Low predictive value of the Pitt Bacteraemia Score in *Staphylococcus aureus* bloodstream infection: a validation study

P 2132

Jan A. Roth[1], Sarah Tschudin-Sutter[1], Marc Dangel[1], Reno Frei[2], Manuel Battegay[1], Andreas F. Widmer[1*]

University Hospital Basel, [1]Division of Infectious Diseases & Hospital Epidemiology, [2]Division of Clinical Microbiology, Petersgraben 4, 4031 Basel, Switzerland

Background

- In *Staphylococcus aureus* bloodstream infection (BSI), the Pitt Bacteraemia Score (PBS) has been described as good estimate for short-term mortality, but little is known about its overall predictive performance.

Objective

- The goal of our study was to externally validate the PBS on a homogenous dataset of methicillin-susceptible *S. aureus* (MSSA) BSIs at a tertiary-care center in Switzerland.

Methods

- At the University Hospital Basel, all consecutive patients aged ≥18 years with a first MSSA BSI between January 2008 and December 2013 were eligible for the study. We excluded patients with a missing PBS at day of BSI onset.
- We extracted relevant data from our prospective in-house BSI surveillance database. BSI onset was defined as day of first positive blood culture.
- For prediction of 30-day all-cause mortality, we measured the overall discriminative power of the PBS at BSI onset by receiver-operating characteristics analysis; the calibration of the PBS was assessed using the Hosmer-Lemeshow goodness-of-fit statistic.

***Correspondence:** Prof. Dr. Andreas F. Widmer, MSc
E-Mail: andreas.widmer@usb.ch

Table: Sensitivity, specificity, and predictive values of the Pitt Bacteraemia Score.

Scoring points[a] at BSI onset	Total, n (%)	Death within 30 days, n (%)	Sensitivity,[b] % (95% CI)	Specificity,[b] % (95% CI)	PPV,[b] % (95% CI)	NPV,[b] % (95% CI)
0	170 (52)	13 (8)	100 (75–100)	0 (0–1)	13 (10–17)	—
1	63 (19)	3 (5)	70 (54–83)	55 (49–61)	19 (13–26)	92 (87–96)
2	54 (16)	8 (15)	63 (47–77)	76 (70–81)	28 (19–38)	93 (89–96)
3	10 (3)	4 (40)	44 (29–60)	92 (88–95)	45 (30–61)	92 (88–95)
4	15 (5)	7 (47)	35 (21–51)	94 (91–96)	47 (29–65)	91 (87–94)
5	6 (2)	2 (33)	19 (8–33)	97 (94–99)	47 (23–72)	89 (85–92)
6	7 (2)	3 (43)	14 (5–28)	98 (96–99)	55 (23–83)	88 (84–92)
≥7	4 (1)	3 (75)	7 (1–19)	100 (98–100)	75 (19–99)	88 (84–91)

Abbreviations: BSI = bloodstream infection; CI = confidence interval; NPV = negative predictive value; PPV = positive predictive value.

[a] The Pitt Bacteraemia Score ranges from 0 to 14 points.
[b] The total of scoring points was used as cut-off (e.g. a total score of 2 resulted in a cut-off of ≥2 points).

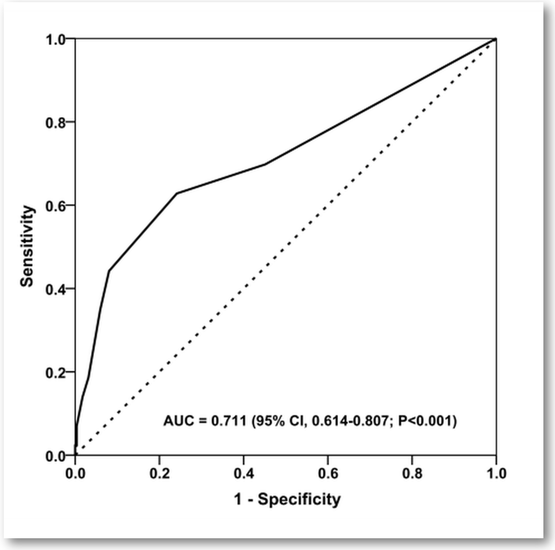

Figure: Receiver-operating characteristics curve of the Pitt Bacteraemia Score.

Abbreviations: AUC = area under the curve; CI = confidence interval.

Results

- Seven of 336 eligible patients were excluded because of a missing PBS at onset of MSSA BSI; the remaining 329 patients were included in the final analysis.
- The median age of the study population was 67 years (interquartile range [IQR], 51–78 years)
- The median PBS at BSI onset was 0 (IQR, 0–2) with patients suffering from various comorbidities (median Charlson Comorbidity Index, 3; IQR, 1–5).
- Overall, the most frequent source of BSI was skin/soft tissue (34%; 113/329) and intravascular catheters/foreign materials (27%; 90/329). At BSI onset, 98% of patients (316/323) received an adequate empirical antimicrobial therapy.
- The crude 30-day mortality was 13% (43/329). At BSI onset, 52% (170/329) and 19% of patients (63/329) had a PBS of 0 and 1 points, respectively; the concomitant specificity for 30-day all-cause mortality was 0% (PBS, 0 points) and 55% (PBS, 1 point) ▸ **Table**.
- The overall performance of the PBS in predicting the 30-day all-cause mortality was lower than published with an area under the curve of 0.711 (95% confidence interval, 0.614–0.807; P <0.001) ▸ **Figure**.
- Hosmer-Lemeshow statistics revealed a good calibration of the PBS with an insignificant P-value (chi-square goodness-of-fit test = 2.91, P = 0.234).

Conclusions

- In regard to short-term mortality, the Pitt Bacteraemia Score had a low predictive value in a homogenous patient population with methicillin-susceptible *S. aureus* bloodstream infections.
- We speculate that the predictive value of the Pitt Bacteraemia Score is even lower, if used in heterogeneous populations with all types of gram-positive and -negative bloodstream infections.