TITLE: The Relationship of ETCO$_2$ to SCVO$_2$ and Lactate during Early Goal Directed Therapy for the Treatment of Severe Sepsis and Septic Shock

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RESEARCH PROJECT DESCRIPTION (brief overview of background, hypothesis, methods, role of medical student, funding and relevant publications)

Severe sepsis is a commonly encountered life threatening condition with an approximately 30% mortality rate. Severe sepsis occurs when infection leads to systemic inflammatory response resulting in decreased blood flow to end-organs, as indicated by a lactate level > 4mg/dl or end organ dysfunction. Early Goal Directed Therapy (EGDT) for severe sepsis includes 4 goals: 1) central venous pressure of 8 to 12, 2) mean arterial pressure of at least 65, 3) central venous oxygen saturation (SCVO$_2$) of at least 70%, and 4) urine output greater than 1 ml/kg per hour. Achieving all 4 goals within 6 hours can reduce mortality by up to 16%, but implementing it is time consuming and invasive. A noninvasive marker that parallels SCVO$_2$ and lactate would offer practical clinical advantages. We propose that End-Tidal CO$_2$ (ETCO$_2$), or the maximal fraction of carbon dioxide present at the end of exhalation, may be such a marker. Dr. Guirgis is investigating the relationship between ETCO$_2$, SCVO$_2$, and lactate in patients with severe sepsis being treated with EGDT and hopes to show that ETCO$_2$ correlates well with SCVO$_2$ and lactate. Patients in the Emergency Department being treated with EGDT will be enrolled in the study, and ETCO$_2$, SCVO$_2$, and lactate will be measured over a 6 hour resuscitation period. Students will receive bedside instruction and will learn to screen and accurately identify patients with severe sepsis and septic shock in the emergency department. Students will learn study inclusion and exclusion criteria and will be taught to consent patients for study enrollment. Additionally, they will assist in chart review of enrolled patients. Funding was provided by a University of Florida Faculty Dean’s Grant. Students with interest in emergency medicine or critical care medicine should apply.