

Background & Aim

In Australia and New Zealand, approximately 20 000 emergency laparotomies are performed each year. (1) The urgent nature of these cases results in limited preoperative patient optimisation and therefore significant variation in patient management and outcomes. As a result, thirty-day mortality rates as high as 20% have been reported around the world for emergency laparotomy patients. (2) To address this, it is essential to identify high-risk patients so they may be managed with care tailored to their individual needs to provide the best opportunity for survival.

In recent years, the National Emergency Laparotomy Audit (NELA) in England and Wales (3) and the Australia and New Zealand Emergency Laparotomy Audit (ANZELA) (2) have been established to report the risk-adjusted outcomes for emergency laparotomy patients, and to promote best practice.

The NELA score (4) is a clinical tool used to estimate (pre-operatively) the mortality risk for patients requiring an emergency laparotomy. The NELA score guide perioperative decision-making (for example, postoperative admission to the High Dependency Unit (HDU) or the Intensive Care Unit (ICU)) and our understanding of risk. An inaccurate mortality risk and its resultant influence on perioperative decision making has the potential to impose a negative financial burden on each respective institution and increases the risk of dubious decision making in an already high-risk setting. (5) However, evidence for the accuracy of the NELA score in predicting the actual mortality risk for emergency laparotomy patients in Australian hospitals remains limited.

The purpose of this study was to determine how well calibrated the NELA score is to the assortment of hospitals contributing to the ANZELA and to assess the consistency of performance across these hospitals.

Method

This was a multi-site retrospective cohort study of all patients who underwent an emergency laparotomy at University Hospital Geelong (UHG) from July 2017 to January 2021 and ANZELA hospitals from June 2018 to August 2021.

For UHG, data was collected directly from the Geelong Emergency Laparotomy Audit (GELA) Database. This data included patient demographics, NELA scores, post-operative destinations and post-operative outcomes. For the ANZELA hospitals, data was collected directly from the ANZELA. This data included patient demographics, NELA scores and post-operative outcomes. Patients included in the study were selected based on the inclusion-exclusion criteria used for the ANZELA.

A total of 325 patients were identified at UHG. Documentation was incomplete for 40 patients, leaving 285 patients that were included in the UHG analysis. Twenty-six hospitals contributed data to the ANZELA. A total of 4723 patients underwent an emergency laparotomy during the study period. Documentation was complete for 2799 patients, who were included in the ANZELA study.

Statistics

Mann-Whitney U Test	→	Median NELA Scores
Indirect Method of Standardisation (8)	→	Standardised Mortality Rate (SMR)
Byar's Method (8)	→	Confidence Intervals for SMR

Results

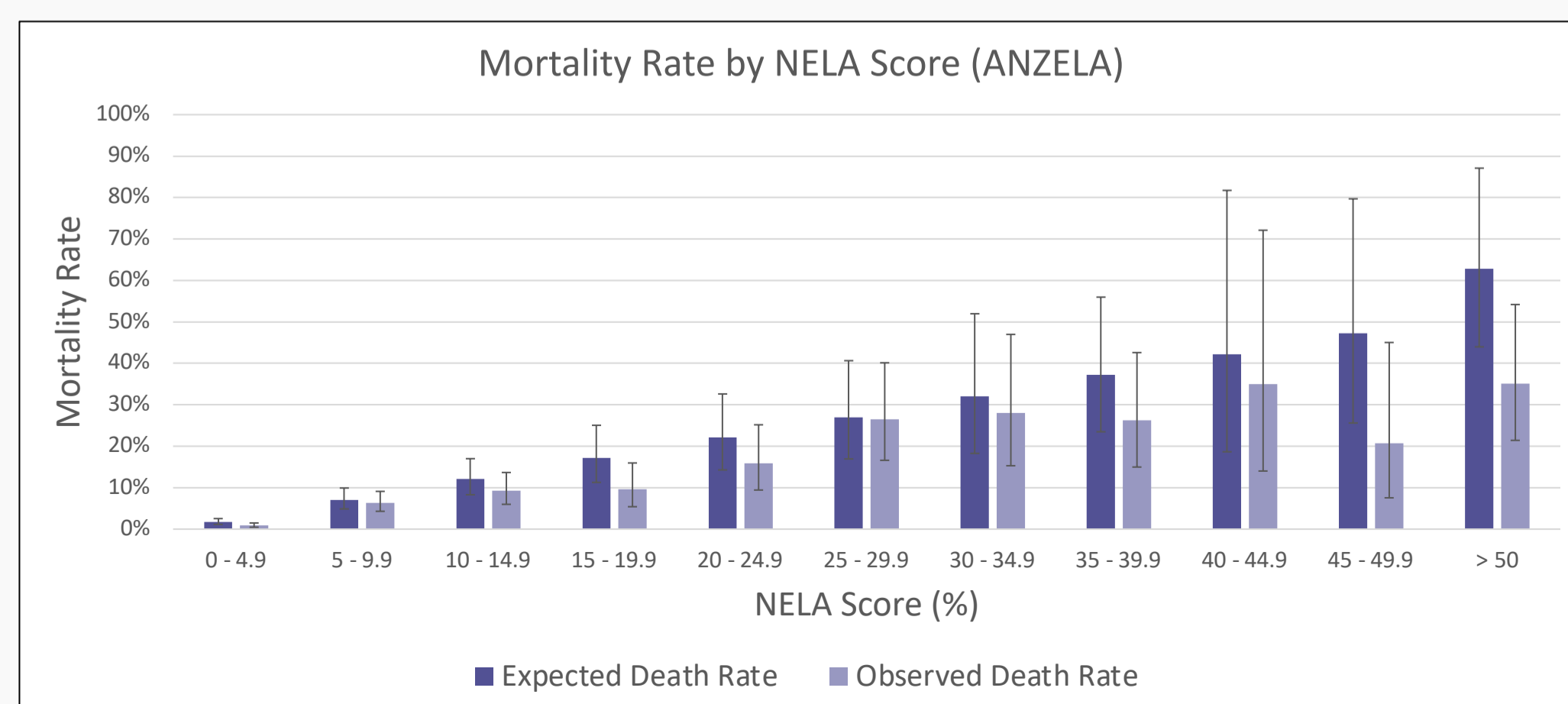
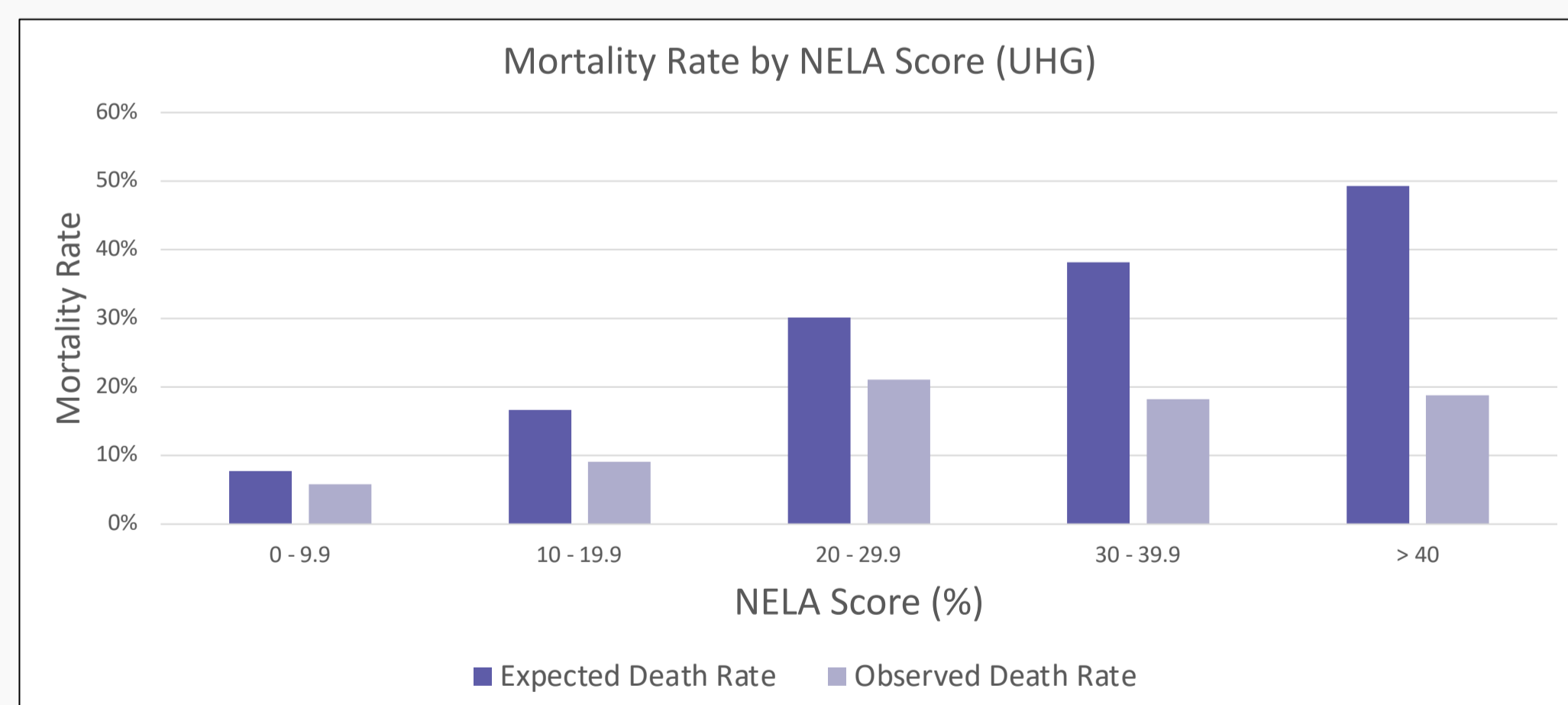
	UHG	ANZELA
Male	n = 125	n = 1386*
Female	n = 160	n = 1407*
Median age (by Gender)	M = 64 years [19 to 94 years] F = 71 years [20 to 94 years]	M = 65 years [18 to 96 years] F = 69 years [18 to 98 years]
Median age (Overall)	68 years [range 19 to 94 years]	67 years [range 18 to 98]

30-Day Mortality

	UHG	ANZELA
Alive	267 (94%)	2613 (93%)
Dead	18 (6%)	186 (7%)

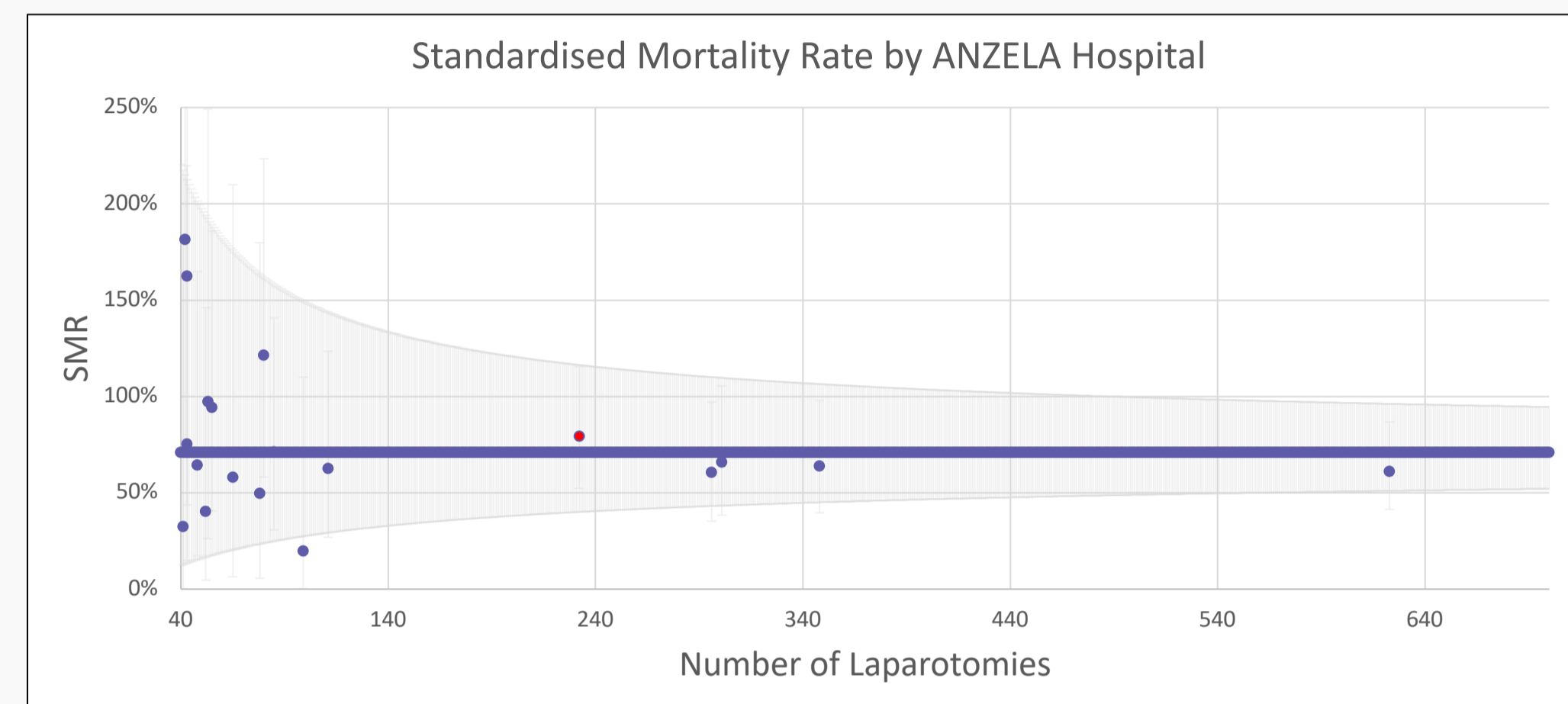
Median NELA Scores

	UHG	ANZELA
Alive	6.4% [range 0.10% to 85%]	3.8% [0.03% to 96%]
Dead	20% [range 3.7% to 44.3%]	22% [range 1.3% to 88%]
Significance	p <0.001	p <0.001



Standardised Mortality Rates

NELA (UHG)	18 observed deaths / 32 expected deaths (57% [95% CI 35% to 90%])
NELA (ANZELA)	186 observed deaths / 262 expected deaths (71% [95% CI 61% to 82%])



Discussion

We found that the NELA score overestimates mortality rates for emergency laparotomy patients at UHG and ANZELA institutions. A consistent level of performance was seen between contributing hospitals to the ANZELA. No hospital had a SMR above the control limit of two standard deviations outside the overall ANZELA SMR (71%).

The overestimation of mortality in our cohort can best be explained by improvements in clinical decision making and patient care since the introduction of the NELA program and its clinical care standards. These improvements include earlier Consultant review and preparations for direct admission to higher-level care following an emergency laparotomy based on mortality risk. We would expect that improvements in patient care that have been driven by NELA should lead to a reduction in mortality and thus cause the NELA score to over-estimate mortality risk as we observed in this study.

Due to the clear improvements in mortality rates seen in England and Wales, hospitals in Australia (especially those contributing to the ANZELA) are actively encouraged to adhere to the quality improvement strategies recommended by NELA.

Conclusion

The NELA scores are useful for identifying high-risk EL patients; however, actual mortality rates were significantly lower than predicted by NELA. Mortality outcomes were consistent between hospitals that contribute to the ANZELA. UHG is performing favourably to the ANZELA standards.

Conflict of Interest

Prof David Watters is a current member of the ANZELA-Quality Improvement (QI) Working Party.

Reference List

- Burmas et al. ANZ J Surg. 2018.
- ANZELA-QI Working Party. ANZELA-QI. 2020.
- NELA Project Team. First NELA Report. 2015.
- Eugene et al. Br J Anaesth. 2018
- Sharrock et al. World J Surg. 2017
- ANZELA-QI. Inclusion-Exclusion Criteria. Feb 2020
- Eayres. Commonly used public health statistics and their confidence intervals. 2008

*Sex not documented in n= 6 cases