

Clinical prediction of bacteremia and the need for early antibiotic therapy in solid tumor cancer patients

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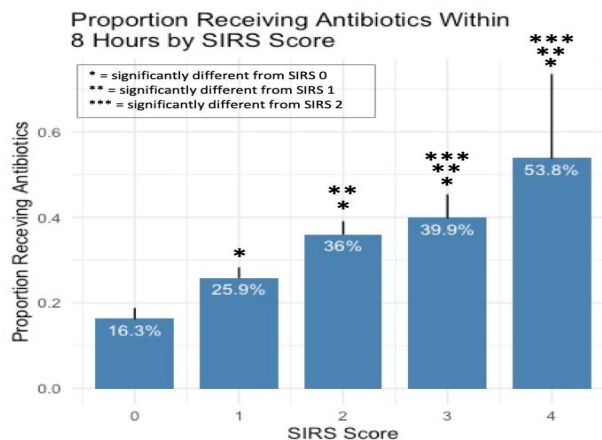
Purpose

Cancer patients (pts) frequently receive empiric antibiotics without clear indication. This retrospective study investigated the relationship between the systemic inflammatory response syndrome (SIRS), early antibiotic (Anb) use, and bacteremia in solid tumor pts presenting to the emergency department (ED).

Methods

We extracted data from the electronic medical records of adults with solid tumors admitted to a tertiary care hospital through the ED for any reason over a 2 year period. Pts with neutropenic fever, organ transplant, trauma, or cardiopulmonary arrest were excluded. Rates of SIRS and bacteremia among pts receiving early Anb (eAnb, within 8 hours of admission) were compared to all others using χ^2 . Binomial regression and receiver operator curves assessed predictors of bacteremia.

Figure 1



Results

Of 3580 eligible pts, 1344 pts were SIRS positive (≥ 2 criteria) and 2236 were SIRS negative, of whom 501 (37%) and 493 (22%), respectively, received eAnb ($p < 0.001$). eAnb use increased with additional SIRS criteria (Fig 1).

Table 1

Parameter	OR \pm SE	P-value
As individual criteria (AUC=0.57):		
Temperature dysregulation (>100.4 or <96.8)	1.6 \pm 0.33	0.01
Tachycardia (HR >90)	1.4 \pm 0.22	0.03
Tachypnea (RR >20)	1.0 \pm 0.15	0.77
Leukocytosis (WBC >12.0)	1.2 \pm 0.17	0.12
As composite score (AUC=0.55):		
SIRS positive (≥ 2)	1.5 \pm 0.21	0.003

Of SIRS positive pts, 860 (64%) had BCs drawn within 48 hrs of presentation, of which 19% were positive. Of SIRS negative pts, 826 (37%) had cultures drawn within 48 hrs of presentation, of which 14% were positive (19% vs 14%, $p = 0.004$). Of pts who had BCs drawn, the proportion of positive BCs among those who received eAnb and those who did not was identical (16% in each group; $p = 1$).

Of 276 pts ultimately proven to have bacteremia within 48 hrs, only 59% were SIRS positive, and only 49% received eAnb in the ED.

By regression, only two SIRS components predicted bacteremia, temperature dysregulation (OR 1.6 \pm 0.33, $p = 0.01$) and tachycardia (1.4 \pm 0.22, $p = 0.03$), and SIRS score ≥ 2 (vs <2) was poorly predictive of bacteremia (AUC 0.57, Table 1). A more robust model, which included additional labs and vital signs, was only marginally better (AUC 0.61, Table 2).

Table 2

Parameter	OR \pm SE	P-value
Temperature (continuous)	1.1 \pm 0.06	0.01
Heart Rate (continuous)	1.01 \pm 0.003	0.02
Systolic Blood Pressure (conts.)	1.0 \pm 0.004	0.68
Diastolic Blood Pressure (conts.)	0.99 \pm 0.007	0.09
Respiratory rate (conts.)	1.0 \pm 0.01	0.49
Leukopenia (WBC <4.0)	1.1 \pm 0.33	0.80
Leukocytosis (WBC >12.0)	0.88 \pm 0.169	0.52
Severe Neutropenia (ANC <0.5)	1.6 \pm 0.82	0.37
Moderate Neutropenia (ANC <1.5)	1.2 \pm 0.47	0.76
Neutrophilia (ANC >8.0)	1.7 \pm 0.33	0.008
Creatinine	1.06 \pm 0.049	0.22
Age	1.0 \pm 0.01	0.86

Conclusions

Clinicians still use SIRS criteria to determine whether to administer eAnb. However, SIRS criteria are poor predictors of bacteremia in solid tumor pts, who frequently manifest them due to complications of cancer or cancer-directed therapy rather than infection. Furthermore, patients who are SIRS negative may be bacteremic. More reliable models are needed to guide judicious use of Anb in the solid tumor population.