportion of patients predicted (by a disease severity model) to die in hospital following a stay in ICU and only includes patients that meet the criteria for an SMR. <i>Note: SMR exclusions differ depending on the predictive model being used.</i>
Physical bed	A single patient care location fully configured to ICU standards. It is an actual bed, not a bed space.
Readmission	A readmitted ICU patient is a patient who survived ICU and has had at least one readmission, excluding direct transfers to or from ICU/HDU. Readmission includes all readmissions; it is not equivalent to the ACHS indicator ≤ 72 hours.
Standardised Mortality Ratio (SMR)	The SMR presents the number of deaths that occur as a proportion of the number of deaths that might be expected based on a disease severity model such as APACHE III-J or PIM3, which aims to take into account confounding factors such as disease severity and age. 'Expected deaths' therefore reflects outcomes that have been achieved internationally across hospitals seen to be delivering best practice treatment. An SMR below 1 represents a lower than expected mortality rate.
Invasively Ventilated	Patients provided with continuous support via oral/nasal intubation or tracheostomy by means of a mechanical device that augments or replaces respiratory effort.



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