

## **Paramedic Services – Introduction of a Sepsis Alert Protocol**

This report outlines how the continuous quality improvement process lead to the development of the Sudbury Paramedic Services Sepsis Alert Protocol which resulted in decreasing mortality for patients suffering from sepsis.

### **Introduction**

Sepsis is a life-threatening illness caused by your body's response to an infection. Your immune system protects you from many illnesses and infections, but it is also possible for it to go into overdrive in response to an infection. Sepsis develops when the chemicals the immune system releases into the bloodstream to fight an infection cause inflammation throughout the entire body instead. Severe cases of sepsis can lead to septic shock, which is a medical emergency. Sepsis is a Public Health Concern as sepsis numbers are on the rise most likely because of aging populations with more comorbidity factors. Sepsis is the primary cause of death from infection and is the leading cause of mortality and critical illness worldwide. It is of high importance that Paramedics are trained to fully understand sepsis, be able to assess, recognize, and initiate rapid transport of sepsis patients to ensure patients receive time sensitive treatment.

### **Background**

Research within the last decade has changed the way sepsis is clinically managed and much effort has been made to better define, recognize and expedite treatment of sepsis. Delays to definitive treatment of intravenous (IV) fluid administration and antibiotics lead to increased morbidity and mortality. Severe sepsis and septic shock bears around 30% mortality rate and for each hour of delay in antibiotics, mortality increases (Rivers Trial).

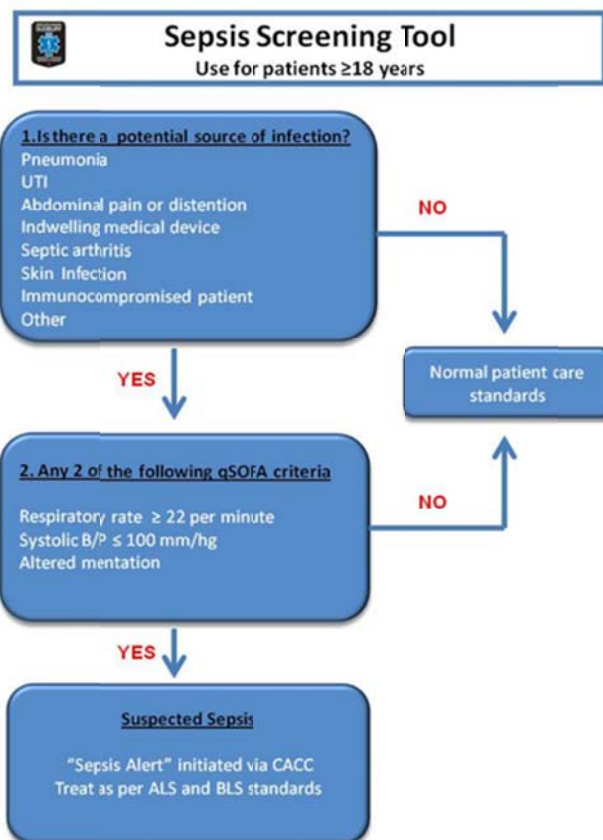
Prehospital medical care provides the earliest opportunity for identification of sepsis and potentially delivering immediate life-saving treatment for patients. It is known that prehospital recognition of sepsis can speed up care in the emergency department and that these patients get the required diagnostics and treatment sooner (Studnick, 2012). Paramedics play a major role in the identification, pre-alert, and initial management of sepsis. Traditionally, Paramedic training has focused on assessing and managing 'barn door' presentations such as chest pain and heart attacks, stroke and transient ischemic attacks, and acute trauma. To date, there has been little focus on the acute assessment and management of sepsis, though the Sequential Organ Failure Assessment (SOFA) and shortened qSOFA Sepsis Screening Tool, is now used by some Paramedic services. This new prehospital sepsis screening tool assesses a patient's breathing rate, blood pressure and level of awareness for those with a suspected infection. Although this new definition of sepsis has been implemented as how we should be identifying sepsis, the qSOFA criteria has never been validated in the Emergency Department (ED) or prehospital setting. Approximately 50% of patients with sepsis in the ED arrive by ambulance, with an average prehospital care time of 45 minutes. This suggests an important window of opportunity for early recognition and care of sepsis before hospital arrival.

## Continuous Quality Improvement Initiative

Beginning in 2015, through the Paramedic Services Continuous Quality Assurance process, it was discovered that Paramedics were not consistently or accurately recognizing all sepsis patients in the field. With a high volume of generally unwell patients transported to the ED, a clinical review identified these patients were potentially suffering from sepsis. This meant delays to early definitive sepsis treatment in the ED with resultant increase in morbidity.

In 2016, our Clinical Auditor lead a project that developed the following two deliverables; a sepsis education plan for Paramedics to better train for recognition of sepsis, near sepsis, or high risk for sepsis patients and a communication alert between Paramedics and Health Sciences North emergency department staff in an effort to see septic patients receive treatment early.

The sepsis training program was delivered in the 2016 Paramedic spring training sessions with the introduction and overview of the Sepsis Screening Tool (Fig.1) that included the new sepsis quick SOFA (qSOFA) patient assessment criteria. The sepsis screening consists of a three-step algorithm for Paramedics to follow. This is based on having two or more of the qSOFA criteria, which assess the patients breathing rate, their blood pressure and their level of awareness for patients with a suspected source of infection.



The development of the Sepsis Alert Protocol had cross-functional impacts with the Sudbury Central Ambulance Communications Centre for hospital Sepsis Alert notification and the ED to ensure seamless transfer of care of patients as well as a process to ensure prompt physician assessment and commencement of treatment. In June 2016, the Sepsis Alert Protocol and Sepsis Screening Tool was made final and received approval from Health Sciences North Medical Director, Dr. Jason Prpic. The Sepsis Alert Protocol and Sepsis Screening Tool became operational June 6, 2016.

## **An Evaluation of the Implementation of a Prehospital Sepsis Alert Protocol & Sepsis Screening Tool**

Sudbury Paramedic Services was the first Paramedic Service in Ontario to implement the Sepsis Alert Protocol and Sepsis Screening Tool. In 2017, a group of researchers and healthcare professionals led by Health Sciences North Medical Director, Dr. Jason Prpic, completed a research study to see whether implementing in the prehospital setting would lead to a decrease in time to antibiotic administration in the ED. The Research Ethics Board of Health Sciences North approved this study.

Specific objectives include determining the predictability and reliability of the screening tool for septic patients, patient impact including number of patients who receive antibiotics and their outcomes, and system impacts including operational efficiencies.

This pre and post observational study was conducted and patients' charts were reviewed by a physician from June 5, 2015 to June 5, 2016. Intervention data was also gathered from implementation until February 28, 2017.

The time to administration of antibiotics was calculated from the time Paramedics arrived in the ED and the time it took the health care provider to administer the antibiotic.

Results from this study showed clinically and statistically, a significant reduction in the time to antibiotic administration with the implementation of the prehospital Sepsis Alert Protocol and Sepsis Screening Tool.

## **Conclusion**

Implementation of the Greater Sudbury Paramedic Services Sepsis Alert Protocol and Sepsis Screening Tool lead to a decrease in time to antibiotic administration in the ED by 48.81 minutes. The qSOFA sepsis patient screening tool is not sensitive enough to use solely as a screening tool. However, in the prehospital setting the qSOFA screening algorithm is of much value, because if patients screen positive, over 95% of patients will indeed have sepsis and should be prioritized given they are the group that will benefit the most from early antibiotic treatment. In this study, the implementation of the qSOFA sepsis screening tool and the sepsis alert protocol had a direct impact on the morbidity of sepsis patients.

Paramedics play a key role in providing early recognition, initial treatment, and rapid transport for patients with sepsis proving earlier identification and management in the prehospital setting improves health outcomes and speeds up care in the ED.

Similarly, Paramedic alert protocols for stroke and heart attack recognition have both been shown to significantly decrease time to definitive treatment and thus sepsis with an up to 30% mortality warrants a fast track protocol. Much public education has been done in recognizing early signs of stroke or heart

attacks and emphasis has been placed on delivering basic life support care. However, there remains a great deal of work in acknowledging and educating the public on the devastating consequences of sepsis from an untreated infection.