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Sepsis Alert Benchmark Project

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Contents

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Executive Summary

Medical City Alliance is a part of the largest healthcare system in the United States, Hospital Corporation of America (HCA). Medical City Alliance is a 75-bed hospital located in North Fort Worth. The hospital serves the communities of North Fort Worth, Saginaw, Keller, Haslet, and surrounding areas. Medical City Alliance services include adult and pediatric emergency care, Level III Trauma center, Women's Services, Level III NICU, certified chest pain center with interventional cardiology capabilities, bariatric surgery, orthopedic surgery, and oncology services.

Based on the data released by the Centers for Disease Control and Prevention (CDC), the state of Texas, in 2018, had over 4,000 mortalities due to sepsis. Texas was ranked fifth in the nation for the highest sepsis mortality rate (*Stats of the States - Septicemia Mortality*, 2020). Anyone can develop an infection which can lead to sepsis, severe sepsis, or septic shock. Those at highest risk are infants, immunocompromised, advanced age, and those with chronic conditions (*Sepsis Alliance*, 2020). Medical City Alliance provides care to approximately 30-40 severe sepsis and septic shock patients per month.

The risk of mortality is higher when a patient develops sepsis while on a general medical floor compared to a patient who presents to the Emergency Department with sepsis (O'Shaughnessy et al, 2017). Proposed is re-education of the nursing staff on the third floor on timely and frequent assessments for potential sepsis through the use of the Sepsis Prevention and Optimization Tool (SPOT). Evaluation of the effectiveness will be measure by the number of sepsis patients identified and SEP-1 core measure compliance. Potential additional results of timely identification and intervention include: decrease in sepsis mortality, increase in SEP-1 compliance, decrease length of stay (LOS), and decrease ventilator use with septic patients.

Sepsis Alert Benchmark Project

Sepsis is steadily rising as one of the leading health concerns in our country due to the high risk of mortality and morbidity. With advances in medicine and technology for early detection of other disease processes, how can we use the same methodology in detecting sepsis sooner to prompt early intervention to promote better patient outcomes? For example, utilizing the National Institutes of Health stroke scale (NIHSS) and the Balance, Eyes, Face, Arm and Speech Test (B.E.F.A.S.T.) to evaluate whether a patient is possibly having a stroke. In the last three years, the Hospital Corporation of America (HCA) has developed a program called SPOT, Sepsis Prevention and Optimization Tool. SPOT utilizes artificial technology with an algorithm that monitors patients admitted to the hospital twenty-four hours a day, seven days a week. SPOT pulls data such as vital signs, medication orders, and laboratory results, from the electronic health record into the algorithm to screen patients for possible signs of sepsis. This prompts the question, for nurses working in an acute care hospital setting (P), how effective is an automated sepsis alert (I) compared to the standard of care (C) for timely sepsis identification and quality of care (O) during a three-month period (T)?

Rationale for the Project

When sepsis is suspected, and initial lactic acid level and blood cultures are drawn, administration of intravenous fluids and antibiotics, oxygen supplementation, and hemodynamic monitoring is warranted within three hours. Delays in early recognition and intervention increase the risk of mortality (Howell & Davis, 2017). This project will focus on sepsis assessment compliance by nursing staff after receiving a sepsis alert from SPOT. SPOT was implemented in 2018 at all HCA North Texas Division hospitals, including Medical City Alliance. Although this program was launched in 2018, compliance with sepsis assessment after

an alert has been historically low at Medical City Alliance. By increasing compliance with sepsis assessments after a SPOT alert, sepsis identification will be timely and allow for early intervention. In addition, early identification will lead to better quality of care as evident by increase sepsis bundle compliance with the Centers of Medicare and Medicaid Services (CMS) core measure, SEP-1.

Literature Synthesis

Literature and research have shown significant improvements in sepsis management and quality outcomes in the last ten years, especially for those presenting to the Emergency Department. Errors in timely diagnosis can occur when the EMR is not used to it fullest potential (Long et al., 2018). Diagnosing sepsis can be very difficult due to the unspecific signs and symptoms of the condition, which can mimic other disease processes. The progression of sepsis is also quick and the mortality increases as the disease process spreads. With early identification and treatment, an estimated 80% of sepsis mortalities could be prevented (Parnas, 2020). Improvement in sepsis recognition in the early stages of the disease process is the first important fact to consider when education staff about sepsis (Winterbottom, 2012). A comprehensive sepsis program for recognition and management of sepsis, including a sepsis alert, has shown to decrease need for mechanical ventilation, as well as ICU and hospital length of stay (LOS) (Guirgis et al., 2017; McDonald et al., 2016).

Proven beneficial in the Emergency Department, a sepsis alert system detects increased infection and sepsis identification. In addition, early identification lead to increase in antibiotic administration within one hour (Nguyen et al., 2014; Shah, Sterk, Rech, 2018). When narrowing down the patient population within the hospital to present on admission (POA) and not present on admission (NPOA), it is worth noting that over 80% of sepsis cases were POA with a

mortality less than 15%, and remaining sepsis cases of NPOA had a mortality rate of 35% (Rothman et al., 2017). This further highlights the need for continuous screening for sepsis of patients outside of the Emergency Department. Electronic sepsis alerts for nursing have been proven to precede Intensive Care Unit (ICU) referral which then triggers early sepsis recognition and intervention (Alsolamy et al., 2014). Implementation of a sepsis electronic alert has proved to be more reliable than a paper-based screening tool and demonstrated the ability to detect sepsis at earlier stages of the disease process. Leveraging the electronic health record by incorporating a sepsis alert has proven to increase sepsis bundle compliance (Arabi et al., 2017; Gross & McGlynn, 2017). In a study at Harborview Medical Center, after the implementation of an electronic sepsis alert, there was a 41% reduction in sepsis mortality over an eight-year period. Also noted, is the fact that the nurse completed a sepsis assessment within two hours of alert (Case study: Automating sepsis alerts at Harborview Medical Center: Using a simple EMR alert, the hospital reduced sepsis fatalities by 41%, 2018). Education, along with a sepsis alert tool, have shown to increase sepsis identification and decrease the median time to provider notification (O'Shaughnessy, Grzelak, Dontsova, & Braun-Alfano, 2017).

Project Stakeholders

Primary stakeholders include patients and their families as they are the end beneficiaries of early sepsis identification. Nurses are also stakeholders in this project. Nurses are the end-users of this alert and are the ones to communicate with the clinical team when sepsis is suspected. Nurses also provide valuable feedback in regards to the functionality of the SPOT alert. Ensuring end-users understand the issue and feel comfortable voicing their concerns are valuable components to the success of the project (Woebkenberg, Hernandez, & Dean, 2019). The telemetry techs in the facility are also stakeholders. Their role is to monitor the SPOT

program and communicate to the primary nurse or charge nurse within five minutes of the alert. The hospital Quality Department, along with the Sepsis Coordinator, are also stakeholders. The Sepsis Coordinator oversees all process improvement projects related to sepsis and reports up to Quality. Other stakeholders include Administration and IT support. Administration is to provide leadership and approve any additional required capital. IT support is also essential in this particular project due to the nature of the SPOT program. If there are any technical issues, IT would be need to be alerted. Physician are also important stakeholders in this project. Implementation of the sepsis bundle is determined based on the physician's assessment of the patient after RN assessment and provider notification.

Implementation Plan

The first part prior to project implementation will be to develop the education for the third-floor nursing staff and ancillary staff. The third floor at Medical City Alliance has three wings divided into one Intensive Care Unit (ICU), one Progressive Care Unit (PCU), and one Medical/Surgical/Telemetry (M/S/T) unit. This proposed project would target patients admitted to the third floor only. Excluded from this project are Emergency Room Overflow, Observation status, and Women's Services. Women's services utilize a different electronic medical record platform and has specific sepsis criteria related to labor and delivery and post-partum. Education will be specific to what SPOT is, how the program works, and sepsis assessment expectations, Appendix C. The next step after the development of education will be to present the project to the Chief Nursing Officer (CNO) and Sepsis Coordinator at Medical City Alliance for approval. With approval, the next step will be to present the project to the third-floor leadership: Director of Operations, ICU/PCU Manager, and M/S/T Manager. After approval, the next step would be to provide the education to the nursing staff at each shift huddle starting on the Sunday of the

week. Participation in shift huddle education is validated with a signed attestation by each staff member (including RNs, telemetry techs, and patient care technicians). Shift huddle is done each day at 0700 and 1900. Data collection will start on week one thru week twelve.

Timetable/Flowchart

Due to the constraints of staffing and resource availability during the COVID-19 pandemic, this is a benchmark project. Week one would consist of two meetings. The first meeting would be with the CNO and Sepsis Coordinator to review education and project proposal. The second meeting would be with the third-floor leadership, Director of Clinical Operations, ICU/PCU Manager, and M/S/T Manager. The timetable outlines the expected completion of each action, Table 1. The flowchart demonstrates the expected progression of the project, see Table 2.

Table 1.

Action	Who	When
Meeting with CNO and Sepsis Coordinator. Identify units with low compliance. Discuss education needs	CNO, Sepsis Coordinator	Week 1
Present project to 3rd Floor Nurse Leadership	Director of Operations, M/S/T Manager, PCU/ICU Manager	Week 1
SPOT education provided in all shift huddles for RNs and Telemetry Techs	M/S/T Manager, ICU/PCU Manager (or designated charge RN)	Week 2
Data collection	Sepsis Coordinator	Week 1 thru week 12

Table 2.

Data Collection Methods

Data will be collected from three different platforms to measure the timeliness of sepsis assessments and the quality of care. The first data point will be collected on the median number of minutes it takes from the SPOT alert to RN sepsis assessment. SPOT data will be collected from a corporate Tableau dashboard. Specific data to be collected is the percent of sepsis screens completed within 27 minutes of alert, the percent of sepsis screens completed within 60 minutes of alert, and the median alert to screen time in minutes. The number of patients diagnosed with sepsis NPOA will be collected from the corporate MicroStrategy dashboard. Data collected on the MicroStrategy dashboard are those patients whose final bill was coded with severe sepsis or septic shock ICD-10 codes. To measure the quality of care, sepsis bundle compliance reported to the Centers of Medicare and Medicaid Services (CMS) via the SEP-1 core measure will be collected.

Cost/Benefit Discussion

Sepsis is one of the most expensive conditions in the United States, costing an estimated $24 billion each year. In addition, 19% of sepsis patients are readmitted to the hospital within 30 days (Parnas, 2020). In 2008, sepsis-related mortalities cost an estimated $14.6 billion in the

United States (Alsolamy et al., 2014). Early management of sepsis has led to a decrease in the need for mechanical ventilation and vasopressor utilization, as well as decrease length of stay (LOS) (Arabi et al., 2017). The cost of this project is minimal. Due to competing priorities on the third floor, it was not recommended to not introduce a new project despite low capital requirements. The SPOT program has been in place for several years, so no further cost would be associated with the SPOT program. Data collection will require approximately one to two hours of productivity each week, equally approximately $80 per week for a total of $960 for the twelve-week period of project.

Discussion of Results

Due to the constraints of staffing, productivity, and resource availability during the COVID-19 pandemic, this is a benchmark project at Medical City Alliance. At the request of the hospital executive team, all projects and additional education for staff was put on hold. The Medical/Surgical/Telemetry and ICU wings on the third floor are designated COVID-19 units.

After proposed implementation, expected results would include a decrease in the median time (in minutes) of the time from SPOT alert to assessment by RN. In addition, an increase in the number of patients diagnosed with severe sepsis or septic shock NPOA would be expected. As a result of increase in timely identification, SEP-1 bundle compliance would also increase, Appendix A.

Conclusions/Recommendations

SPOT has proven to be a beneficial tool throughout HCA. More than five thousand lives have been saved as a result of early sepsis detection by SPOT and has shown a 23% reduction in mortality (Castellucci, 2019). Frequent screening for sepsis should remain at the forefront of nursing despite challenges, as research as shown the high risk of mortality and morbidity for those

patients outside of the Emergency Department. In conjunction with early sepsis identification, physician communication and engagement are recommended for early treatment of sepsis. Before initiating treatment, physicians should review all cases in order to reduce the risk of overtreatment and increase workload (Arabi et al., 2017). An additional recommendation or consideration should be given to alarm fatigue for staff. Development of an alert that is both meaningful with minimal information overload could be a barrier (Harrison et al., 2017). Further research in required to assess alarm fatigue to due SPOT alerts.

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Appendix A

Data Synthesis Table

Week	1	2 ***Intervention***	3	4	5	6	7	8	9	10	11	12
Median time of alert to screen												
SEP-1 Compliance												
NPOA volume												

Appendix B

Flowchart

Appendix C

Education

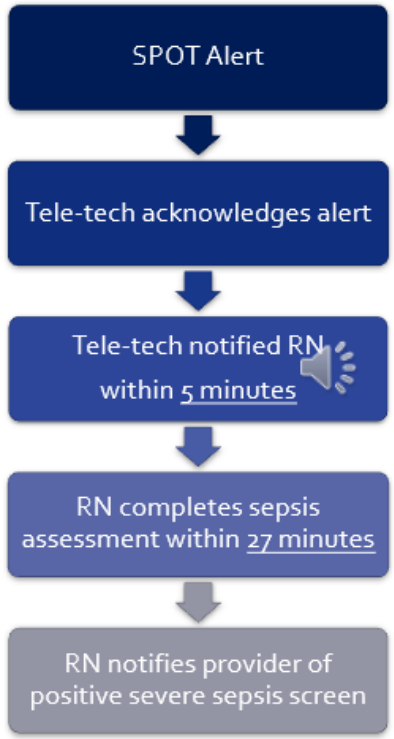
SPOT

Sepsis Prevention and Optimization Tool

SPOT is a program developed to detect early signs and symptoms of sepsis.

Early detection leads to improved outcomes. Every hour delay is associated with an additional 4% risk for death.*

*New England Journal of Medicine



How to screen for sepsis:

1. Add intervention under Safety/Risk/Regulatory or Severe Sepsis
2. Complete sepsis assessment for organ dysfunction

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- - SEVERE SEPSIS SCREENING - -
                                    Assess sepsis: Yes
                                      Temperature: No
                                       Heart rate: Yes
                                     Respirations: No
                                      WBC results: 12/05/20 17.6H 2120
                                     Band results: 12/05/20 2 2120
                                        WBC/Bands: Yes
If yes to 2 or more of above, proceed to next section: 2
                          Suspected/documented infection: No
                    Antibiotic therapy (not prophylaxis): No

Screening due to sepsis early warning alert/detection: Yes
    If yes to 1 of the above, proceed to next section: 1

     If yes to 1 of the above, proceed to next section:
                                             Respiratory:

                                           Cardiovascular:

                                                   Renal:

                                               Metabolic:

                                           Hematologic:

                                                 Hepatic:

                                        Central nervous system:

  If yes to 1 of the above, positive for severe sepsis: 1
  Severe sepsis comment:
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For any questions, call Leigh Ann Normand *91115