Australian and New Zealand Intensive Care Society

Centre for Outcome and Resource Evaluation

2018 Report

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About ANZICS

The Australian and New Zealand Intensive Care Society is the leading advocate on all Intensive Care related matters. ANZICS is a world leader in the benchmarking of Intensive Care outcomes through its clinical quality registries and in research through its Clinical Trials Group. The Society is devoted to all aspects of intensive care medical practice through ongoing professional education, the provision of leadership in medical settings, clinical research and analysis of critical care outcomes and resources.

ANZICS Centre for Outcome and Resource Evaluation

For more than 20 years ANZICS Centre for Outcome and Resource Evaluation (CORE) has been providing ICU Registry Services for benchmarking and auditing of Intensive Care outcomes bi-nationally across Australia and New Zealand. The well recognised success of ANZICS CORE is achieved through enduring partnerships with strong support and commitment from across Jurisdictional health departments and the ICU clinical community.

Aims of ANZICS CORE

- To provide comparative benchmarking reports to submitting ICUs and health department detailing variation in risk adjusted clinical outcomes, process measures, and quality of care indicators.
- Identify and provide additional analysis when submitting ICU appears as an outlier.
- Provide a data quality and education program to support submission of high quality data to produce the most accurate benchmarking reports.
- Assist researchers to identify potential areas of improvement of Intensive care practices and outcomes.

The ANZICS CORE Registries

- The **Adult Patient Database (APD)** is one of the largest clinical ICU datasets in the world with more than 2 million de-identified patient episodes submitted since 1992.
- The **Australian and New Zealand Paediatric Intensive Care (ANZPIC) Registry** holds more than 170,000 patient episodes since 1997.
- The **Critical Care Resources (CCR)** Registry collects annual data on resources (e.g. ICU beds, staffing levels, and processes of care) dating from 1997.
- The **Central Line Associated Bloodstream Infections (CLABSI) Registry** that commenced in 2012.

This report provides an overview of ANZICS CORE activities up to June 2018. Where stated, resources data are drawn from the 2016/17 Critical Care Resources Registry survey. Detailed Registry activity reports for 2017/18 are available on the ANZICS website https://www.anzics.com.au/

A Tribute to Dr. Peter Hicks

Very unexpectedly and sadly, Peter Hicks died while this report was being prepared. Peter made a huge contribution to ANZICS for more than twenty years. Above everything, Peter valued the ICU team. He brought that same philosophy to ANZICS CORE, where his main interest for many years was the Critical Care Resources Registry. Peter's contribution to ANZICS is immeasurable. This Annual Report is dedicated to his memory.

Below is an extract of the ANZICS Tribute to Peter written by David Pilcher in collaboration with Peter's family and closest colleagues which reflects his dedication and commitment to ANZICS and for all those that worked with him. The full version of the tribute can be found here: ow.ly/a0nI30n2ud4

Many of Peter's attributes show through in his ANZICS activities: his attention to detail……hours spent checking ANZICS IT contracts; his care and support…..never failing to recognize the hard work by ANZICS staff and to thank all those collecting data within ICUs throughout Australia and New Zealand; his unique combination of drive, dedication, humour and humility….. as ANZICS President in the mid 2000's, he stood firm with the Clinical Trials Group and refused to endorse the initial version of the Surviving Sepsis Guidelines until it truly reflected best practice. Despite this, he wryly stated his greatest achievement as ANZICS President was removing the Sunday program from the Annual Scientific Meeting, "No one turns up on Sundays after the dinner. Let's just start a day earlier."

He was an integral part of ANZICS CORE for over 15 years, as leader of the Critical Care Resources registry and most recently as Chair. He understood the power of wide-reaching comparative data about the resources needed to care for the critically ill. When you look at a report comparing your ICU's staffing or occupancy to others in Australia and New Zealand, you are looking directly at Peter's work. He was one of few people who really understood how to measure and compare ICU costs. In addition, he intimately understood the human costs of Intensive Care, the impact on families and patients, the support needed for staff and colleagues, and the bonds and friendships that are not only formed but also tested by the work we do.

As a tribute to Peter, ANZICS has created the Peter Hicks travel fellowship to support trainees and junior clinicians attend events which promote the use of Intensive Care data to improve patient outcomes.

The ANZICS CORE Team

Peter Hicks CORE Chair 2016 - 2018

CORE Program Team 2018

Back row (Left to Right)
Tatjana Kriveca, Jostein Saethern, Isobel Leggett, Johnny Millar (ANZPIC Registry Clinical Lead,) David Pilcher (Chair CORE Committee from Nov 2018) Ed Litton (CCR Registry Clinical Lead), Alastair McGeorge (APD Clinical Lead)
Front row (Left to Right)
Sue Huckson, Tamara Bucci, Jan Alexander, Shaila Chavan
Missing: *Kerry McClean, Emma Feeney, Julieta Woolsey*

ANZICS CORE Working Groups

We would also like to acknowledge the work of our supporters through the Outlier Review Working Group and Research Publication Working Group who provide the important clinical perspective to all that we do.

ANZICS CORE - Who We Work With

Collaboration is central to how CORE works to achieve a high level of engagement from the ICU clinical community, Jurisdictional Health Departments and other agencies. We would like to acknowledge the support of the following:

Our Funders

- Australian Capital Territory Health
- Northern Territory Department of Health
- Tasmanian Department of Health and Human Services
- New South Wales Ministry of Health
- South Australian Health
- Western Australia Department of Health
- Queensland Health
- Victorian Department of Health and Human Services
- Health Quality and Safety Commission New Zealand

National and International Agencies

- College of Intensive Care Medicine
- Australian Commission on Safety and Quality in Health Care
- The Australian Institute of Health and Welfare
- The Australian Organ and Tissue Authority
- Agency for Clinical Innovation - New South Wales
- Health Round Table

Research Agencies

- Australian and New Zealand Intensive Care - Research Centre, Monash University, Melbourne
- The George Institute, Sydney
- University of Adelaide
- The SAX Institute
- University of Sydney

Collaborating International Organisations

- Japanese Intensive Care Society
- Epimed, Brazil
- Massachusetts Institute of Technology
- National University of Singapore
- Prince of Wales Hospital, Hong Kong
- Nemazee Hospital, Iran

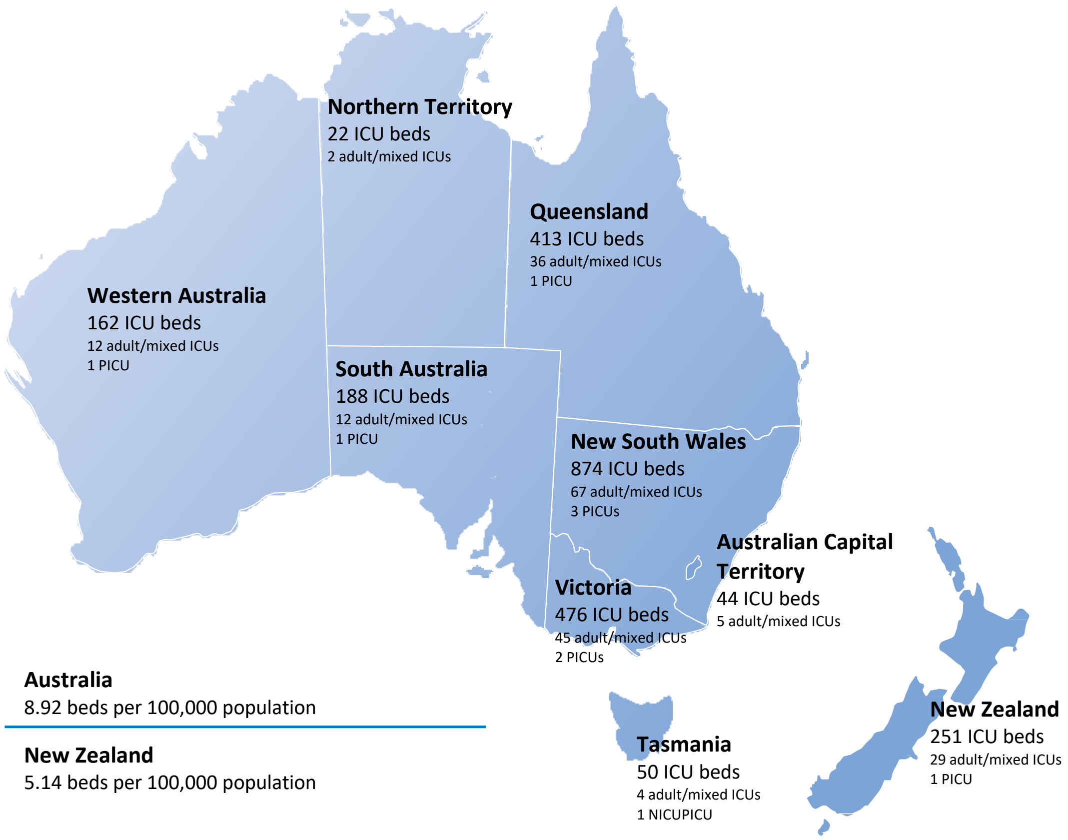
Other Important Contributors

Each day ANZICS CORE is reminded of the amazing commitment across the ICU community from the data collectors, those who check the data before submission and those that use the data to ensure high quality of care is delivered to critically ill patients. Their support also ensures the ANZICS Registries are so highly regarded across Australia and New Zealand, and internationally.

We thank and appreciate the efforts of all clinicians, data collectors and researchers with whom we have day-to-day contact and our colleagues within ANZICS.

Profile of Australia and New Zealand Intensive Care Units

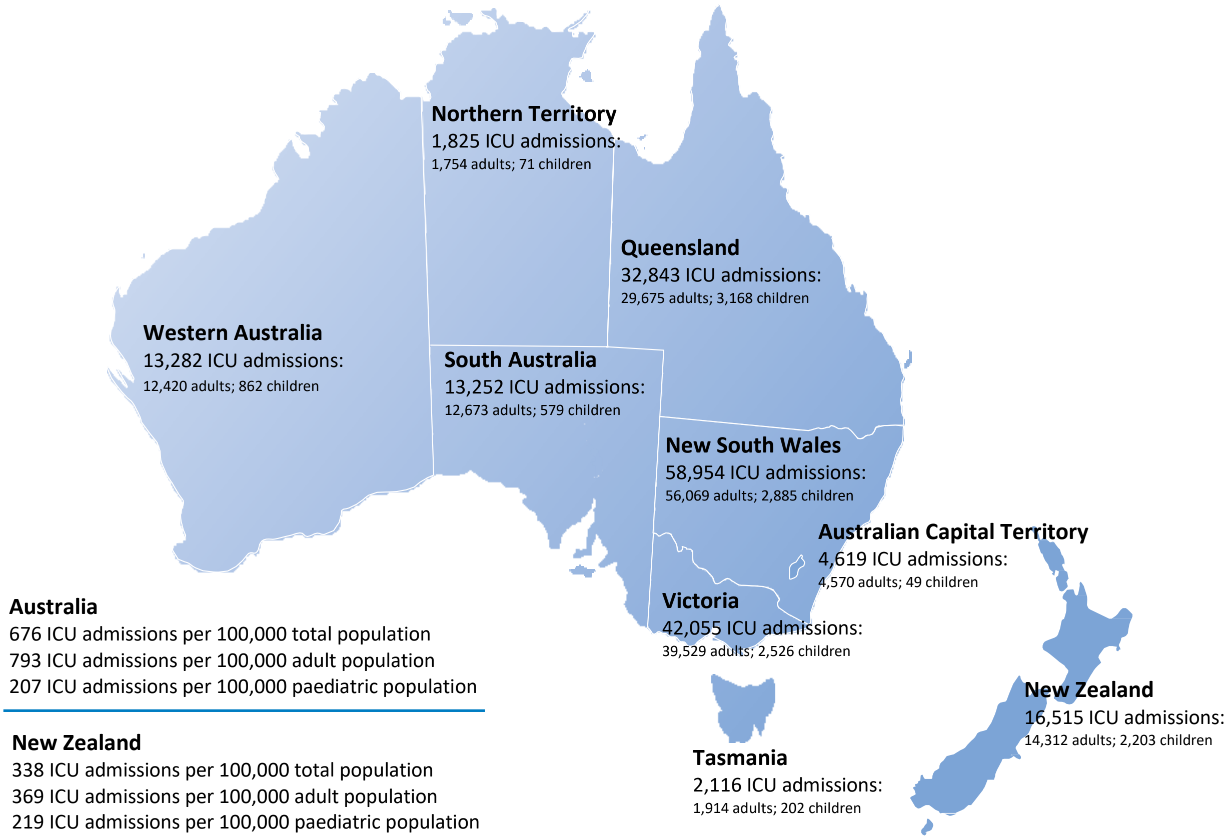
Figure 1. Profile of Public and Private ICUs across Australia and New Zealand



Source: CCR Survey 2017/18.
Population estimates as at 30th June 2018 were 24,992,747 for Australia and 4,885,500 for New Zealand.
http://nzdotstat.stats.govt.nz/wbos/Index.aspx?_ga=2.227011870.2048874141.1547617034-720109120.1547617034#
http://stat.data.abs.gov.au/Index.aspx?DataSetCode=ERP_QUARTERLY#

Profile of adult and paediatric ICU admissions

Figure 2. Profile of Adult and Paediatric admission across Australia and New Zealand 2017/18



Source: APD Database, ANZPIC Registry.
Population estimates as at 30th June 2018 were 24,992,747 for Australia and 4,885,500 for New Zealand.
http://nzdotstat.stats.govt.nz/wbos/Index.aspx?_ga=2.227011870.2048874141.1547617034-720109120.1547617034#
http://stat.data.abs.gov.au/Index.aspx?DataSetCode=ERP_QUARTERLY#

Number of ICU admissions across Australia and New Zealand

	Paediatric admissions to specialist PICUs	Paediatric admissions to other ICUs*	Adult ICU admissions
Australia	8,602	1,740	158,604
New Zealand	1,119	1,084	14,312
Total	9,721	2,824	172,916

*Other ICUs include paediatric admissions to adult ICUs and to mixed adult/paediatric ICUs

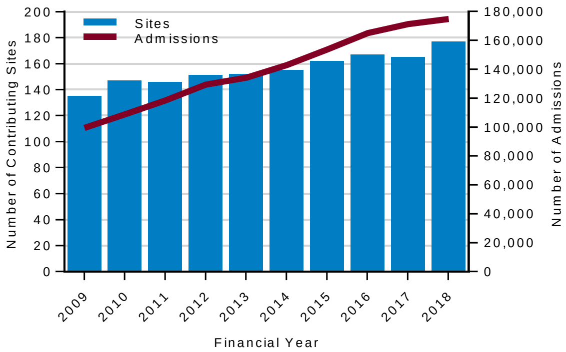
The map above illustrates adult (≥16yrs) and paediatric (<16yrs) ICU admissions throughout Australia and New Zealand in 2017/18. Children may be admitted to specialist paediatric ICUs, to ICUs which specialise in both paediatric and adult intensive care and sometimes to adult ICUs. The numbers above are derived from 10 specialist PICUs and 177 mixed or adult ICUs, and account for all paediatric admissions recorded in both the APD and the ANZPIC registries.

Contribution to the Intensive Care Registries

93% (206/222) of ICUs contribute data to the ANZICS CORE Registries, with an estimated 90% of all admissions captured in either the APD or ANZPIC Registry. Sites that do not contribute to the ANZICS CORE Registries are predominantly private ICUs or smaller rural units.

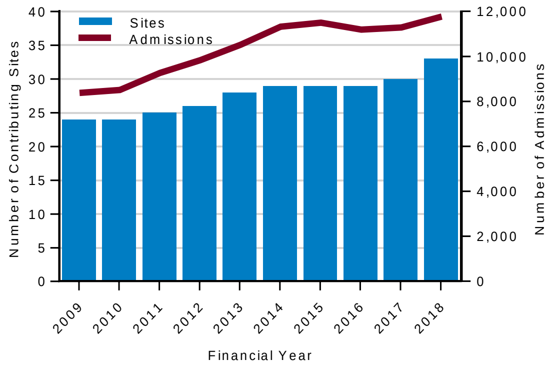
Figure 3. Contributors to the Intensive Care registries

Adult Patient Database (APD)



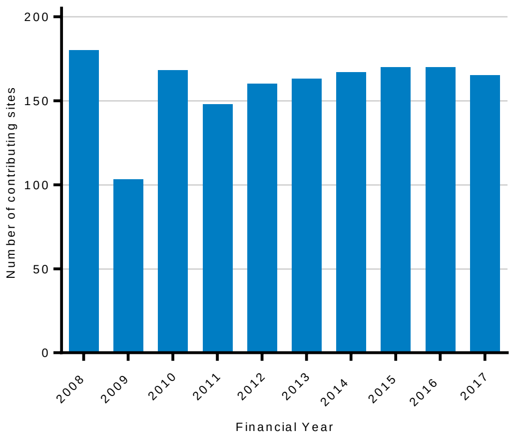
Source: APD

Australian and New Zealand Paediatric Intensive Care (ANZPIC) Registry



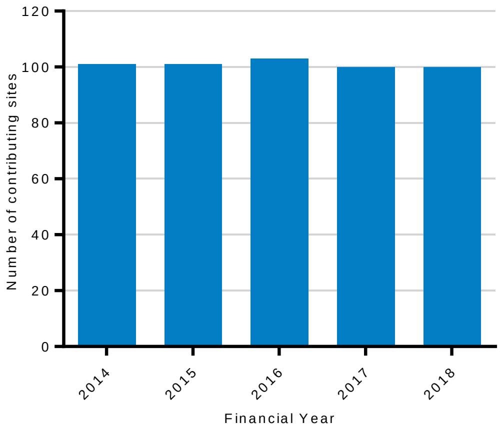
Source: ANZPICR

Critical Care Resources (CCR) Registry



Source: CCR Registry

Central Line Associate Bloodstream (CLABSI) Infection Registry



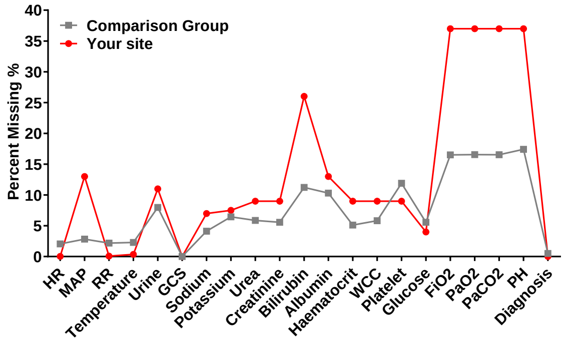
Source: CLABSI Registry

Data Quality Improvements

Improving data quality with a local 'nudge'

To encourage real time review of data quality, the report below was added to the suite of APD web-based reports. This report shows the amount of 'missingness' in data submitted by a site compared to their peer group hospitals. Some missing values are expected e.g. patients who have no arterial line and thus no blood gas measurements. This provides a quick and easy way to quickly identify where there may focus their efforts to improve data quality.

Figure 4. Example of Data Quality report



More training of data collectors

Four workshops were held across Australia in South Australia, Victoria, Queensland and New South Wales attended by over 100 ICU staff including clinicians, researchers, data managers and data collectors. To supplement face to face training resources are made available for ongoing onsite support including videos, education material and training manuals. The ANZICS CORE team provide phone support for data submissions and data collection.

Improved data validation processes

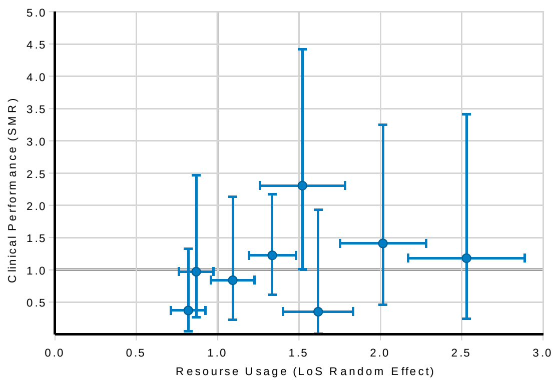
The new COMET data collection tool includes automated validation rules which improve the quality of submitted through the web-based data collection tool. New validation processes have been introduced to ensure the data from local data collection tools or clinical information systems that may not have the validation rules built in. The Programmers Data Dictionary is made available to all sites that use data collection systems other than COMET.

Improved reporting - ICU efficiency plots

Efficiency in healthcare is a measure of effectiveness and cost of care. The 'ICU Efficiency' report plots the SMR as an indicator of clinical performance on the vertical axis against the Risk Adjusted Length of Stay (RALOS) ratio on the horizontal axis. The RALOS ratio is the observed length of ICU stay divided by the predicted length of stay and is a marker for resource use. An RALOS ratio greater than one means that most patients in this ICU spend longer than would be expected by severity of illness characteristics.

In 2018 this report was made available for ICUs to enable units to compare their efficiency with peer groups.

Figure 5. Sample ICU Efficiency Plot for all cardiac surgery admissions to Tertiary sites



Using Registry data

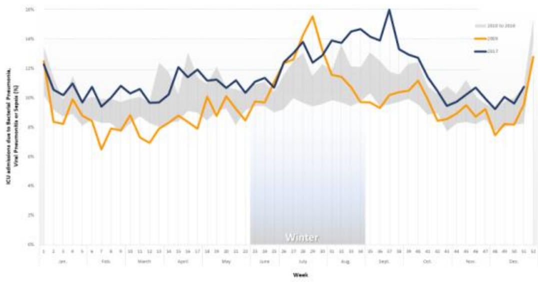
While the primary role of the ANZICS Intensive Care Registries is for benchmarking ICU performance, the data provides opportunities to identify and report on current, emerging and critical issues for Intensive Care across the Australia and New Zealand

The impact of "Aussie Flu" in 2017 worse than "Swine Flu" in 2009

July, August & September 2017[1] saw the highest ever proportion of ICU admissions with bacterial pneumonia, viral pneumonitis and sepsis in Australia with: 16% of all ICU admissions and 26.5% of all ICU bed-days

The peak was similar to the H1N1 pandemic[2] in 2009 but was sustained throughout Winter and into Spring. It was associated with a reduction in elective surgical admissions to ICU. Influenza H3N2 was the most prevalent strain.[3] The eastern Australian states were most severely affected, more so than New Zealand or other parts of Australia.

Figure 6. Percentage of All Patients Admitted to Australian and New Zealand ICUs with Bacterial Pneumonia, Viral Pneumonitis, or Sepsis each week, 2009 to 2017



Data Linkage

Through data linkage, ANZICS Registry data can be enhanced to provide greater depth in terms of measuring long term outcomes and survival after an ICU admission.

Patient characteristics, incidence, technique, outcomes and early prediction of tracheostomy in the state of Victoria, Australia. A Casamento, M Bailey, R Robbins, D Pilcher, S Warrillow, A Ghosh, R Bellomo. Journal of critical care 44, Dec 17, 278-284,

Acute Risk Change: An innovative measure of operative adverse events and perioperative team performance. TG Coulson, B Gregson, S Sandys, S Nashef, S Webb, M Bailey, C Reid, D Pilcher. Journal of Cardiothoracic and Vascular Anesthesia

Age and other perioperative risk factors for postoperative systemic inflammatory response syndrome after cardiac surgery. Dieleman JM, Peelen LM, Coulson TG, Tran L, Reid CM, Smith JA, Myles PS, Pilcher D. British Journal of Anaesthesia 2017 Oct; 119 (4): 637–644

The association between peri-operative acute risk change (ARC) and long-term survival after cardiac surgery. Coulson TG, Bailey M, Reid CM, Tran L, Mullany DV, Smith JA, et al. Anaesthesia. 2017 Jul 13

Prognostic accuracy of age-adapted SOFA, SIRS, PELOD-2, and qSOFA for in-hospital mortality among children with suspected infection admitted to the intensive care unit. Intensive Care Med. Schlapbach LJ, Straney L, Bellomo R, MacLaren G, Pilcher D. 2018 Feb;44(2):179-188

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[1] ICU Admissions for Sepsis or Pneumonia in Australia and New Zealand in 2017.A Burrell, S Huckson, DV Pilcher.New England Journal of Medicine 378 (22), 2138-2139

[2] ANZIC Influenza Investigators, Webb SAR, Pettilä V, et al. Critical care services and 2009 H1N1 influenza in Australia and New Zealand. N Engl J Med 2009;361:1925–34. doi:10.1056/NEJMoa0908481
2017 Influenza Season summary from the Australian National Influenza Surveillance Committee
http://www.health.gov.au/internet/main/publishing.nsf/Content/097F15A91C05FBE7CA2581E20017F09E/$File/2017-season-summary-22112017.pdf Accessed 16-1-18. 2017;:1–5.

[3] 2017 Influenza Season summary from the Australian National Influenza Surveillance Committee
http://www.health.gov.au/internet/main/publishing.nsf/Content/097F15A91C05FBE7CA2581E20017F09E/$File/2017-season-summary-22112017.pdf Accessed 16-1-18. 2017;:1–5.

Registry Data to Promote Collaboration and Research

Datathons are the new "black"

Building on the success of the inaugural ANZICS Critical Care Datathon held in Melbourne in 2017, a second event was held in April 2018 at the University of Sydney. The event was a collaboration between ANZICS, The NSW Agency for Clinical Innovation and The University of Sydney. The supporting organisations included MIT, Alfred Health, and the College of Intensive Medicine. Data hosting services were provided by Google Cloud. Eighteen teams tackled issues as diverse as the predictive value of the urine output in ICU patients, circadian rhythms in the ICU, outcomes of indigenous patients and many more. One team built on their success applying machine learning algorithms to predict mortality in ICU, to then go on to win the Singapore Critical Care Datathon later in the year. Even the NSW Minister for Health came along!

'The power of large datasets and how much you can achieve if you remove the 'boring stuff' from research and replace it with the power of working in teams of people with different skill sets,' Datathon participant



Registry Data Informing Practice

The importance of Registry data being a source for research continues to grow[4]. The ANZICS CORE Data Access and Publication Policy (https://www.anzics.com.au/data-access-and-publication-policy/) provides governance to ensure appropriate management related to data requests. The following publications highlight examples of research undertaken and the significance to Intensive Care and the overall health system.

In early 2017, the Sepsis-3 guidelines were published and standardised the diagnosis of sepsis worldwide. Describing one of the largest cohorts of critically ill children with infections ever published, Luregn Schlapbach[5] and colleagues showed that these criteria could be adapted and applied to paediatric intensive care patients. Unusually the publication focussed primarily on children admitted to adult and mixed ICUs throughout Australia and New Zealand. This highly cited paper has created the de facto standard for the diagnosis of sepsis in children.

The primary purpose of the ANZICS CORE registry is to compare and benchmark outcomes and to encourage improvements in practice. An integral part of this is a process to identify potential outlier ICUs. Kerry McClean[6] and her colleagues described the impact of the first six years of the ANZICS outlier program. This paper combined a descriptive study about the implementation of a bi-national quality improvement process, with objective measurements of outcome and important practical learnings for monitoring the whole healthcare system.

[4] Gliklich RE, Dreyer NA, Leavy MB, editors. Registries for Evaluating Patient Outcomes: A User's Guide [Internet]. 3rd edition. Rockville (MD): Agency for Healthcare Research and Quality (US); 2014 Apr. 6, Data Sources for Registries. Available from: http://www.ncbi.nlm.nih.gov/books/NBK208611/

[5] Schlapbach LJ, Straney L, Bellomo R, MacLaren G, Pilcher D. Prognostic accuracy of age-adapted SOFA, SIRS, PELOD-2, and qSOFA for in-hospital mortality among children with suspected infection admitted to the intensive care unit. Intensive Care Med. 2017 Dec 19.

[6] McClean K, Mullany D, Huckson S, Lint A van, Chavan S, Hicks P, Hart G, Paul E, Pilcher D. Identification and assessment of potentially high-mortality intensive care units using the ANZICS Centre for Outcome and Resource Evaluation clinical registry. Crit Care Resusc. 2017 Sep;19(3):230–8.

The Adult Patient Database

Who Contributed?

212 mixed ICUs across Australia and New Zealand of which **177*** contributed to APD:

- **87.4%** of Australian ICUs (160/183)
- **58.6%** of New Zealand ICUs (17/29)
- **97.6%** of all adult tertiary ICUs (40/41), with
- **172,916** admissions (158,604 from Australia, 14,312 from New Zealand).

ICU Activity and Resources

- **517,376** bed days used in the treatment of adult patients in 2017/18.
- **2.4%** admissions had an ICU length of stay more than 14 days and accounted for **20.8 %** bed days.
- Median LOS (IQR) – 1.7 (0.9-3.1) days:
  - Australia – 1.7 (0.9-3.2),
  - New Zealand – 1.4 (0.8-2.8),
- **30.7%** of admissions required mechanical ventilation in the first 24 hours of admission.

Clinical outcomes for adult patients

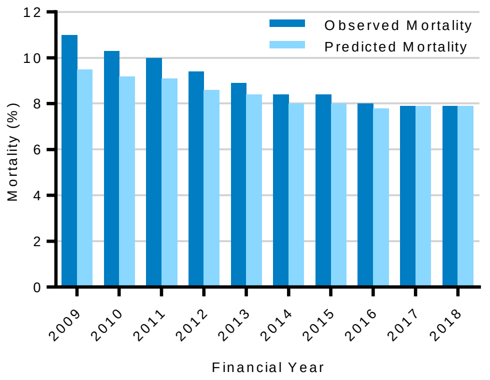
- Observed hospital mortality
  - **7.7%** in Australia
  - **10.4%** in New Zealand
- ANZROD predicted risk of death**
  - **7.7%** in Australia
  - **9.4%** in New Zealand

Source: APD

Observed and Predicted Mortality

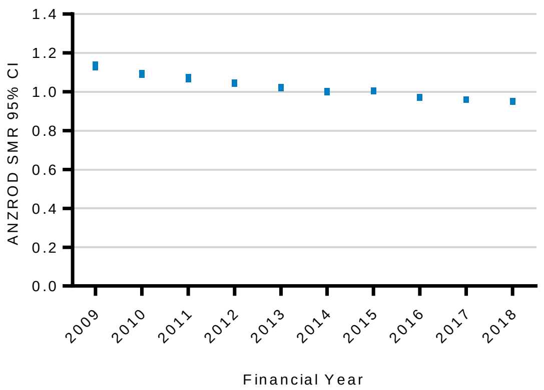
Figure 7 shows the observed and predicted mortality by year. Both observed and predicted mortality decline from 2009 and have remained relatively unchanged since 2016. This is also reflected in Figure 8 which shows the declining Australian and New Zealand Risk of Death (ANZROD**) Standard Mortality Ratio (SMR).

Figure 7. Observed and Predicted (ANZROD) Hospital Mortality - 10 Year Trend



Source: APD

Figure 8. ANZROD SMR– 10 Year Trend



Source: APD

* listed in Appendix as sites submitted to APD registry

** ANZROD is the Australian and New Zealand Risk of Death. This is calculated on all ICU patients except for those aged 16 and under, palliative care or organ donor admissions, those with unknown hospital outcome, missing all physiological variables or readmission episodes to the ICU.

Variation in Outcomes

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 ANZROD calculation**.**

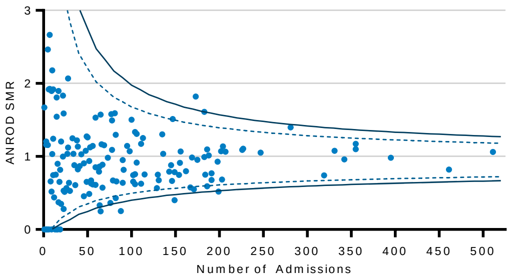
Adult Intensive Care

To identify units with outcomes that are potentially significantly different to their peer group, SMRs are presented on a funnel plot. The SMR for each site is plotted against the number of admissions for that site for the appropriate reporting period. Control lines, taking the shape of a funnel, are based on the mean SMR of the group.

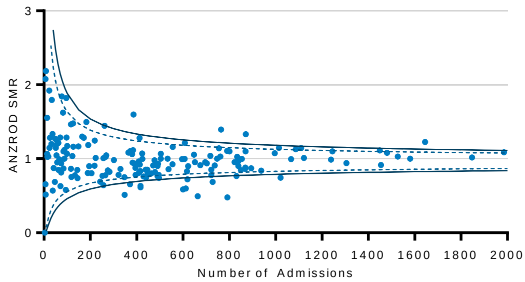
The funnel plots in Figure 8 show the SMRs for four common diagnostic groups over from 2014-2018 for all ICUs in Australia and New Zealand. Although there are obvious differences in patient numbers, most sites are within acceptable range, with relatively little variation in risk adjusted mortality outcomes.

Figure 9. Mean SMR for various diagnostic groups from the APD (five years data 2014-2018)

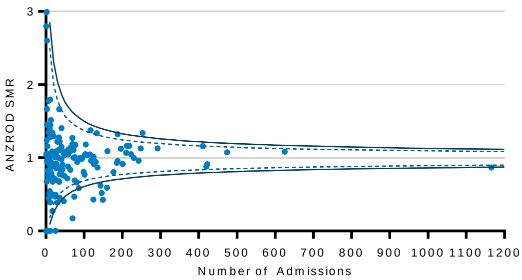
Chronic Obstructive Pulmonary Disease



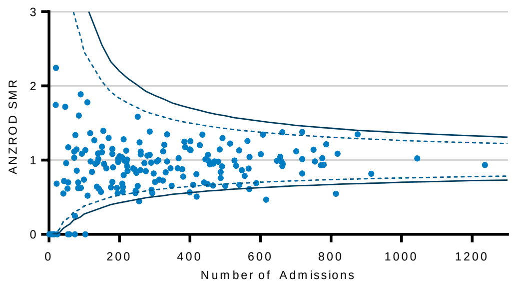
Infectious Diseases



Stroke



Gastro-Intestinal Malignancy



Source: APD

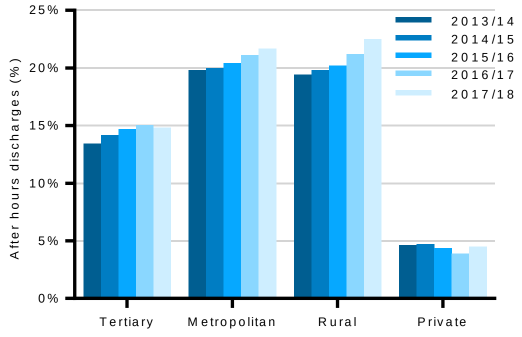
Variation in Practice

After-hours Discharge

Figure 10 is the percentage of after-hours discharge at adult ICUs across different hospital classifications. Metropolitan and Rural ICU's have increasing rates of afterhours discharge where the trend in Tertiary and Private ICUs appear to be relatively unchanged over the past 3 years.

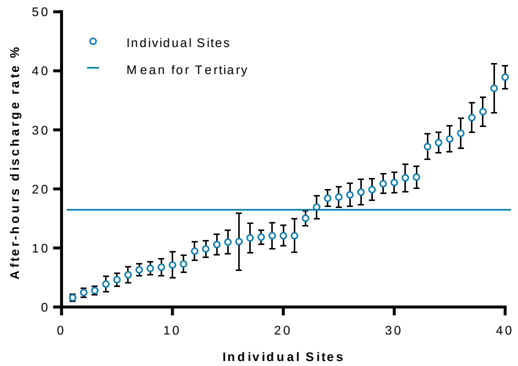
Figure 11 shows continued wide variation of after-hours discharge across the 40 Tertiary ICUs from 1.6% to 38.9% (mean of 16.5%). After-hours discharge from ICU is associated with an increased risk of death[7,8,9].

Figure 10. Adult ICU patients discharged between 6pm and 6am by Hospital Classification – 5yr trend



Source: APD

Figure 11. After hours discharge by tertiary sites 2017/18



Source: APD

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[7] Goldfrad C, Rowan K. Consequences of discharges from Intensive Care at night. Lancet. 2000 Apr 1; 355(9210):1138-42.

[8] Gantner D, Farley K, Bailey M, Huckson S, Hicks P, Pilcher D. Mortality related to after-hours discharge from intensive care in Australia and New Zealand, 2005-2012. Intensive Care Med. 2014;40(10):1528-35.

[9] Pilcher DV, Duke GJ, George C, Bailey MJ, Hart G. After-hours discharge from intensive care increases the risk of readmission and death. Anaesthesia and intensive care. 2007;35(4):477-85.

The Australian & New Zealand Paediatric Intensive Care Registry

Who Contributed?

- **100%** of all PICUs and **24** mixed adult/paediatric ICUs bi-nationally.
- **11,771** paediatric admissions to the ANZPIC Registry.
- **92%** of all paediatric ICU admissions in Australia & New Zealand.
- Over **185,000** admissions from 1997 to June, 2018.

Clinical Outcomes for Paediatric Patients

- **3.5%** Paediatric observed hospital mortality
- Paediatric observed ICU mortality and the predicted mortality were similar at **2.3%** and **2.33%** respectively (PIM3-anz 15 mortality prediction model).

ICU Activity and Resources

- **42,044** bed days used in the treatment of paediatric patients in 2017/18.
- **3.9%** admissions had an ICU length of stay more than 14 days and accounted for **36.5%** bed days.
- **38.4%** admissions had an intubation episode, **47.8%** of admissions required non-invasive or invasive ventilation.

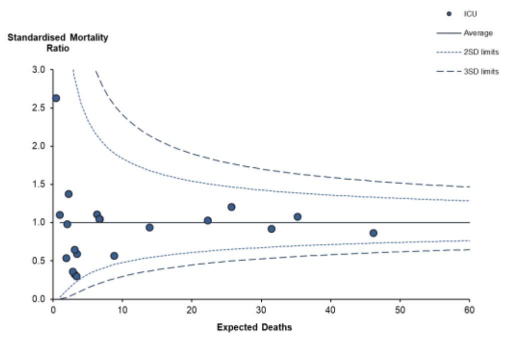
Monitoring and Data Review

- ANZPIC Registry Clinical Advisory Committee (ARCAC) review all data and reports.
- Risk-adjusted outcomes of contributing units in 2017/18 was within acceptable limits.

Monitoring Outcomes in Paediatric ICU's

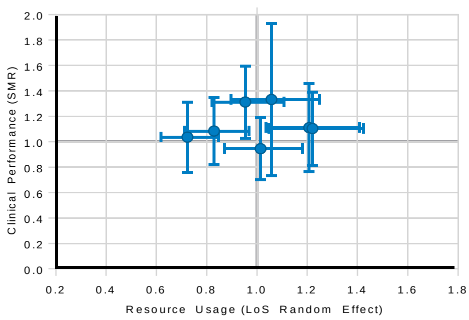
The Paediatric Registry also report ICU efficiency, where the SMR[10] based on PIM3-anz 15 score (Figure 12) is used as the indicator of clinical performance, and a risk-adjusted length of stay model is used as a marker of resource use (Figure 13). The units in specific quadrants can be described as 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 12. Funnel Plot Representation of PIM3-anz 15 SMRs for Contributing Units in 2017/18



Source: ANZPIC Registry

Figure 13. ANZPICR Rapport-Teres Plot of Efficiency 2017



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[10] 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 Registry

Who Contributed?

The data reported from CCR in this report is 2016/17 and reported to sites in 2018 following validation and cleaning.

- 78% ICUs provided data to the CCR Survey (167/213) from units across Australia and New Zealand
- Data was received from all Tertiary sites (41/41), most non-contributing sites were Rural and Private ICUs. 53% New Zealand ICUs (21/39) submit data through the CCR survey.

Unless otherwise indicated PICUs are included in the data. For those sites that did not complete the survey contact was made for information related to bed numbers and admissions to ensure accurate bed status bi-nationally.

Figure 14. Contribution to CCR over 5 years

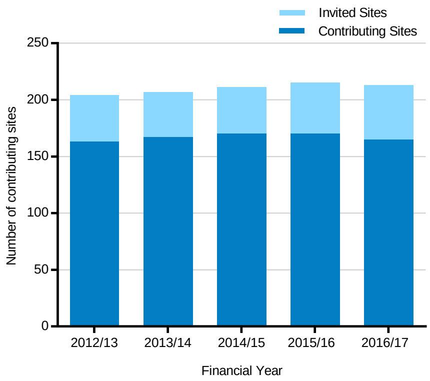
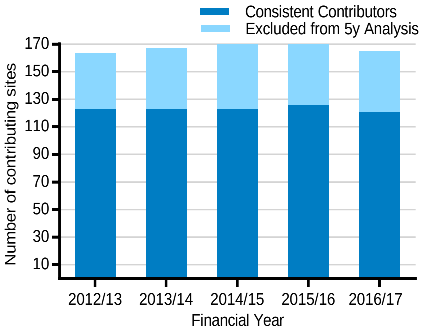


Figure 15. Consistent Contributors over 5 years



Changes in Resources & Activity

- **4.6%** growth in available beds
- **2.6%** increase in admissions
- **2%** increase in patient days.
- **25 units** expect to increase available beds in 2018
- Staffing kept pace with activity changes

Admissions & Patient Days 2016/17

182,473 admissions were reported from 165 units.

- **535,228** patient days were reported from 147 units with 1.5% decrease in private units and a 2.7% increase in public units.

Metropolitan units had 1.8% increase, Tertiary units a 2.2% increase and rural units a 7.4% increase in rural units.

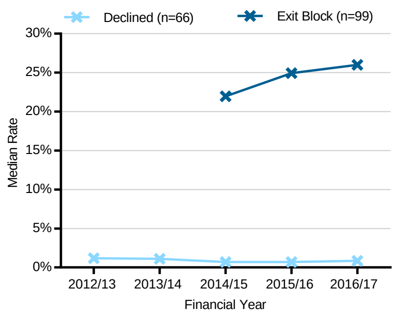
Availability of ICU Beds

- **2,503** available beds and
- **2,952** physical beds across 213 ICUs inclusive of PICUs
- 5% increase in available beds and 4.6% increase in physical beds

Exit Block and Declined admissions

Exit block data has only been reported for the past 3 years but shows an upward trend

Figure 16. Exit Block and Decline Admissions



Note: Exit block, delay in discharge of 6 hours or more. Declined Admissions due to inadequate ICU resources

Critical Care Resources Registry

Medical Emergency Teams

153/206 (74%) ICU's reported having hospital Medical Emergency Teams (MET).

Figure 17. Total number of MET calls, Over 5 Years by Classification

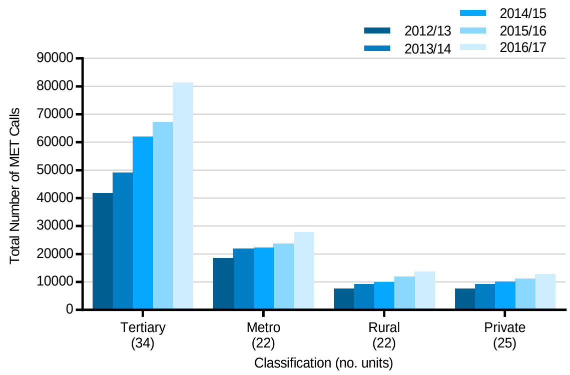


Figure 18. Proportion MET Managed by ICU, Over 5 Years by Classification

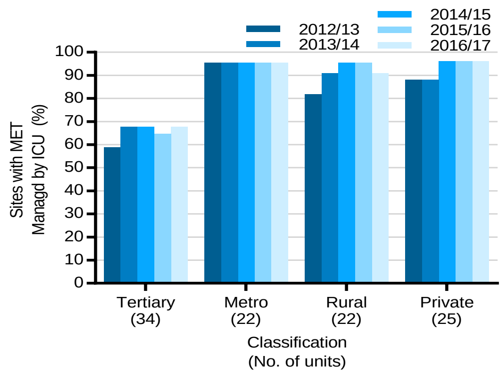
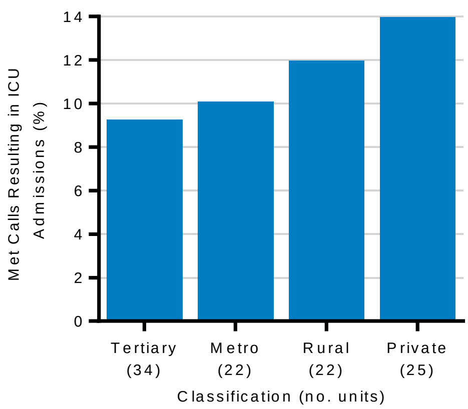


Figure 19. Proportion of MET Calls Resulting in ICU Admissions, by Classification



Profile of Workforce

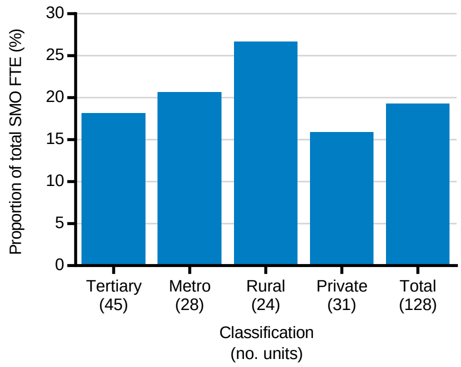
Senior Medical Workforce (SMO)

- 148 units reported SMO data for 2016/17 with a total of 774 full time equivalent (FTE).
- 216 practicing female Intensivists, 19% of FTE.
- 6.4% increase in SMO FTE across 133 units that submitted data over two years.

The SMO FTE per 1000 patient days has remained consistent suggesting that growth in senior medical workforce is consistent with growth in the number of patient days.

Women Specialists in ICU

Figure 20. Proportion of Female Specialists (FTE), by Classification



CCR Data from 128 sites.

Nursing Workforce

160 units reported registered nurse (RN) data for 2016/17 with a total 1001 FTE, with

- 2.9% increase in RN FTE across 147 units
- 3.2% increase in public units (n=110)
- 1% increase in private units (n=37)

The RN FTE per 1000 patient days remains consistent suggesting that the growth in nursing workforce is consistent with the growth in patient days.

The total vacancy rate for 2016/17 was 5.4%, which is consistent with data from 2015/16 at 5.5%.

Publications based on ANZICS Registry data 2017/18

ICU Admissions for Sepsis or Pneumonia in Australia and New Zealand in 2017. Burrell A, Huckson S, Pilcher DV; ANZICS**.** N Engl J Med. 2018 May 31;378(22):2138-2139.

Adverse outcomes after planned surgery with anticipated intensive care admission in out-of-office-hours time periods: a multicentre cohort study. Morgan DJ, Ho KM, Kolybaba ML, Ong YJ; ANZICS Centre for Outcome and Resource Evaluation. Br J Anaesth. 2018 Jun;120(6):1420-1428.

The Melbourne epidemic thunderstorm asthma event 2016: an investigation of environmental triggers, effect on health services, and patient risk factors. Thien F, Beggs PJ, Csutoros D, Darvall J, Hew M, Davies JM, et al. Lancet Planet Health. 2018 Jun;2(6)

Early Hyperoxia in Patients with Traumatic Brain Injury Admitted to Intensive Care in Australia and New Zealand: A Retrospective Multicenter Cohort Study. Ó Briain D, Nickson C, Pilcher DV, Udy AA. Neurocrit Care. 2018 Jun 8.

Sample size calculations for cluster randomised crossover trials in Australian and New Zealand intensive care research. Arnup SJ, McKenzie JE, Pilcher D, Bellomo R, Forbes AB. Crit Care Resusc. 2018 Jun;20(2):117-123.

Hypercapnia and hypercapnic acidosis in sepsis: harmful, beneficial or unclear? Tiruvoipati R, Gupta S, Pilcher D, Bailey M. Crit Care Resusc. 2018 Jun;20(2):94-100.

The systemic inflammatory response syndrome criteria and their differential association with mortality. Kaukonen K-M, Bailey M, Pilcher D, Cooper DJ, Bellomo R. J Crit Care. 2018 Apr 7;46:29–36.

Paediatric sequential organ failure assessment score (pSOFA): a plea for the world-wide collaboration for consensus. Kawasaki T, Shime N, Straney L, Bellomo R, MacLaren G, Pilcher D, et al. Intensive Care Med. 2018 Apr 27;

Effect of a National Standard for Deteriorating Patients on Intensive Care Admissions Due to Cardiac Arrest in Australia. Jones D, Bhasale A, Bailey M, Pilcher D, Anstey MH. Crit Care Med. 2018 Apr;46(4):586–93.

Association of Hypercapnia and Hypercapnic Acidosis With Clinical Outcomes in Mechanically Ventilated Patients With Cerebral Injury. Tiruvoipati R, Pilcher D, Botha J, Buscher H, Simister R, Bailey M. JAMA Neurol. 2018 Mar

Early glycemia and mortality in critically ill septic patients: Interaction with insulin-treated diabetes. Magee F, Bailey M, Pilcher DV, Mårtensson J, Bellomo R. J Crit Care. 2018 Mar 3;45:170–1.

Which organ dysfunction scores to use in children with infection? Leclerc F, Duhamel A, Leteurtre S, Straney L, Bellomo R, MacLaren G, et al. Intensive Care Med. 2018 Mar 22;

Predicting Expected Organ Donor Numbers in Australian Hospitals Outside of the Donate-Life Network Using the ANZICS Adult Patient Database. O'Brien Y, Chavan S, Huckson S, Russ G, Opdam H, Pilcher D. Transplantation. 2018 Feb

Characteristics, incidence, and outcome of patients admitted to the intensive care unit with myasthenia gravis. Al-Bassam W, Kubicki M, Bailey M, Walker L, Young P, Pilcher DV, et al. J Crit Care. 2018 Jan 7;45:90–4.

Acute Risk Change: An innovative measure of operative adverse events and perioperative team performance. TG Coulson, B Gregson, S Sandys, S Nashef, S Webb, M Bailey, C Reid, D Pilcher. Journal of Cardiothoracic and Vascular Anesthesia

Patterns of organ donation in children in Australia and New Zealand. Corkery-Lavender T, Millar J, Cavazzoni E, Gelbart B.Crit Care Resusc. 2017 Dec;19(4):296-302.

Patient characteristics, incidence, technique, outcomes and early prediction of tracheostomy in the state of Victoria, Australia. A Casamento, M Bailey, R Robbins, D Pilcher, S Warrillow, A Ghosh, R Bellomo. Journal of critical care 44, Dec 17, 278-284,

Prognostic accuracy of age-adapted SOFA, SIRS, PELOD-2, and qSOFA for in-hospital mortality among children with suspected infection admitted to the intensive care unit. Schlapbach LJ, Straney L, Bellomo R, MacLaren G, Pilcher D. Intensive Care Med. 2017 Dec 19.

Publications based on ANZICS Registry data 2017/18 *continued*

Age and other perioperative risk factors for postoperative systemic inflammatory response syndrome after cardiac surgery. Dieleman JM, Peelen LM, Coulson TG, Tran L, Reid CM, Smith JA, Myles PS, Pilcher D. British Journal of Anaesthesia 2017 Oct; 119 (4): 637–644

Central line-associated bloodstream infections in Australian ICUs: evaluating modifiable and non-modifiable risks in Victorian healthcare facilities. Spelman T, Pilcher DV, Cheng AC, Bull AL, Richards MJ, Worth LJ. Epidemiol Infect. 2017 Sep 4:1-9.

Intensity of early correction of hyperglycaemia and outcome of critically ill patients with diabetic ketoacidosis. Mårtensson J, Bailey M, Venkatesh B, Pilcher D, Deane A, Abdelhamid YA, Crisman M, Verma B, MacIsaac C, Wigmore G, Shehabi Y, Suzuki T, French C, Orford N, Kakho N, Prins J, Ekinci EI, Bellomo RCrit Care Resusc. 2017 Sep;19(3):266-273.

Identification and assessment of potentially high-mortality intensive care units using the ANZICS Centre for Outcome and Resource Evaluation clinical registry. McClean K, Mullany D, Huckson S, Lint A van, Chavan S, Hicks P, et al**.** Crit Care Resusc. 2017 Sep;19(3):230–8.

Understanding the cluster randomised crossover design: a graphical illustraton of the components of variation and a sample size tutorial. Arnup SJ, McKenzie JE, Hemming K, Pilcher D, Forbes AB. Trials. 2017 Aug 15;18(1):381.

Admission to Intensive Care for Palliative Care or Potential Organ Donation: Demographics, Circumstances, Outcomes, and Resource Use. Melville A, Kolt G, Anderson D, Mitropoulos J, Pilcher D. Crit Care Med. 2017 Aug 11;

Declining mortality in critically ill patients with cirrhosis in Australia and New Zealand between 2000 and 2015. Majumdar A, Bailey M, Kemp WM, Bellomo R, Roberts SK, Pilcher D. J Hepatol. 2017 Aug 9;

The association between peri-operative acute risk change (ARC) and long-term survival after cardiac surgery. Coulson TG, Bailey M, Reid CM, Tran L, Mullany DV, Smith JA, et al. Anaesthesia. 2017 Jul 13;

Appendix: Sites contributing to ANZICS CORE Registries

Sites listed are those that contributed data to the specific ANZICS CORE Registries for the period 2017/18. 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	✓		✓	✓

New South Wales	APD	ANZPICR	CCR	CLABSI
Armidale Rural Referral Hospital ICU				✓
Bankstown-Lidcombe Hospital ICU	✓		✓	✓
Bathurst Base Hospital ICU	✓		✓	✓
Blacktown Hospital ICU	✓			✓
Bowral Hospital HDU			✓	
Broken Hill Base Hospital & Health Services ICU			✓	✓
Calvary Health Care Riverina (Wagga) 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	✓	✓	✓	✓
Hornsby Ku-ring-gai Hospital ICU	✓		✓	✓
Hurstville Private Hospital ICU	✓			
John Hunter Children's Hospital PICU		✓		
John Hunter Hospital ICU	✓		✓	✓
Kareena Private Hospital ICU	✓		✓	
Kempsey District Hospital HDU				✓
Lake Macquarie Private Hospital ICU			✓	
Lismore Base Hospital ICU	✓		✓	✓
Liverpool Hospital ICU	✓		✓	✓
Macquarie University Private Hospital ICU	✓		✓	
Manly Hospital & Community Health ICU	✓		✓	✓
Manning Rural Referral Hospital ICU	✓		✓	✓
Mater Private Hospital (Sydney) ICU	✓			
Mona Vale Hospital ICU				✓

Appendix: Sites contributing to ANZICS CORE Registries *continued*

New South Wales *continued*	APD	ANZPICR	CCR	CLABSI
Nepean Hospital ICU	✓		✓	✓
Newcastle Private Hospital ICU	✓		✓	
North Shore Private 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	✓		✓	✓
Shoalhaven Hospital ICU	✓		✓	✓
South East Regional Hospital ICU				✓
St George Hospital (Sydney) CICU	✓			
St George Hospital (Sydney) ICU	✓		✓	✓
St George Hospital (Sydney) ICU2	✓			
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 Heads District Hospital ICU	✓			✓
Wagga Wagga Base Hospital & District Health ICU	✓		✓	✓
Westmead Hospital ICU	✓		✓	✓
Westmead Private Hospital ICU	✓		✓	
Wollongong Hospital ICU	✓		✓	✓
Wollongong Private Hospital ICU	✓			
Wyong Hospital ICU	✓		✓	

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

Appendix: 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	✓			
Holy Spirit Northside 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 North Queensland ICU	✓			
Mater Private Hospital (Brisbane) ICU	✓		✓	
Mount Isa Hospital ICU	✓		✓	
Noosa 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 War Memorial Hospital ICU	✓			
St Vincent's Hospital (Toowoomba) ICU	✓			
Sunnybank Hospital ICU	✓		✓	
The Prince Charles Hospital ICU	✓		✓	
Sunshine Coast University Hospital ICU			✓	
Sunshine Coast University Hospital ICU - Paeds		✓		
The Sunshine Coast Private Hospital ICU			✓	
The Townsville Hospital ICU	✓		✓	
The Townsville Hospital ICU - Paeds		✓	✓	
The Wesley Hospital ICU	✓		✓	
Toowoomba Hospital ICU	✓		✓	

Appendix: Sites contributing to ANZICS CORE Registries *continued*

South Australia	APD	ANZPICR	CCR	CLABSI
Ashford Community Hospital ICU	✓			
Calvary North Adelaide Hospital ICU	✓			✓
Calvary Wakefield Hospital (Adelaide) 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
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	✓	✓	✓	✓
Austin Hospital ICU	✓		✓	✓
Ballarat Health Services ICU	✓		✓	✓
Bendigo Health Care Group ICU	✓		✓	✓
Box Hill Hospital ICU	✓		✓	✓
Cabrini Hospital ICU	✓		✓	
Central Gippsland Health Service ICU	✓		✓	✓
Dandenong Hospital ICU	✓		✓	✓
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	✓			✓
Holmesglen Private Hospital ICU	✓			✓
John Fawkner Hospital ICU	✓		✓	✓
Knox Private Hospital ICU	✓		✓	

Appendix: Sites contributing to ANZICS CORE Registries *continued*

Victoria *continued*	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	✓		✓	✓
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 Valley Private Hospital ICU	✓			
University Hospital Geelong ICU	✓	✓	✓	✓
Warringal Private Hospital ICU	✓		✓	
Western District Health Service (Hamilton) ICU	✓		✓	✓
Western Private Hospital ICU	✓			
Wimmera Health Care Group (Horsham) ICU	✓		✓	✓

Western Australia	APD	ANZPICR	CCR	CLABSI
Armadale Health Service ICU	✓		✓	✓
Bunbury Regional Hospital ICU	✓		✓	✓
Fiona Stanley 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: Sites contributing to ANZICS CORE Registries *continued*

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

Abbreviations

ACSQHC	Australian Commission on Safety and Quality in Health Care
ANZICS	Australian and New Zealand Intensive Care Society
ANZIC-RC	Australian and New Zealand Intensive Care Research Centre
ANZPICR	Australian and New Zealand Paediatric Intensive Care Registry
ANZROD	Australian and New Zealand Risk of Death
APD	Adult Patient Database
ARCAC	ANZPIC Registry Clinical Advisory Committee
AIHW	Australian Institute of Health and Welfare
CCR	Critical Care Resources Registry
CERS	CORE Enterprise Reporting System
CI	Confidence Interval
CICM	College of Intensive Care Medicine
CLABSI	Central Line Associated Bloodstream Infection
COMET	CORE Outcome Measurement Evaluation Tool
CORE	Centre for Outcome and Resource Evaluation
ICNARC	Intensive Care National Audit & Research Centre
ICU	Intensive Care Unit
JAG	Jurisdictional Advisory Group
MIT	Massachusetts Institute of Technology

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.
Full Time Equivalent	The number of paid hours which is expressed as a ratio of the agreed hours for a full time employee (>35 hours per week of paid employment, worked at an individual site)
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. *Note: SMR exclusions differ depending on the predictive model being used.*
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. *Note: SMR exclusions differ depending on the predictive model being used.*
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.
Registered Nurse	Australia: A nurse who is on the register maintained by the State or Territory nurses board or nursing council to practice nursing in that state or territory New Zealand: A registered nurse is defined aby the Nurses Act 1977 as a nurse whose name is recorded on one of the registers of Nurses
Senior Medical Officer	A medical practitioner employed or working in a role as a specialist
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.
Ventilated	Patients provided with continuous support via oral/nasal intubation or tracheostomy by means of a mechanical device that augments or replaces respiratory effort.