DEPARTMENT OF EMERGENCY MEDICINE, NORTH SHORE UNIVERSITY HOSPITAL

The StO2 Non-Invasive Tissue Hypoperfusion Monitor as a Screening Tool for Early Sepsis Detection in the Emergency Department

Zachary Kopelman, BA; James Zhou, BA; Alexandra Dattilo, BA; Eric Boccio, BA; Sandra Schneider, MD; Mary Frances Ward, RN, MS, ANP; John D’Angelo, MD; Jason D’Amore, MD.

Department of Emergency Medicine, North Shore University Hospital, Manhasset, New York
Feinstein Institute for Medical Research, North Shore-LIJ Health System, Manhasset, New York

INTRODUCTION

• Early recognition of patients with sepsis induced tissue hypoperfusion (SITH) remains a clinical challenge.
• Non-Invasive tissue oxygenation saturation (StO2) monitors have been developed to provide a rapid, low-cost, and non-invasive bedside assessment of tissue oxygenation extraction.
• Use of StO2 monitors has not been well validated as an initial screening tool for sepsis in the ED

OBJECTIVES

• To assess the efficacy of initial bedside StO2 readings in the early identification of patients with SITH and to compare StO2 readings with lactate levels.
• We hypothesize that patients with significantly abnormal StO2 readings will have a higher sepsis mortality and higher lactate levels.

METHODS

• We performed an IRB-approved, prospective, observational pilot study of a convenience sample of ED patients presenting with a sepsis continuum diagnosis.
• The study was conducted at an urban, tertiary care center with 90,000 visits per year
• A portable In-Spectra ‘Spot Check’ StO2 monitor was used to take a StO2 reading at the thenar eminence.
• We defined an abnormal StO2 as <80% or >91% based on consultations with the device manufacturer
• Sensitivity/Specificity, Likelihood ratios, and NPV/PPV were calculated with 95% confidence intervals where appropriate.
• Inclusion: Patients with a suspected new infection confirmed by the attending physician and at least 2 SIRS (systemic inflammatory response syndrome) criteria.
• Exclusion: Patients <18 years of age or patients with no suspicion of infection.

RESULTS

Enrollment Statistics
79 patients enrolled
-Mean Age: 63 (21-96)
61 patients were admitted

Lactate vs. Abnormal StO2
16/20 (80%) w/Lactate >3.0 had an abnormal StO2
7/8 (88%) w/Lactate >3.0 had an abnormal StO2
3/3 (100%) w/Lactate >4.0 had an abnormal StO2

Figure 1. Percentage of study patients with abnormal StO2 readings at varying lactate levels

ICU Admissions, Mortality, and MAP vs. Abnormal StO2
5/5 (100%) admitted to the ICU had an StO2 <74%
3/3 (100%) of mortalities had an StO2 <72%
3/3 (100%) with a MAP <70 had an StO2 <70%

Figure 2. Percent of patients with abnormal StO2 readings compared with various demographics

CONCLUSIONS

• There was a strong correlation between poor patient outcomes and abnormal StO2 levels as well as a strong correlation between high lactate levels and abnormal StO2 levels.
• StO2 may be a useful, rapid, low cost, and non-invasive bedside screening tool for SITH in the ED.
• StO2 is particularly effective with severely ill patients.
• A reliable bedside tissue oxygenation monitor will allow physicians and nurses to provide sepsis treatment closer to time zero.
• Further studies are needed to determine StO2’s ability to predict mortality and assess response to therapy.
• We will be looking at a subset of severe sepsis/septic shock patients using a constant monitoring StO2 monitor

CONTACT

PI: Jason D’Amore, MD – jdamore@nshs.edu
Presenter: Zachary Kopelman, BA – zkopelman@nshs.edu

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