

Burn Sepsis: Does the Initial Vitamin C Level Matter

Jeffrey W Williams, PA-C, Christopher K Craig, DMSc, PA-C, Anju B Saraswat, MD, James H Holmes, IV, MD
Department of General Surgery Wake Forest School of Medicine

INTRODUCTION

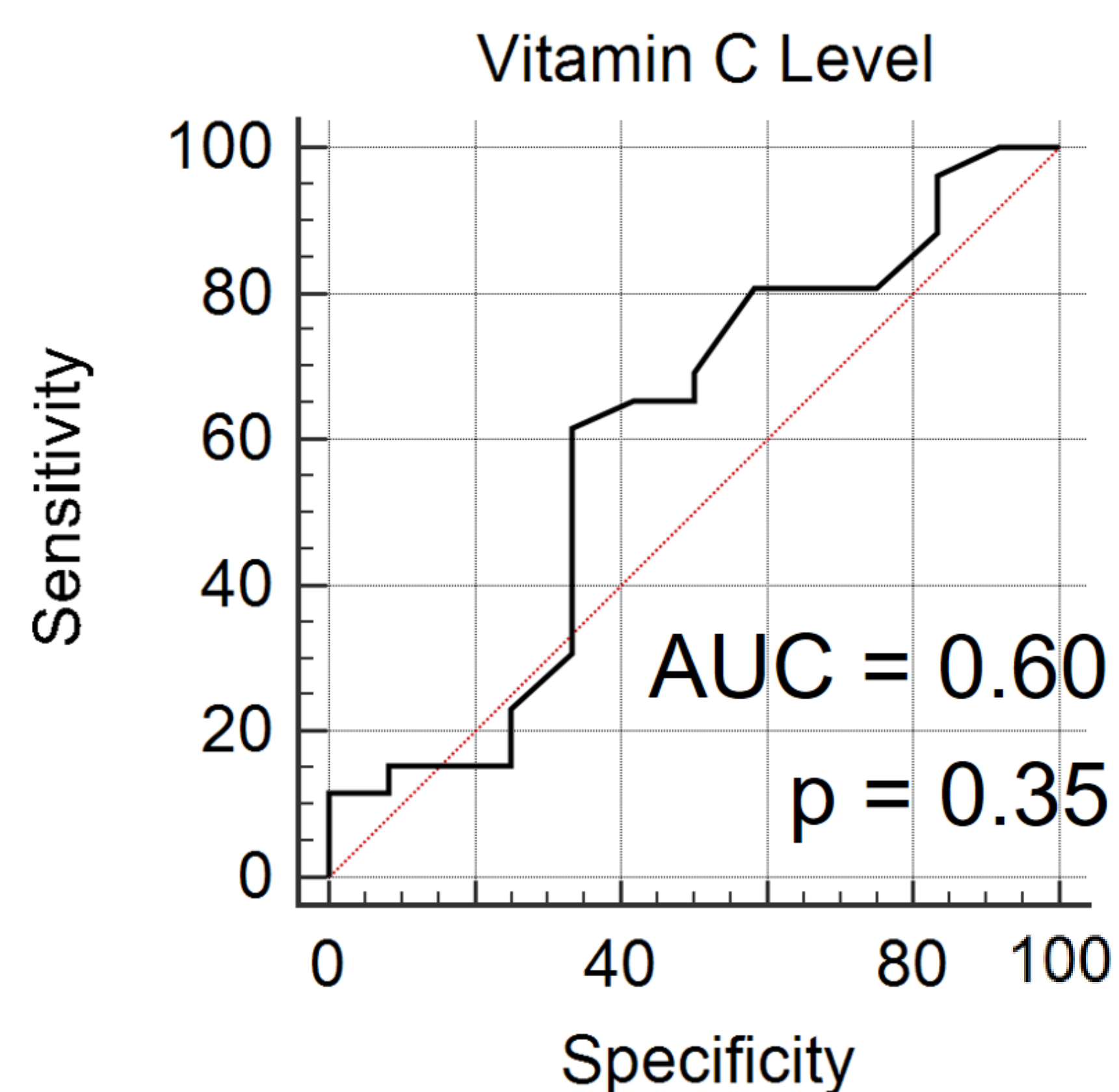
After the first 24 hours, the principle cause of death in burn patients is multiple organ dysfunction/failure syndrome. It is preceded by infection in 83% of burn patients, with reported septic mortality up to 65%. A recent journal article involving septic medical ICU patients by Marik et al. reports that all initial vitamin C levels were below the normal range (0.4-2.0 mg/dL) prior to any intervention. Independent of each other, both early recognition and treatment of infection and vitamin C have been shown to be beneficial in sepsis. We monitored vitamin C levels as part of our "Burn Code Sepsis" algorithm to obtain a baseline understanding of vitamin C levels in infected adult burn patients.

METHODS

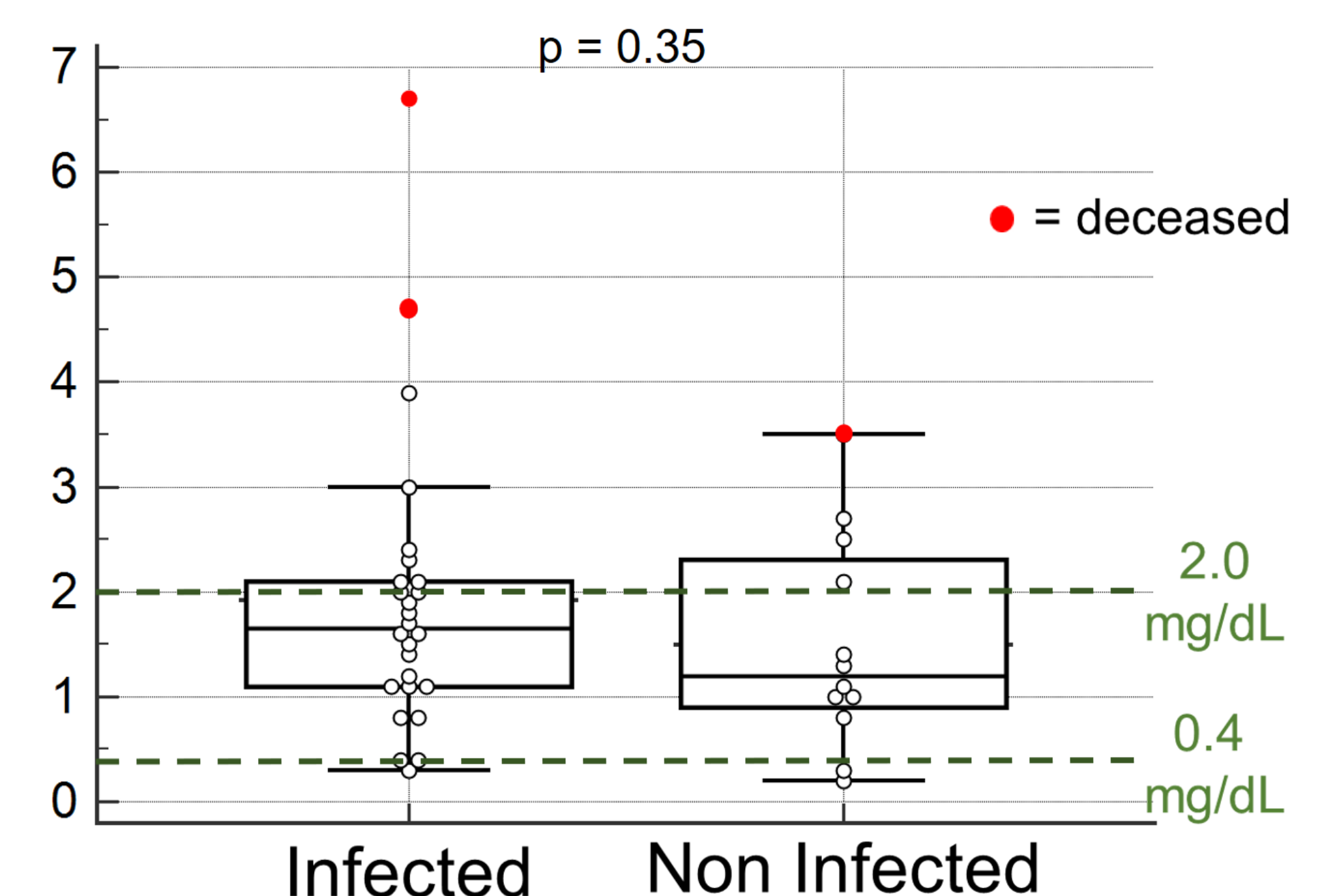
Adult (≥ 18 years old) admissions between July 1, 2018 and June 30, 2019 were reviewed. Patients receiving lactic acid, procalcitonin and vitamin C labs to screen for sepsis were further evaluated using other physiologic and lab data as sepsis markers. A patient was considered positive for sepsis if one of the following occurred: a positive blood culture, a positive bronchoalveolar lavage ($>10^5$ CFUs) or the radiologic imaging results indicated an was consistent with an infectious process. All burn injured patients with greater than or equal to 20% TBSA burns receive vitamin C supplementation as part of our standard of care.

RESULTS

There were 286 admissions during the 12 month period, with 38 positive initial sepsis screens (mean Total BSA = 35%) that have an associated vitamin C level. Of these positive screens, 26 (65%) were infected and 12 (35%) were not infected. ROC Curve analysis with AUC = 0.60 ($p = 0.37$). The mean Vitamin C level of infected patients at the time of initial screening was 1.9 +/- 1.4 mg/dL and the mean vitamin C level of non-infected patients at initial screening was 1.5 +/- 1.0 mg/dL. Also, 3 out of the 4 patients with vitamin C levels of 3.5 mg/dL or higher died during their inpatient stay.



Vitamin C Level (mg/dL)



CONCLUSIONS

Our results contrast with the previously published article on vitamin C levels in a septic, non-burn injured population. Only 1 of our 26 infected patients possessed a vitamin C level below the normal range (0.4-2.0 mg/dL). Infected patients possessed higher vitamin C levels than the non-infected patients, though not statistically significant ($p = 0.35$). AUC analysis indicates the vitamin C level is a poor prognostic test for sepsis in burn injured patients.

REFERENCES

1. Marik, P.E., et al. (2017). Hydrocortisone, Vitamin C and Thiamine for the Treatment of Severe Sepsis and Septic Shock; A Retrospective Before-After Study. *Chest*, 151(6), 1229-1238.

DISCLOSURES

None