ANZICS CORE

The ANZICS Registry: How to read the ICU Efficiency Plot

Centre for Outcome and Resource Evaluation

June 2025

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This presentation will…

Demonstrate how to access the ANZICS CORE Portal to extract an ICU Efficiency Plot

Define the following terms:

- The ICU Efficiency Plot
- The Australia and New Zealand Risk of Death (ANZROD) Standardised Mortality Ratio
- The Risk Adjusted Length of Stay Ratio (RALOSR)

State how to read an Efficiency Plot and interpret an ICU's position within it

Provide recent research about the Efficiency Plot

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Navigate and login to the **CORE Portal**

www.coreportal.anzics.org

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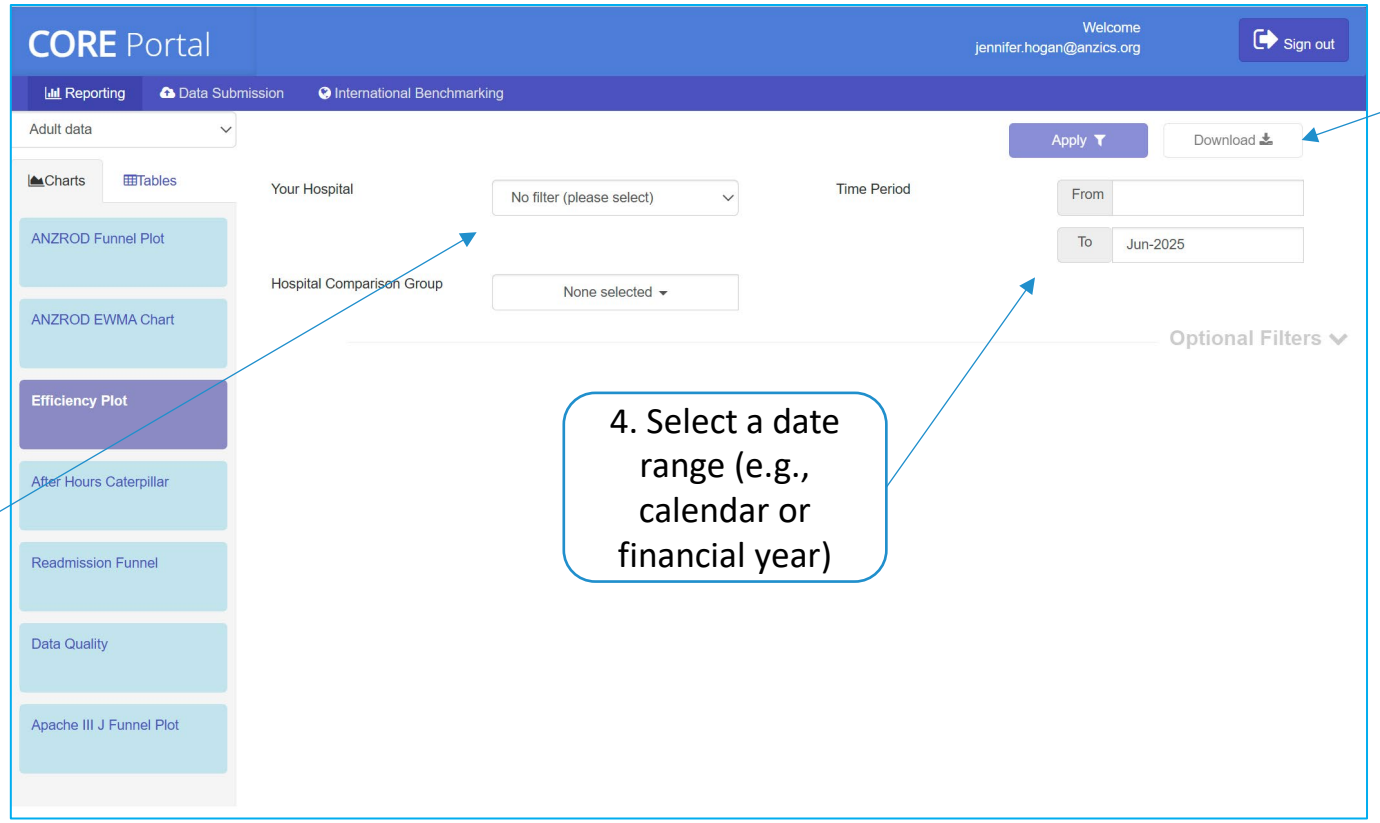
1. In the Reporting tab, filter for adult or paediatric data

2. Select ‘Efficiency Plot’

3. Your ICU will be located here



4. Select a date range (e.g., calendar or financial year)

5. The ‘Optional Filter’ tab allows you to filer for admission source, ventilation type or diagnostic group

6. Select ‘Download’. The report may take a few minutes to run

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The ICU Efficiency Plot

The **ICU Efficiency Plot** combines the **Australia and New Zealand Risk of Death** (ANZROD) **Standardised Mortality Ratio** (SMR) plotted against the **Risk-Adjusted Length of Stay Ratio** (RALOSR), with 99% confidence intervals.

To interpret an ICU's position on the plot, it is necessary to define these terms.

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The ANZROD SMR

- ANZROD is the **primary risk prediction model to benchmark mortality outcomes** and to **identify potential ICU outliers** using the **Standardised Mortality Ratio** (SMS).

- ANZROD provides a single number for each patient which **represents the individual's risk of death before hospital discharge.**

- The **SMR** is the **actual number of deaths divided by the predicted number of deaths.**

The RALOSR

- The **risk adjusted length of stay ratio** is considered the **most typical length of stay for a patient group based on severity of illness characteristics.**
- It represents the **actual length of stay divided by the predicted length of stay** and is a **marker of resource use.**

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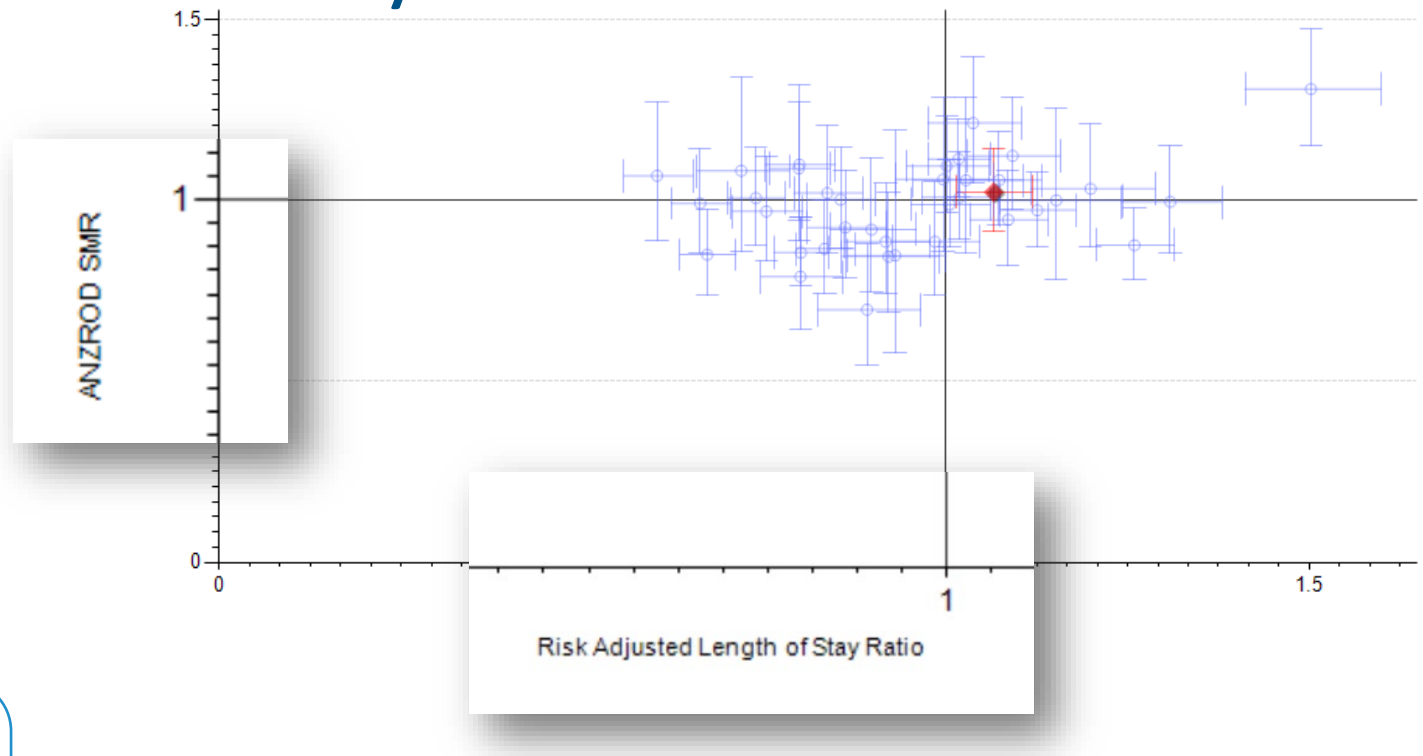
The ICU Efficiency Plot



If an ICU's SMR is close to 1, the observed deaths for the reporting period are within risk prediction

If an ICU's RALOSR is close to 1, the length of stay for a patient group is within risk prediction based on severity of illness characteristics

The SMR and RALOSR are calibrated to an SMR of 1

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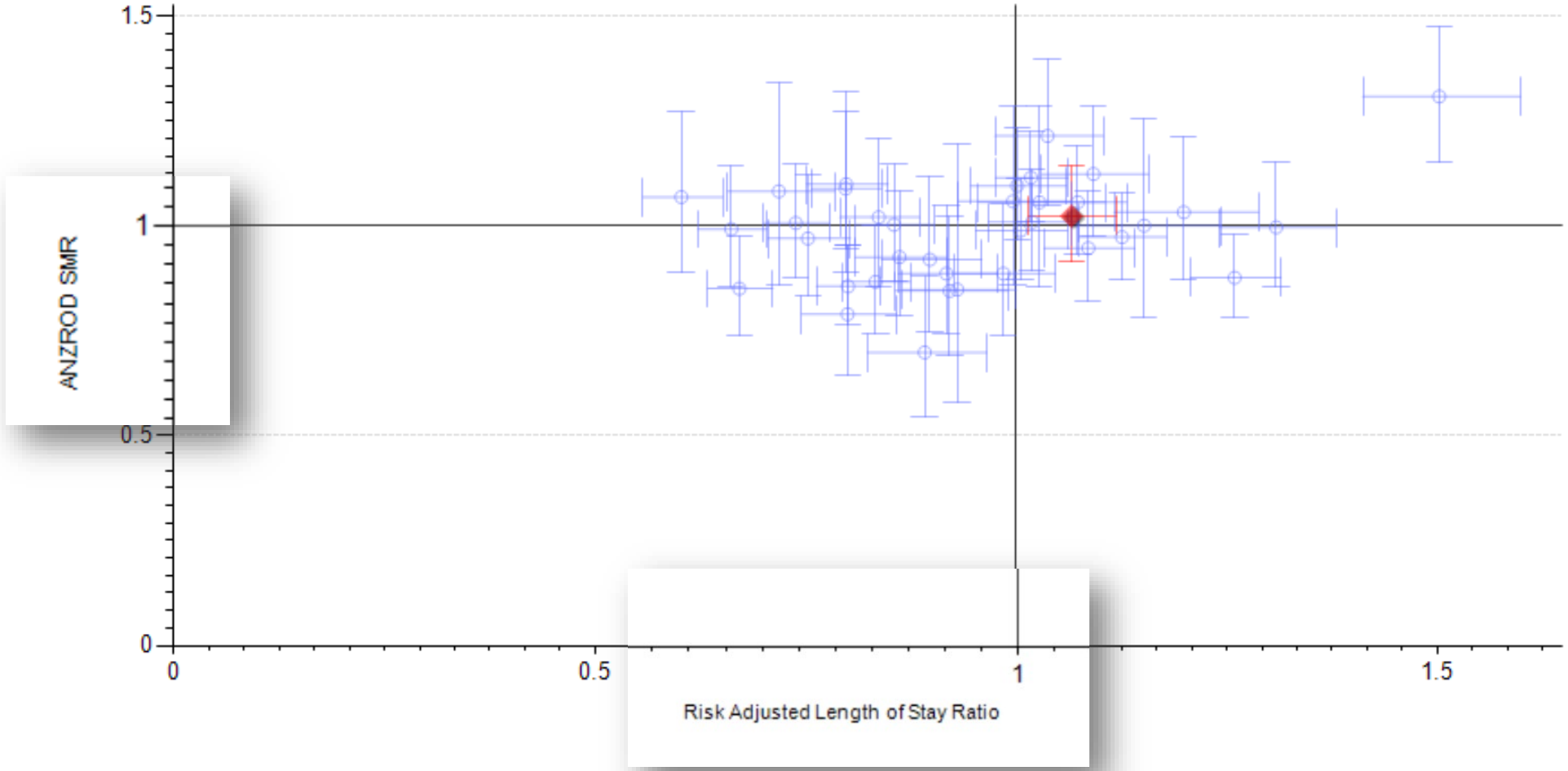
The ICU Efficiency Plot

Each ICU is displayed as a point estimate with 95% confidence intervals. Your ICU will be highlighted in red against comparative sites



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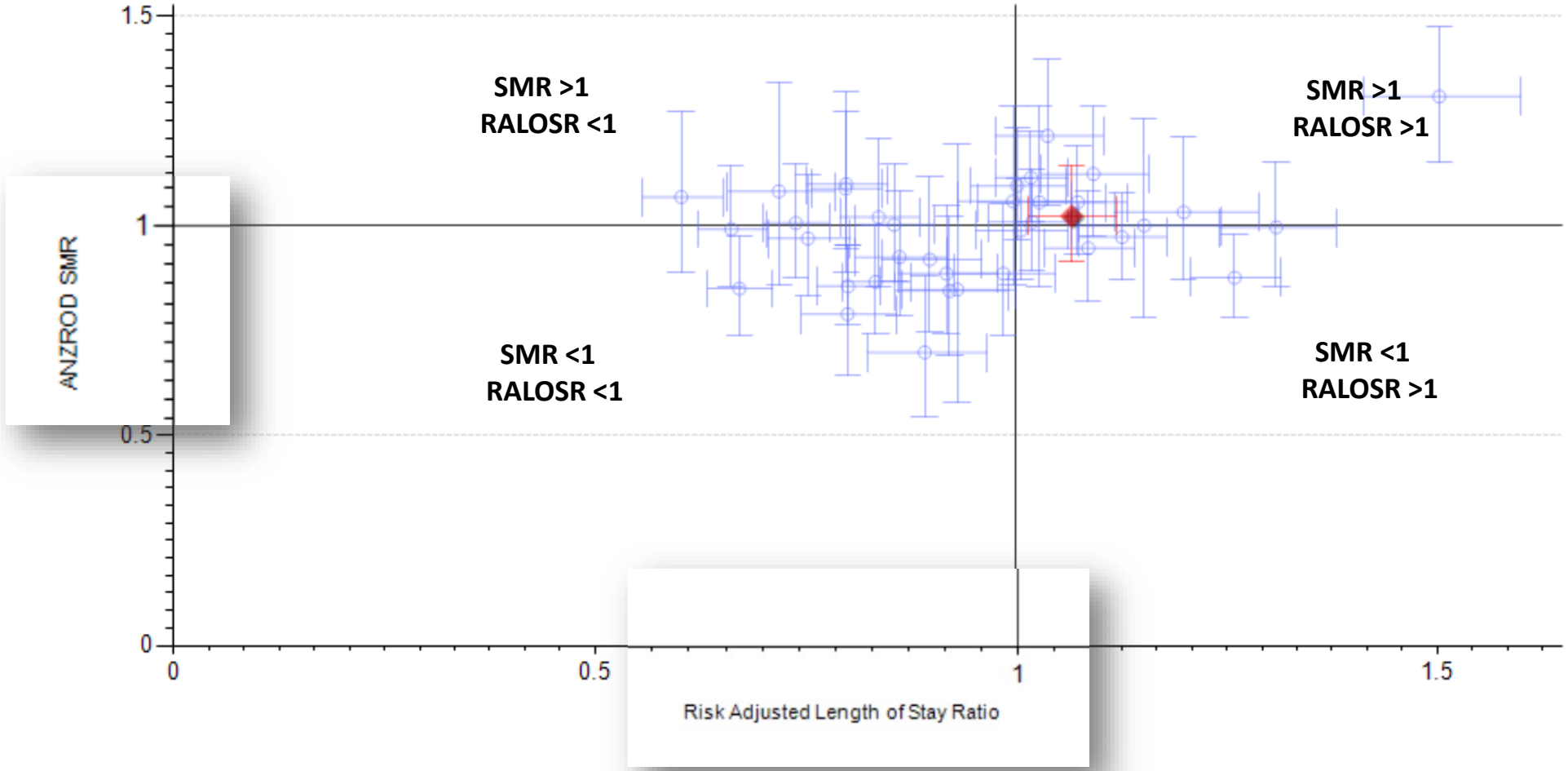
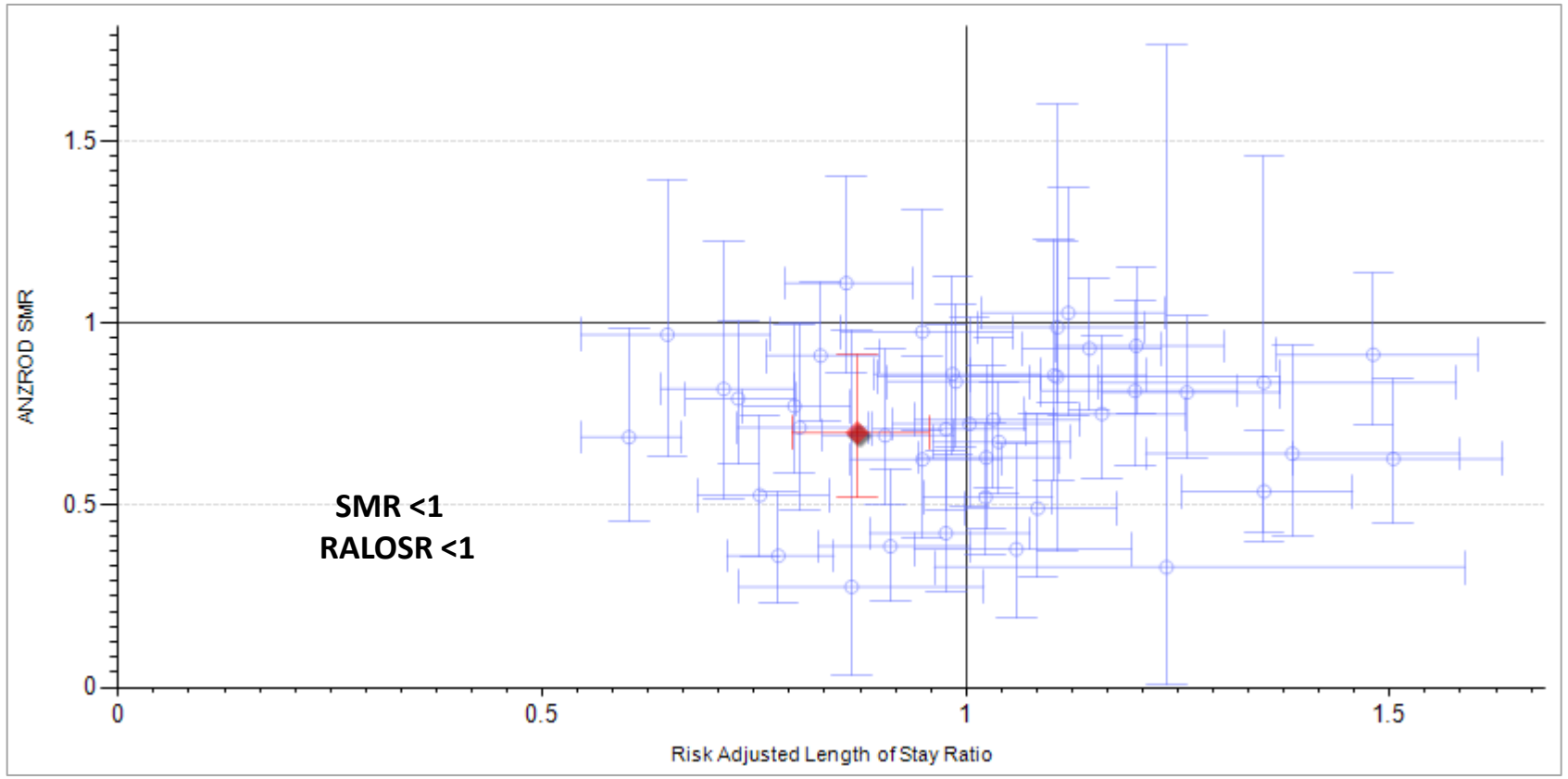
The ICU Efficiency Plot

Each ICU falls between one of four quadrants which represent different outcome and resource combinations

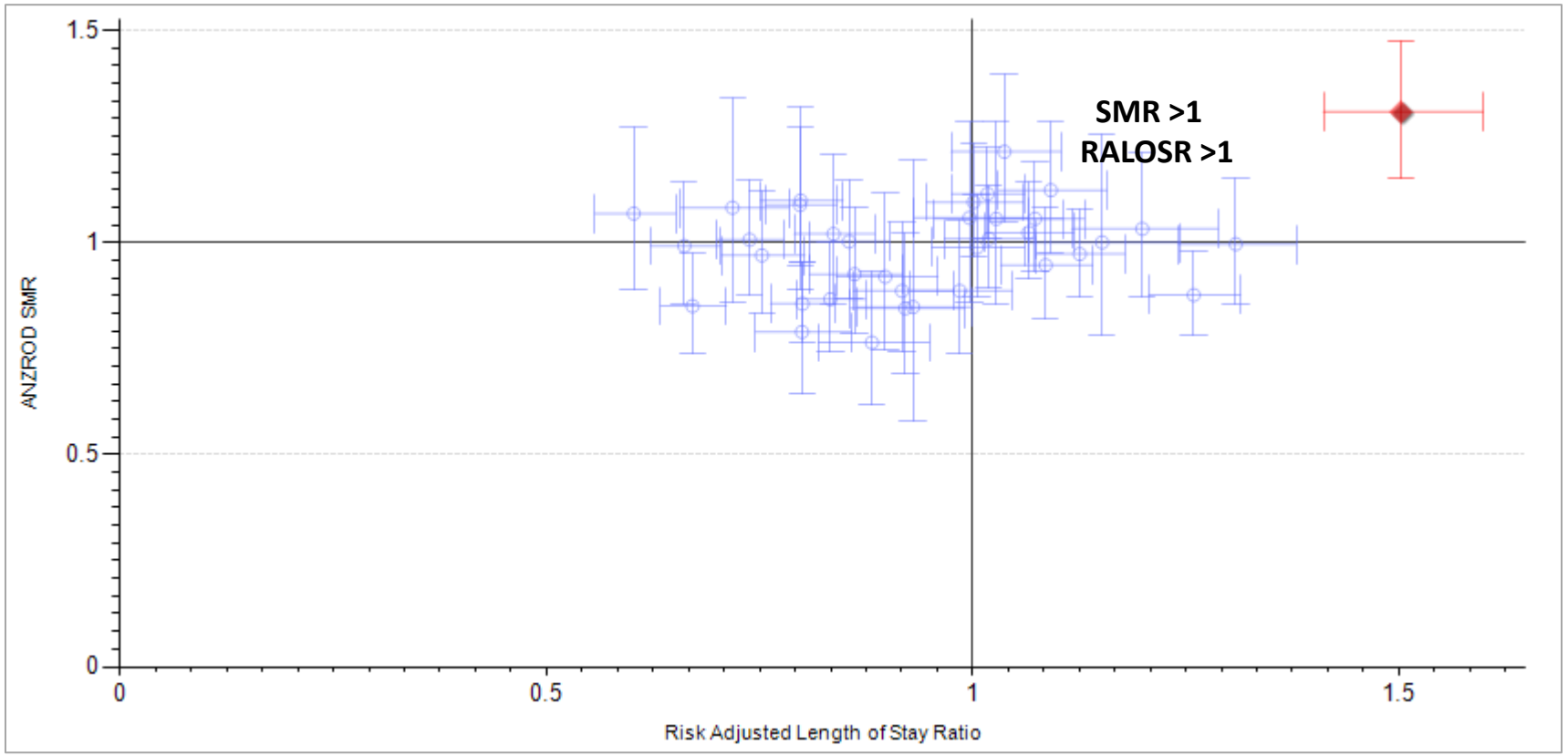


The ICU Efficiency Plot

ICUs that fall within the lower left quadrant are the **most efficient**, with both a low SMR and a shorter ICU length of stay than predicted



The ICU Efficiency Plot



ICUs that fall within the upper right quadrant are the **least efficient**, with both a high SMR and a longer ICU length of stay than predicted

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Review Philosophy for Causes of a High SMR

Before an ICU is confirmed as having a high SMR, data quality issues must be investigated.

Three factors influence the SMR:

- Data Reliability – Inaccurate data collection can produce a change in the ROD
- Data Completeness – Missing data is treated as normal
- Case Mix – Diagnosis, admission type, chronic comorbidities, age

For units flagged with a high SMR, a supportive process of investigation is undertaken by ANZICS in accordance with the **Outlier Management Policy.**

This involves investigation of data quality issues, case mix and unit-based resources and processes.

1. Outlier Management Policy
https://www.anzics.com.au/outlier-management-policy/

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What causes a RALOSR > 1?

An ICU with a RALOSR, whose lower confidence interval is > 1, has a longer overall ICU length of stay than would be expected from the baseline severity of illness of their patients.

A high RALOSR may be due to:

- Large numbers of patients where the length of stay (LOS) predictions have *underestimated* the true LOS, or
- Large numbers of patients who have *accurate predictions* of LOS but *spend longer than expected* in the ICU e.g. patients with ‘exit block’.

How is RALOSR calculated?

The RALOSR is a ratio of the **geometric mean of observed LOS in ICU divided by the geometric mean of predicted LOS.**

Predicted LOS **is calculated using *age, diagnosis, severity of illness indices* and *mortality*.** Sicker, older patients and those with co-morbidities spend longer in ICU, but only up to a point.

Overall length of stay **predictions are accurate for major groups** such as ventilated and non-ventilated patients and for **common diagnostic groups** such as cardiac surgery, sepsis and overdoses.

Predictions **may be inaccurate for smaller ICUs with < 200 admissions.**

Research into RALOSR: Causes

An analysis by Burrell et al (2019) of 167,014 ICU admissions showed:

- *Statistically significant but clinically small differences between* ***observed*** *and* ***predicted LOS***

(typically less than 4 hours)

- Most common causative factor was **discharge delay.**

'The ICU Efficiency Plot': a novel graphical measure of ICU performance in Australia and New Zealand. Burrell, A[1,2]., Udy, A[1,2,3]., Straney, L[2]., Huckson, S[3]., Chavan, S[3]., Saethern, J[3]., Pilcher, D[1,2,3].

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Research into RALOSR: Implications

The ICU Efficiency Plot:

Is an innovative display of overall ICU performance.

Provides an opportunity to benchmark institutional resource utilisation against mortality

Submitted data requires further scrutiny.

In future, it may facilitate monitoring of interventions to improve overall ICU performance.

To stimulate review of hospital-wide processes which affect ICU LOS, patient disposition and workflow.

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