

Biomarkers for the diagnosis of sepsis in burns: systematic review and meta-analysis

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BACKGROUND

- Sepsis is a common complication after burn injury and a leading cause of death
- Prompt antibiotic administration is critical to survival, however early clinical diagnosis remains challenging
- Biomarkers, such as blood cell counts and serum molecules, have been proposed as adjuncts to aid in delineating sepsis from the systemic inflammatory and hypermetabolic state following a burn injury

AIM

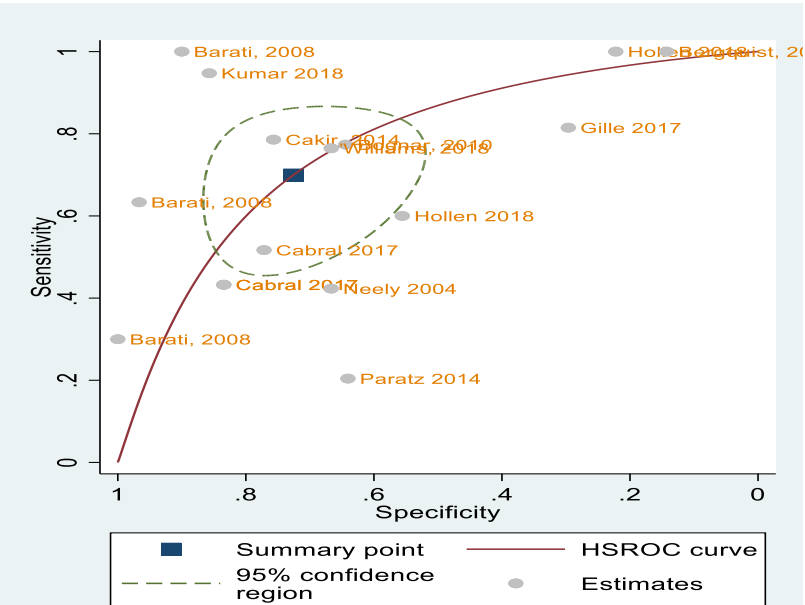
- To estimate the diagnostic performance of biomarkers in the diagnosis of sepsis in hospitalised patients with burns.

METHODS

- Medline, Embase, Cochrane Central, Biosis Previews, Web of Science, and Medline In-Process searched using defined search criteria from inception to December 2018, plus citation checking of included articles
- Diagnostic meta-analysis performed for procalcitonin and other biomarkers as diagnostic markers for sepsis in patients with burns.
- Where possible, reported contingency tables were used. For studies where original data were supplied, a cutoff based on Youden's index was calculated and contingency tables constructed.
- Pooled estimates of sensitivity and specificity estimated using a two-level mixed logistic regression model, with independent binomial distributions for the true positives and true negatives conditional on the sensitivity and specificity in each study, and a bivariate normal model for the logit transforms of sensitivity and specificity between studies
- Risk of bias assessed using QUADAS-2 checklist

RESULTS

- 22 studies met inclusion criteria, incorporating over 1100 participants
- Majority of studies had overall low risk of bias
- Procalcitonin is moderately sensitive and specific for sepsis in patients with burns (optimal sensitivity 68%, specificity 67%)
- Significant heterogeneity between studies reflecting different definitions and cutoffs
- Studies with higher mean TBSA showed greater trend towards higher diagnostic accuracy for PCT
- Considerable variety of other biomarkers assessed with varying reports of diagnostic accuracy. Of note, one study (Paratz 2014) reported 96% sensitivity and 99% specificity with BNP at threshold of 1200 pg/mL



Study	Criteria	Test	Threshold	Sensitivity	Specificity
Barati, 2008	Sepsis 2001	PCT	0.5	1.00	0.90
Barati, 2008*	Sepsis 2001	PCT	2	0.63	0.97
Barati, 2008	Sepsis 2001	PCT	10	0.30	1.00
Cabral 2017*	ABA	PCT	0.5	0.52	0.77
Cabral 2017	ABA	PCT	1	0.43	0.83
Cabral 2017	ABA	PCT	1.5	0.43	0.83
Hollen 2018	Bacteraemia	PCT	0.5	1.00	0.22
Hollen 2018*	Bacteraemia	PCT	2	0.60	0.56
Neely 2004	Custom criteria	PCT	5	0.42	0.67
Kumar 2018	ABA	PCT	3.5	0.95	0.86
Paratz 2014	ABA	PCT	1.4	0.20	0.64
Gille 2017	ABA, sepsis 1992	PCT	Increase of >39%, value >0.15	0.81	0.30
Bognar, 2010	ABA	PCT	3.44	0.77	0.64
Cakir, 2014	ABA	PCT	0.768	0.79	0.76
Williams, 2018	ABA	PCT	1.4	0.76	0.67
Bergquist, 2016	Sepsis day 7	PCT	4.75	1.00	0.14

CONCLUSIONS

- A considerable variety of biomarkers have been studied for the diagnosis of sepsis in burns patients
- Considerable heterogeneity in methods, sepsis definitions, and cutoffs
- PCT moderately sensitive and specific for sepsis in burns, with higher TBSA showing greater trend towards higher diagnostic accuracy