

# Innovating a simple score to predict Group A Streptococcus clinical outcome among First Nations Australians

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## Background:

Group A Streptococcus (GAS) bacteraemia can have high case-fatality rates and disproportionately affects Aboriginal and Torres Strait Islander Australians, herein respectively referred to as First Nations Australians.<sup>1</sup> Early recognition of high-risk patients facilitates prognostication, escalation to tertiary-level care from remote settings and assist clinical management by identifying factors associated with worse outcomes.<sup>2</sup>

## Methodology/Principal Findings:

We examined 286 consecutive GAS bacteraemia patients between January 1, 2014, and December 31, 2020. Overall, 169/286 (59.1%) identified as First Nations Australian. These individuals were more likely to have severe comorbidity compared to non-First Nations Australians (85/169 (50.3%) versus 41/117 (35.0%),  $p=0.01$ ). 50/286 (18%) had adverse outcomes (death or intensive care unit admission within 30 days of hospitalisation). We identified associations between demographic, clinical and laboratory indices at presentation and adverse outcomes. Multivariable analysis indicated systolic blood pressure (SBP)  $<100$  mmHg, serum albumin  $<30$  mmol/L, serum lactate  $>4$  mmol/L, and lymphocyte count  $<0.5 \times 10^9/L$  were independent predictors of adverse outcomes. The BALL prediction score was created using these variables, with one point for each criterion. Adverse outcomes in patients proportionately increased with rising BALL scores: 6/59 (10%), 17/50 (34%), 12/19 (63%), 3/4 (75%) and 3/3 (100%) for scores of 0, 1, 2, 3, and 4, respectively. The area-under-the-receivingoperator-characteristic curve of the BALL score in predicting adverse outcomes 0.77 (95% CI 0.69–0.85) was superior to NEWS2 (0.62 (95% CI 0.51–0.72),  $p=0.02$ ) and APACHEII (0.53 (95% CI 0.41–0.65),  $p=0.001$ ) scores and similar to the SOFA score (0.79 (95%CI: 0.69–0.88),  $p=0.75$ ).

## Conclusions:

Despite our cohort's severe comorbidity amid the high burden First Nations Australians experience, the simple calculation of a 4-point score – SBP, serum albumin, serum lactate, lymphocyte count – in GAS bacteraemia patients can rapidly stratify those at risk of sequelae or death, and determine those in need of referral, potentially leading to improved outcomes.