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ANZICS CORE

Clinical Quality Registry

Benchmarking, Risk Prediction and ICU Performance

Centre for Outcome and Resource Evaluation

May 2025

www.anzics.org

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ACKNOWLEDGEMENT OF COUNTRY

ANZICS acknowledges and pays respect to the Traditional Custodians of the lands across Australia and New Zealand.

We pay respect to the **Wurundjeri People of the Kulin Nation** as the Traditional Custodians of the land on which the ANZICS' office stands.

The Society acknowledges **Māori as tangata whenua and Treaty of Waitangi partners** in Aotearoa New Zealand.

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SESSION OUTCOMES

Introduce the ANZICS CORE Clinical Quality Registries:

- Outline the ANZICS CORE datasets
- State the need for the ICU registry service
- Define the variables collected for the Adult Patient Database

Use the Adult Patient Database to explain:

- Benchmarking of ICU performance
- Risk prediction terms – ANZROD and SMR
- Importance of data quality

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WHY HAVE AN ICU REGISTRY?

The ANZICS ICU Registry:

- Recognised as a **Clinical Quality Registry** by the **Australian Commission on Safety and Quality in Health Care (ACSQHC)**
- Monitors **patient outcomes**, **quality of care** and **availability of resources**
- Contributes to the **world class standard of care** delivered in intensive care units across AUS/NZ
- Submission of data is an important **process indictor** for the Australian Council of Healthcare Standards (ACHS) and assists with **timely review for accreditation of intensive care unit**
- Endorsed as a **national quality assurance and improvement program** by the Commonwealth Govt through renewal of **Qualified Privilege** status in 2023

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ANZICS CORE IS THE CUSTODIAN OF THE ICU REGISTRY

- We **work with the clinical community** to support the collection and submission of compliant data
- ICUs receive quarterly **risk-adjusted, benchmark reports** which compare the outcomes of **their patients to peer-group ICUs**
- **98.6%** of all ICUs in Australia and almost **70%** in New Zealand contribute data to the Registry
- The **ANZICS Outlier Management Program** is an established system which responds to **unwarranted variation**. This program has been demonstrated to:
    - Reduce ICU mortality and length of stay[1],
    - Provide an economic cost benefit to cost ratio of 4:1[1]

1. The Australian Commission on Safety and Quality in Health Care. Economic evaluation of clinical quality registries: Final report Sydney: ACSQHC; 2016

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ANZICS CORE DATASETS

EXTRA CORPOREAL MEMBRANCE OXYGENATION

- Low volume, high-cost intervention
- Data linkage and research ongoing

CLABSI SURVEILLANCE PROGRAM

- Monitors Central Line Associated Blood Stream Infection rates
  - Central line days
  - CLABSIs per month

ADULT PATIENT DATABASE

- 200,000 admissions/year
- > 3 million episodes of care
- Risk prediction based on the ANZROD model

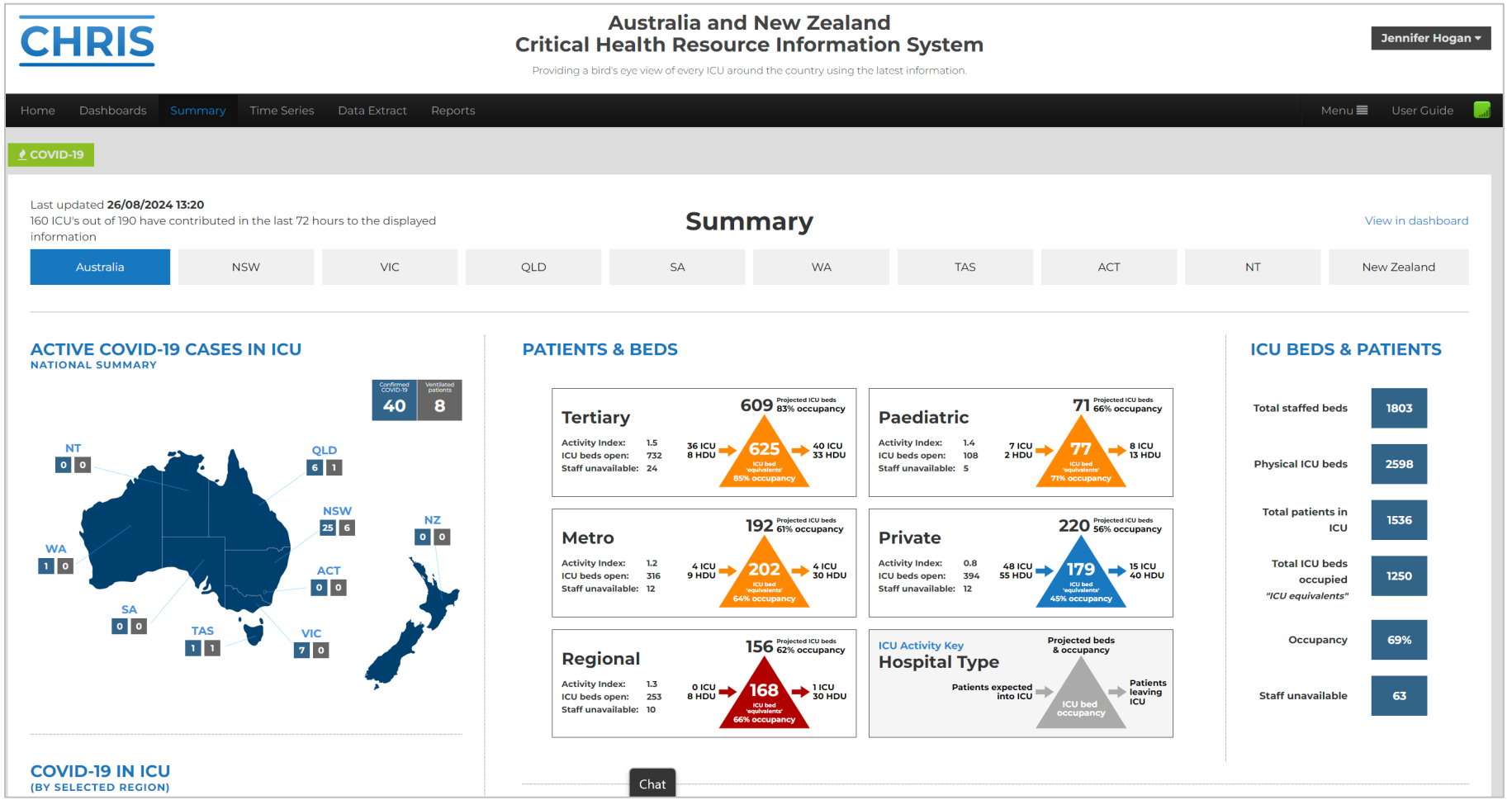
PAEDIATRIC REGISTRY

- 13,000 admission/year
- Risk prediction based on PIM3anz15

CRITICAL CARE RESOURCES

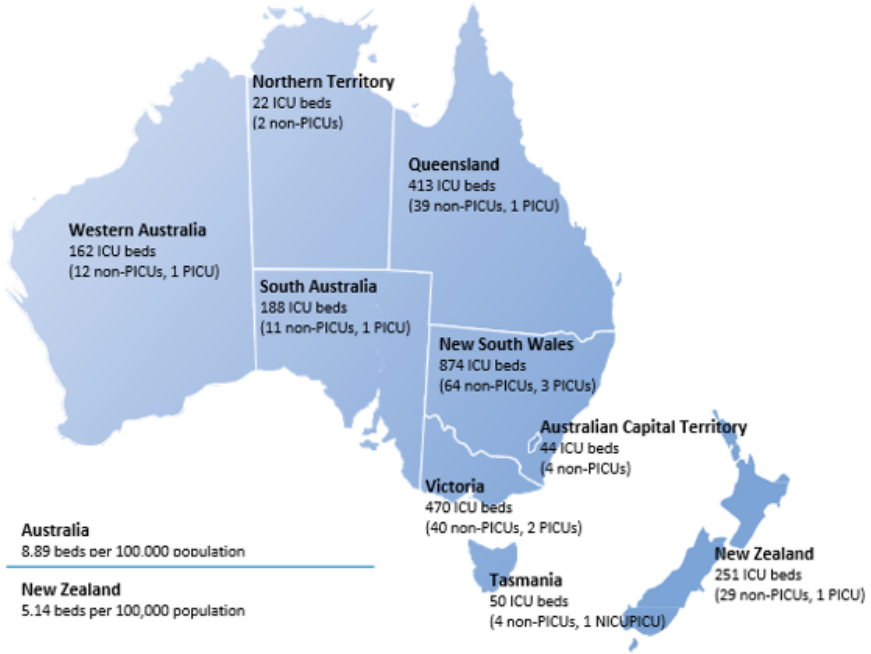
- Annual survey on ICU beds, staffing, resources
- Used for reporting ICU clinical indicators to ACHS

CRITICAL HEALTH RESOURCE INFORMATION SYSTEM (CHRIS)



DATA HELD WITHIN THE REGISTRY

- Provides an **accurate picture** of Intensive Care **practice** and **patient outcomes**
- **Informs improvements** in care through the **benchmarking** of outcomes, resources and processes of care
- **Provides system-wide monitoring** leading to health **economic savings**
- Assists with the **translation of research into practice**
- **Encourages collaboration** and sharing of information across the sector



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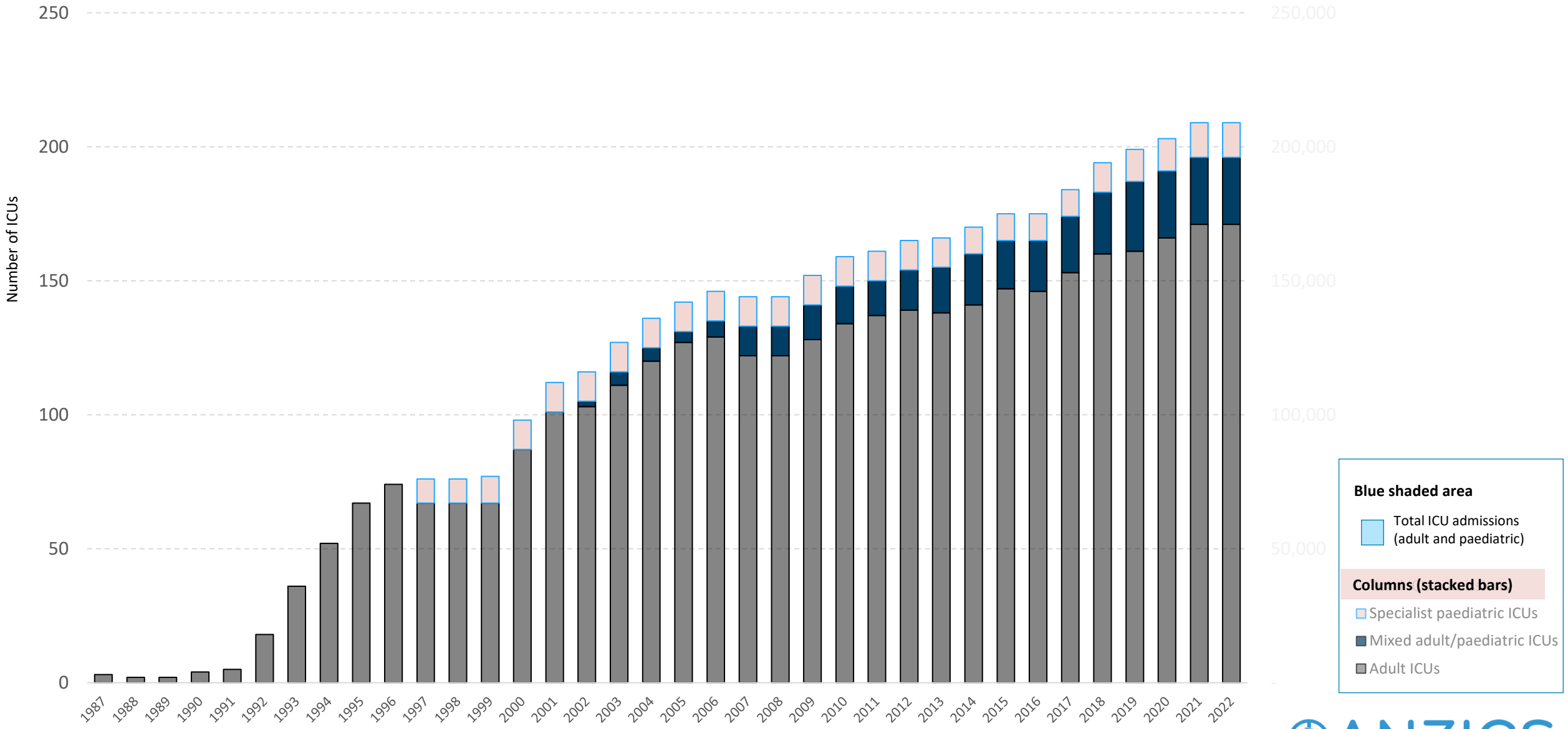
GROWTH OF ANZICS REGISTRY CONTRIBUTORS



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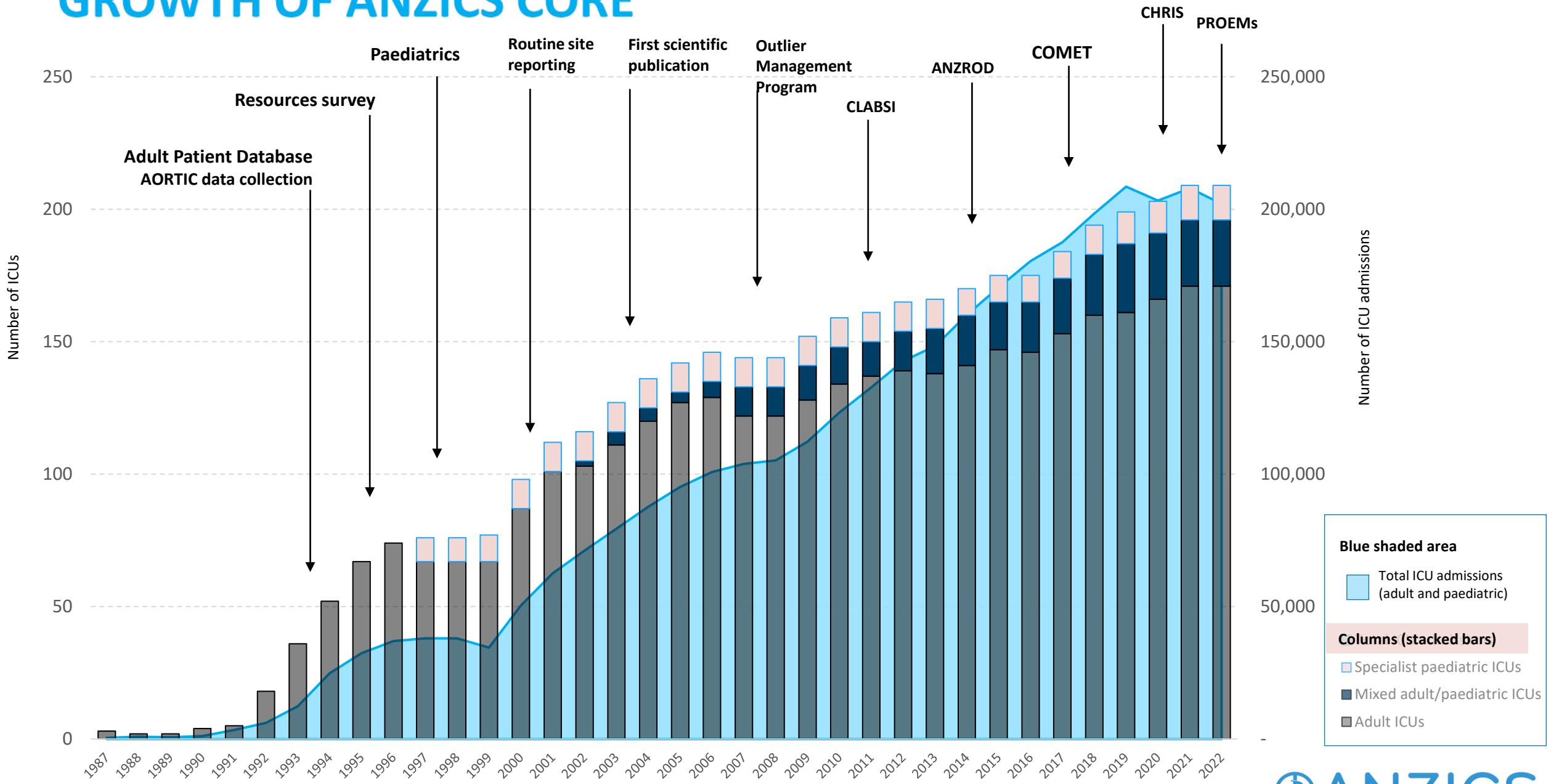
GROWTH OF ANZICS CORE



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ICU DATA - WHAT WE COLLECT

Adult Patient Database:

- Patient data on individual episodes of care (for the first 24 hours from ICU admission time)

Included:

1. All admissions to ICU including readmissions
2. All admissions/readmissions to other units under the care umbrella of ICU (including HDU)

Excluded:

1. Admissions to units remote from ICU which are not controlled by intensivists or staff providing ICU services e.g., a separate neurosurgical HDU
2. Coronary care admissions to combined ICU/CCUs
3. Ward admissions
4. Admissions for solitary procedures

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WHY PREDICT PATIENT OUTCOMES?

Severity Scoring Systems…

- To facilitate appropriate interpretation and **comparison of mortality outcomes** of ICUs and patient cohorts
- Can be used to compare predicted mortality to **resource use** and **length of stay**, and potentially estimate **ICU efficiency**
- Patient illness severity can be compared in different arms of a **research** trial

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SEVERITY SCORING SYSTEMS = PREDICTIVE TOOLS

The accurate prediction of patient outcomes is a cornerstone of clinical medicine

- Most severity of illness scores predict mortality in the general ICU population
- Outcome prediction involves identifying and measuring markers of illness severity and correlating them to relevant outcomes
- Other scores have been developed for specific populations e.g., ECMO, trauma, sepsis

APACHE [2-5]

ANZROD SAPS [8-11]

ICNARC [7] PIM [15–17]

MBM [12-14]

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SEVERITY SCORING SYSTEMS

- Scores are created by **weighting physiological variables**, **diagnosis**, **location prior to admission** and **other factors** to produce a total score

- The first step is to **identify variables which have a relationship with mortality**

- The second step is to **derive an equation or algorithm which connects the measured variable to the outcome**

PRINCIPLES OF MORTALITY PREDICTION

The predictive capacity of one variable may differ between individual patient groups:

- GCS is more strongly related to the outcome of patients with neurological injuries than those with cardiac surgery

Key considerations:

- The strength of the relationship with mortality
- Size of the dataset
- Practical aspects such as burden of data collection

USE OF SEVERITY SCORES

Severity scores which predict mortality are often used for:

- Evaluation and audit of the quality of care
- Resource allocation and management
- Comparison of groups in research trials

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RISK PREDICTION FOR ADULTS

Two key terms are important:

- **Standardised Mortality Ratio (SMR),** and
- The **Australia and New Zealand Risk of Death Model (ANZROD)**

- **The SMR is the ratio for a patient population where the observed deaths is divided by the predicted mortality for a specified time period**
  - A value of 1 is considered normal or expected
  - > 1 is worse than expected
  - < 1 is better than expected

- Calculated from physiological scoring e.g., age, physiology, chronic conditions and Apache III-J diagnosis, ICU lead time, ICU source, emergency surgery/trauma, GCS, thrombolytic therapy.

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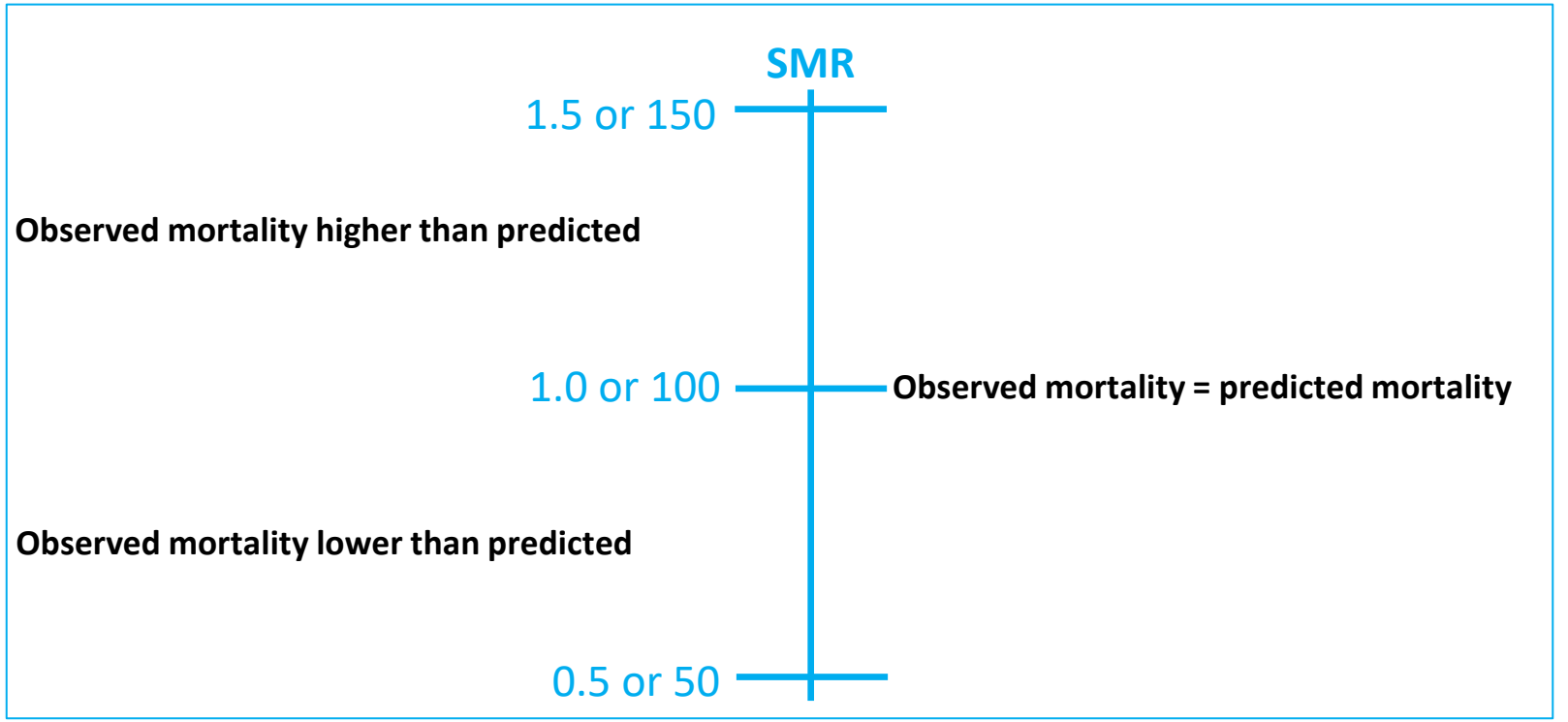
STANDARDISED MORTALITY RATIO (SMR)

For a patient population:

$$\frac{\text{Observed deaths} \times 100}{\text{Predicted deaths}} = \text{Standardised Mortality Ratio (SMR)}$$



Predicted risk of death calculated by the ANZROD algorithm based on APACHE III-J variables

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A CHANGE IN SMR

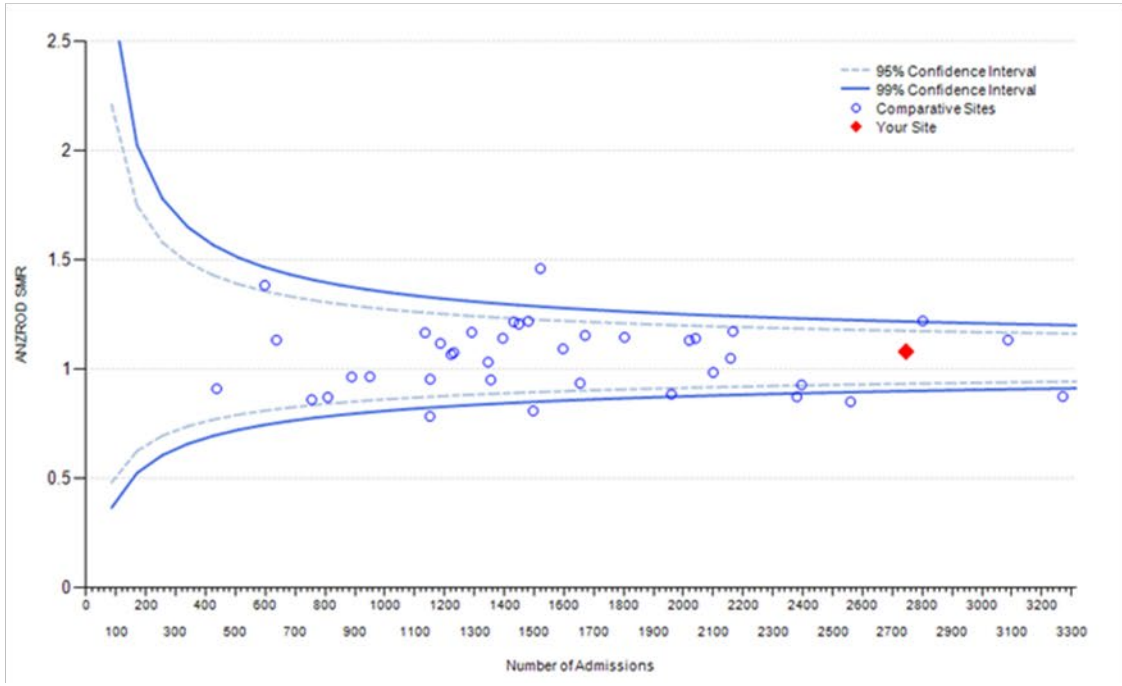
Potential reasons for a change in SMR for an ICU:

- Inaccurate /inconsistent data collection (poor data quality)
- Change in case mix
- System-wide performance issues (SMR based on hospital mortality)
- Clinical practice variation / deviation
- Unusual community events – e.g., influenza epidemic
- Process changes – e.g., personnel, staffing levels
- Lead time bias (pre-ICU care can impact SMR)

AUSRTALIAN AND NEW ZEALAND RISK OF DEATH - ANZROD

- **Primary risk prediction model** for **benchmarking mortality outcomes** and for identifying **potential ICU outliers** using the **Standardised Mortality Ratio (SMR)**
- Provides a single number for each patient which represents the **individual's ROD** before hospital discharge
- Developed using **Aust** & **NZ patient data** from the **Adult Patient Database**
- **More accurate predictor of mortality** than APACHE III-J

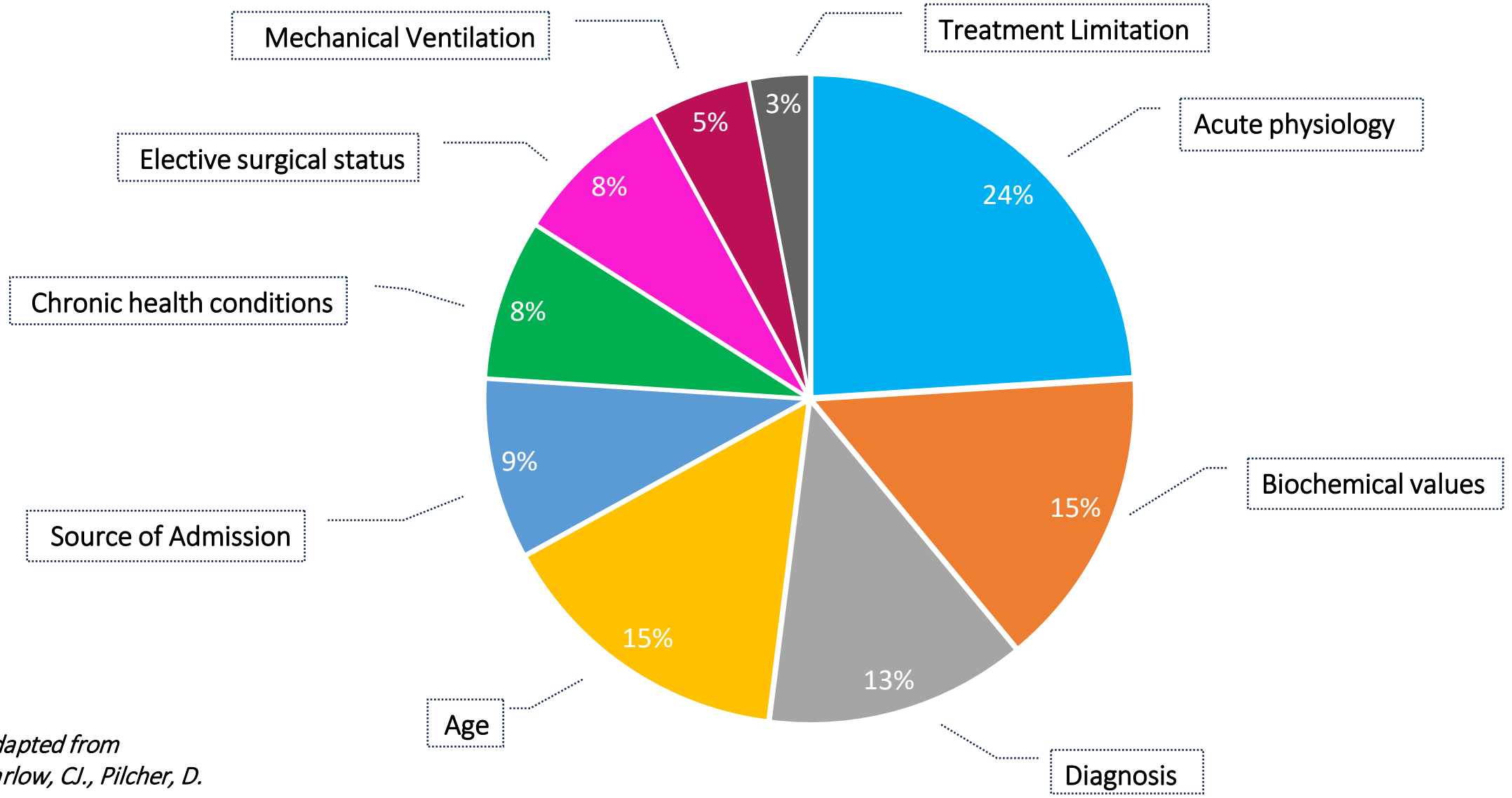
SMR = Observed deaths /predicted deaths)



The ANZROD Funnel Plot

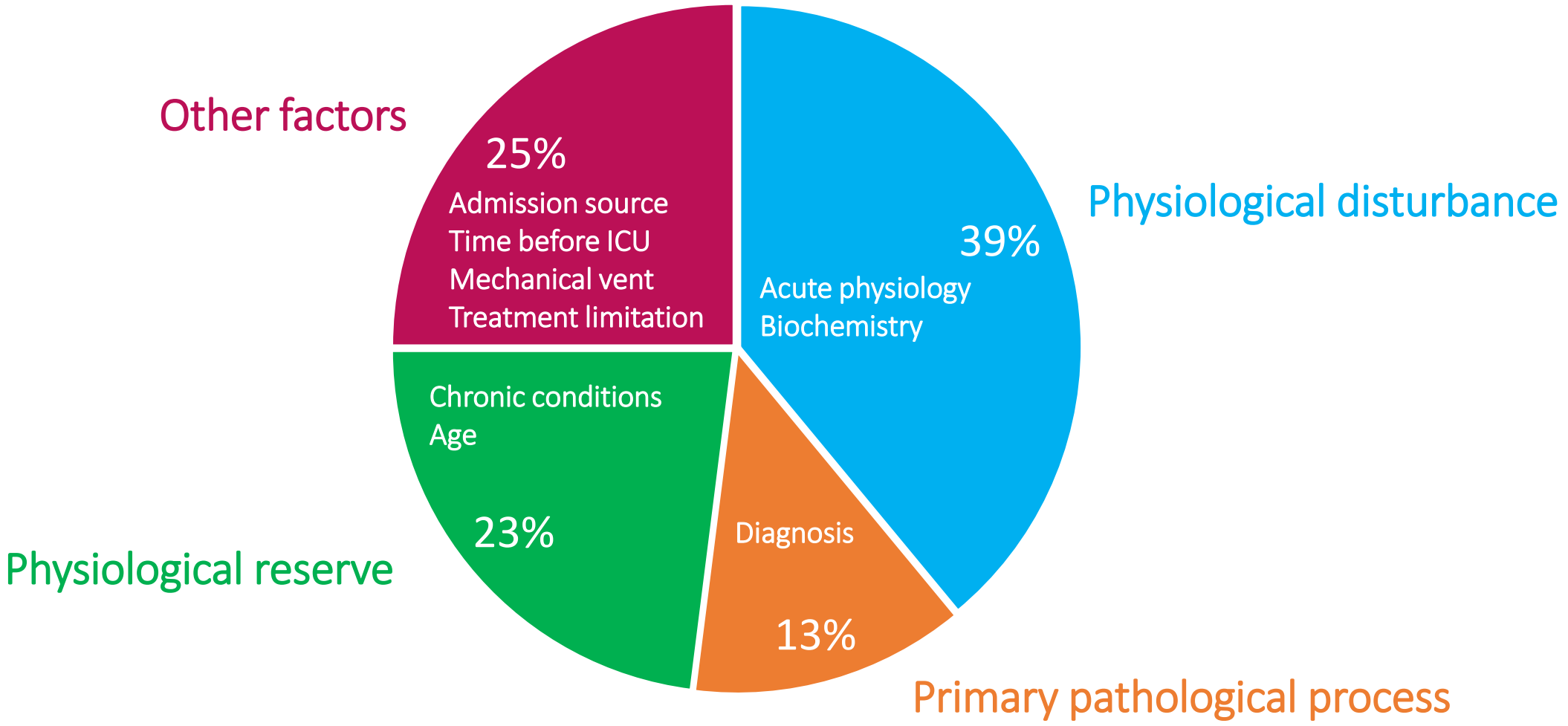
- Each site within a comparative group is represented by a circle
- Funnel lines are the 95% & 99% confidence intervals for the mean SMR of the group

ANZROD – RELATIVE CONTRIBUTION OF APD VARIABLES



Adapted from
Barlow, CJ., Pilcher, D.

ANZROD – RELATIVE CONTRIBUTION OF APD VARIABLES



IMPLICATIONS FOR ANZROD SCORING

Implications for ANZROD Scoring

- Frequent Evaluation is required (but this is done by ANZICS):
  - Discrimination
  - Calibration
  - Validity

For Data Collectors

- Be mindful of the relative contributions of each variable
- Missing data will be treated as normal
- Failing to follow the rules of the data dictionary will produce an inaccurate risk prediction

IMPORTANCE OF DATA QUALITY

Characteristics of data quality:

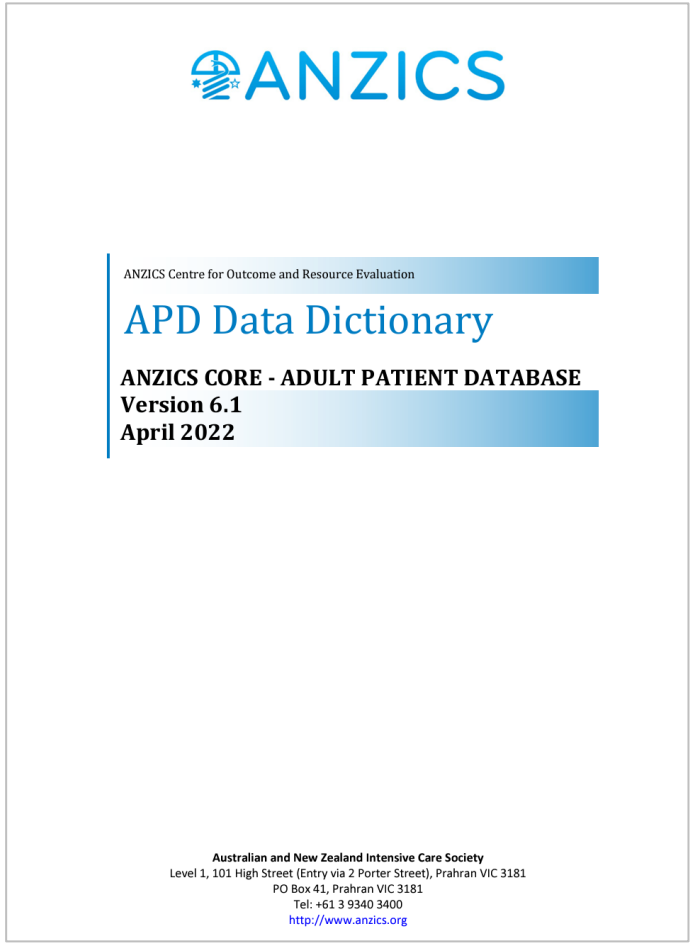
- **Current** – time sensitive
- **Complete** – wholeness of the data
- **Clean** – inaccurate records are detected and corrected
- **Consistent** – data standardized across all systems
- **Credible** – data is verified from a reliable source to be credible
- **Compliant** – sensitive data meets legal, governmental, business regulations

Dedicated data collectors produce better quality data!

IMPORTANCE OF DATA QUALITY

Practices to maintain data quality:

- Adhere to the rules of the **Adult Data Dictionary**
- Ensure **clinical oversight** of coding
  - Form a **Registry Special Interest Group**
- **Inform your clinical staff** about the registry and the important **data variables** to collect
- If you have the data enter it - **missing data is treated as normal**
- **Monitor your SMR** regularly
- **Self-audit** 10% of your records annually
- **Stay connected with ANZICS CORE** – have a low threshold for calling for help



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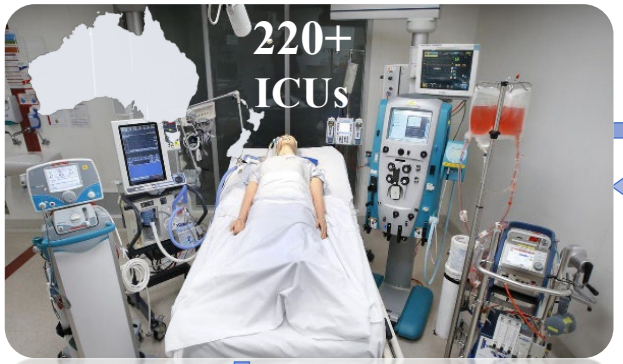

Identified patient information

De-identified patient information

Aggregated census data on activity, resources and occupancy

Data immediately available to all contributing ICUs

NDI
NATIONAL DEATH INDEX

COMET
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Email address
Password
Forgot password?
Sign in
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core

Australian Government Australian Institute of Health and Welfare AIHW

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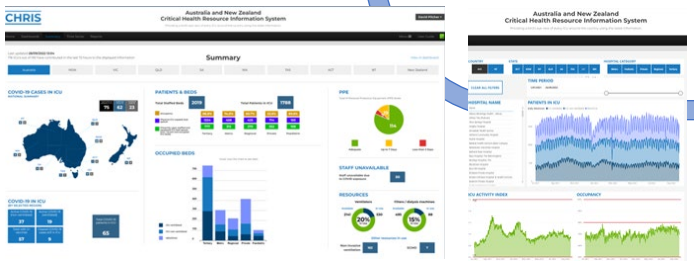
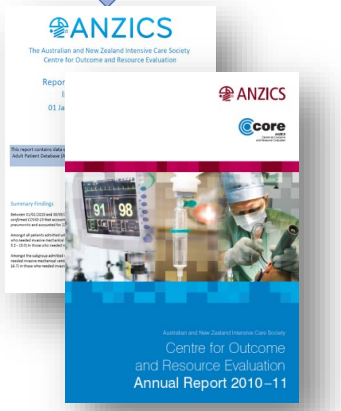
ANZICS Reporting System

Benchmarking reports to hospitals and health departments



Critical Health Resources Information System (CHRIS)



Annual reports

SUMMARY

The ANZICS Clinical Quality Registry facilitates:

- **Regular monitoring and review of ICU performance** – ICU leadership teams can readily access their data for continuous improvement
- **Quality improvement projects** – Data held within the registry informs the development of targeted improvement projects to improve patient care and patient outcomes e.g., enhancing infection control practices, optimizing discharge processes
- **Staff engagement** – Regular sharing of ICU benchmarked performance data fosters a culture of transparency and collective responsibility for patient outcomes

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