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Improving Early Sepsis Identification on Inpatient Units

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Nursing 653: Clinical Nurse Leader Internship

University of San Francisco

Abstract

Sepsis is a serious complication caused by an overwhelming immune response to infection that affect millions of people worldwide each year. Sepsis is a time sensitive illness that requires early identification and quick interventions to improve patient outcomes. This quality improvement project includes a team of clinical nurse leader (CNL) students and gathering information on the nursing compliance of the sepsis protocol at a large metropolitan hospital. The observations on different inpatient units and chart review conducted at the large metropolitan hospital led to increased awareness of gaps that prolong the identification of sepsis among patients; also to the creation of a sepsis protocol badge for nurses to use as a quick reference tool and the re-development of a sepsis process map that better reflects the hospital's sepsis policy.

Introduction

Sepsis is a serious complication initiated by an overwhelming immune response to infection. Severe sepsis is defined by the Centers for Medicare & Medicaid Services (CMS) as an infection or suspected infection with two or more systemic inflammatory response syndrome (SIRS) criteria plus one sign of organ dysfunction. The Centers for Disease Control and Prevention (CDC) reports that more than 1.5 million people in the United States suffer from sepsis, with at least 250,000 sepsis-related mortalities each year; in addition, one in every three patients who die in the hospital setting die from sepsis ("Data Reports | Sepsis | CDC," 2017). In a study done by Winterbottom et al. (2011), they suggest routine screening and monitoring as being essential to identifying SIRS to intervene early and utilizing supportive measures to increase patient outcomes. With prompt interventions to detect sepsis early along with aggressive treatment, sepsis morbidity and mortality rates will decline leading to improved patient outcomes (Novosad et al., 2016). Therefore, the focus of this project is optimizing patient outcomes within a large metropolitan hospital by working alongside the sepsis committee to assess the nurses' understanding and implementation of the sepsis protocol.

A literature review using the following keywords *early sepsis identification, sepsis checklist, improving sepsis screening, and inpatient units* was conducted using CINAHL Complete and PubMed. Since nurses play a vital role in the detection of sepsis, understanding the nurses' knowledge of sepsis detection and treatment methods will help identify the gaps that prolong the detection of sepsis. The efficacy of the current sepsis protocol in placed at the hospital was evaluated by conducting a retrospective patient chart review. To help facilitate the early identification and appropriate treatment of sepsis, we must ensure the hospital's sepsis protocol are aligned with the international guidelines for the management of sepsis and septic

shock released by The Surviving Sepsis Campaign (SSC) and guidelines established by the CMS.

Methods

Microsystem Assessment

Before initiation of the project, a microsystem assessment was conducted in five inpatient units to understand the healthcare facility. Established as a non-profit organization in 1983 and governed by a Board of Trustees, this facility is a 384-bed hospital that provides a range of services that includes the following: Level II Trauma Center, emergency, oncology, cardiovascular, pediatrics, behavioral health, skilled nursing and obstetrics. The vision of this facility states, "our vision is to be a values-driven integrated health care delivery system in collaboration with those who share our values" (x). The facility strives on promoting quality, patient-centered care through advocacy and preserving the health of the community, meanwhile upholding the values of respect, caring, integrity, passion and stewardship (x).

Sepsis screening observation for this project were conducted on a medical-surgical/telemetry unit that treated a wide range of medical conditions including: cardiac, stroke, oncology, telemetry, and medical-surgical patients. Four other inpatient units were included in the chart review and surveys. 60% of the patients are uninsured and relied on Medi-Cal services to over their hospital visits (x). Each patient is overseen by a multi-disciplinary team of healthcare professionals that play a vital part in patient outcomes, they include: physicians, nurse practitioners, registered nurses, respiratory therapists, certified nursing assistants and licensed vocational nurses. Patient-family centered care is used as the facility's patient care delivery model, which promotes quality care by including both the patient and family members in their care.

Data Collection

After meeting with the sepsis committee, a root cause analysis (RCA) was conducted to identify compliance of the sepsis protocol and possible gaps in the early detection of sepsis. Data collection for the RCA was conducted over multiple visits coordinated with the sepsis committee that included sepsis screening observations, chart review audits, and surveying the registered nurse about the sepsis protocols. Conducting a systematic review of the sepsis protocol, policy, algorithm, and screening tool is important in distinguishing disparities and inconsistencies.

The student-nurse sepsis screening observations were conducted on 4 shifts with time and date coordinated by the sepsis committee (See Appendix A for Sepsis Screening Observational Checklist). The director for the sepsis committee individually introduced each student to a nurse as a strategy to reduce tension and promote communication during the observation. Although the nurses were informed the observations were sepsis-related, the completion of the screening checklist was not specified. The observations are focused on the compliance of a sepsis-screening checklist that is mandatory for each patient within the first 3 hours of a shift in an inpatient unit, which are between 7:00am to 10:00am and 7:00pm to 10:00pm. It is important to complete the checklist within the first 3 hours to promote an early detection of sepsis. A total of 66 patients were audited during the observation.

After approval of access to the facility's electronic medical record (EMR), a chart review audit was conducted to see what time the nurses documented the mandatory sepsis screening checklist and if any interventions were performed (See Appendix B for Sepsis Chart Review Form). All patients documented were 18 years of age or older and on their second day of their hospital stay. 100 patients were audited for both morning and night shifts, with 199 total audits.

Following the facility's Sepsis Protocol Administration Manual, a 10-question survey was created and administered to registered nurses in five inpatient units (See Appendix C for Nurses' Questionnaire). The purpose of the survey is to gauge the nurses' knowledge of sepsis and the facility's sepsis protocols and their opinions on possible gaps related to the protocol. A total of 32 surveys were collected from the nurses. All data collection methods were first approved by the director of the sepsis committee before initiating. In addition, since this project is focused only on quality improvement, approval from the Institutional Review Board (IRB) was not required.

Results

The sepsis screening observation data showed a total of 66 patient observations (Graph D.1). When observing the nurses, 58% (38 patients) of sepsis screenings were not performed within the first 3 hours of the nursing shift; meanwhile, 42% (28 patients) of sepsis screenings were performed within the first 3 hours. Based on the 28 patients that were screened, 93% (26 patients) of the sepsis screening used vital signs taken between 5:00am and 10:00am; 18% (5 patients) met the two SIRS criteria; and 7% (2 patients) had the sepsis protocol initiated and transferred to the intensive care unit (Graph D.2). All pairing of students to nurses were initiated by an introduction from the director that the student observations are sepsis-related. In doing so, a higher number of sepsis screenings performed during the first 3 hours was expected. Due to other comorbidities, initiating the sepsis protocol for all 5 patients that met the two SIRS criteria may not have been necessary.

The data for the sepsis screening chart audits are shown in Appendix E. Out of 199 screenings, 72% performed within the first 3 hours of the nursing shift, with 3% showing a positive sepsis screening and 1% with the sepsis bundle being initiated.

In the 32 surveys that were received back from nurses, it shows only 50% of abnormal vital signs are being reported in a timely manner (Graph F.1). 21 nurses agree that lab delays are the greatest contributor to delays in the treatment of sepsis (Graph F.2). 38% of the nurses agreed that the facility provides adequate educational resources regarding sepsis for nurses (Graph F.3); and most nurses use Arcis to reference nurse driven protocols for sepsis (Graph F.4). The survey also shows 88% of nurses able to define a positive sepsis screen; 95% able to identify the SIRS criteria; 44% could identify the incorrect nursing intervention for a positive sepsis screening; 31% could identify the criteria required to call a code sepsis; and 97% could identify interventions to be performed within 3 hours of the presentation of severe sepsis (Graph F.5).

Implementation

The timeframe of this quality improvement project only allowed the student team up to the point to conduct the survey and compile the data collected. The implementations that were suggested are: a staff education program, a sepsis protocol badge, a sepsis champion, and a revised sepsis process map.

Based on the surveys, most of the nurses are able to correctly define and identify sepsis but it was still visible that an education program to remind the nurses of the pathophysiology, SIRS criteria, and the importance of early detection is beneficial. A sepsis protocol badge behind the regular badge can also be used as a reminder tool (Appendix G). In addition, appointing someone who is more comfortable and familiar with sepsis or a sepsis champion on each unit is recommended to improve patient outcomes related to sepsis. The champion will stay up-to-date with new information on sepsis and serve as a resource and reference to help identify patients with sepsis.

During the project, there was some confusion from the students and nurses for when the sepsis screening checklist must be done. Some nurses verbalized that it is better to complete the checklist early. Going through the hospital's sepsis policy and electronic charting system, the process map was outdated and a specific timeframe to complete the checklist could not be found. Therefore, re-creating the process map and including a specific time for the checklist can increase the compliance of the sepsis screening checklist (See Appendix H for Revised Process Map.

Cost Analysis

In 2016, the Healthcare Cost and Utilization Project (HCUP) showed sepsis as the most expensive condition to treat in the United States, with an average of $18,000 per stay; meanwhile, the expense per stay for other conditions averages around $10,000 (Torio & Moore, 2016). In a discussion with the sepsis committee, it was mentioned that the intensive care unit (ICU) sees on average 2-3 septic patients a week; the emergency department sees 3-4 patients a day; and the inpatient units hardly ever see a septic patient (x). This approximates to about 1176-1584 patients treated each year for sepsis at this facility and roughly estimates to $21 to $28 million dollars in sepsis treatment a year. The CDC reported patients with sepsis stayed an average length of stay (LOS) of 8.5 days ("Data Reports | Sepsis | CDC," 2017). The desired outcome for early recognition and treatment of sepsis is to reduce sepsis related mortality and average LOS. By implementing proper interventions to aid in the early detection of sepsis and reducing the total average LOS by half a day, this facility can save $1.2 to $1.7 million each year, which is more than enough to cover the cost of fully implementing this project.

In hypothesis, 3% of sepsis cases are due to poor management and cost the hospital approximately $630,000 to $850,000 a year. With more awareness of sepsis among nurses, a

hypothesized reduction of 1% can be achieved saving the hospital an estimate of $250,000 a year.

Evaluation

A survey can be used as an auditing tool to evaluate the effectiveness of the interventions before and after the implementation. The survey will be given to nurses to assess their knowledge and what materials should be included in the education materials. After implementing the education program, the same survey can be used to determine if there was an increase in knowledge from the previous survey. A questionnaire will be redistributed 3 month afterwards to assess the retention of knowledge and what educational materials and interventions are further needed. A retention of knowledge can be used as one of the indicators for compliance with the hospital's protocols.

Discussion

The purpose of this project is focused on the early recognition of sepsis. One of the tasks was to observe nurses complete the sepsis screening checklist within the first 3 hours of their shift. From our observations, less than 50% of the nurses physically completed the checklist within the first 3 hours, while the chart review indicates that 72% of the screenings were done within the first 3 hours. At this hospital, nurses are able to manually input the time without any time-stamp of the original input. This charting method is believed to have been a factor in having a higher rate of compliance in the chart review compared to the physical observation.

It may be more beneficial if the observations were performed during the nurses' full 12-hour shift, rather than just the first 3 hours of their morning shift. Additionally, if the students also had the opportunity to observe if the sepsis screening was done during the night shift, it may provide crucial data in evaluating compliance and identifying barriers. By following the nurses

during their entire shift or up until the screening is physically charted in the system, we would have a more precise data of which vital signs were used and when the screening was completed.

As students, one of the more complex situation came from handing out surveys to nurses. Due to a limited timeframe, the student team individually handed out surveys to nurses. Some nurses were receptive to the survey, but the small number of surveys received back compared to the amount handed out suggested differently. Although the nurse manager was informed and approved of the survey, it may be beneficial in the future to delegate this task to a hospital staff that is familiar with the unit or made mandatory to increase survey participation.

Nursing Relevance

Nurses are at the forefront of the healthcare industry and in this case, play an important role in the early identification of sepsis. Combining their critical thinking and clinical judgement, some nurses use those abilities to complete the sepsis screening checklist without fully assessing their patients. To improve the early identification of sepsis, nurse's must understand their responsibility in completing a thorough assessment on each patient. The clinical nursing role can be used to promote awareness sepsis and advocate for their patients.

Clinical Nurse Leader Relevance

Working alongside other healthcare professionals in this project shows the many hats CNLs take on within a microsystem. Partnering with clinical nurse specialists (CNS) who deal with sepsis daily, we formulated a plan to evaluate the nurses' compliance of the hospital's sepsis protocols. Approval is very important when dealing with sensitive patient information; therefore, working with the CNS, nurse managers and charge nurses were crucial in the receptiveness of a unit. The CNL's organizational systems leadership competency is demonstrated in this situation by assuming a leadership role in implementing patient safety and

quality improvement along with an interdisciplinary team (AACN, 2013). Some of the other CNL competencies that can be easily identified in this project are quality improvement and safety, informatics and healthcare technologies, and health policy and advocacy (AACN, 2013).

This project is focused on improving the early detection of sepsis and compliance of a hospital's sepsis protocol. With one of the CNL competency being quality improvement and safety, CNLs are well-equipped with the knowledge to successfully improve patient outcomes and advocate for patients. During this project, there were opportunities to utilize competencies in informatics and healthcare technologies when working with the hospital's electronic charting system. CNL's can work with nurse informatics to improve the charting system where a time-stamp is recorded for manually inputted data. By doing so, it may increase compliance of completing the sepsis screening checklist on time. Lastly, by researching up-to-date guidelines on sepsis, we updated the hospital's process map and developed a sepsis protocol badge to be used as a reference. Filling the gaps in different roles and working alongside other healthcare professionals in an interdisciplinary team, a CNL would make a great contribution to many diverse and complex projects.

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(x). *The references that can identify the hospital were intentionally omitted to maintain the privacy of the institution where this project was conducted*

Appendix A

Sepsis Screening Observational Checklist

1. Was the sepsis screening done?
    a. No
    b. If yes, then answer questions 2-6.

2. What time were the vital signs done that were used to complete the screening?

    a. Note: vital signs from 5am-10am can be used.

3. Did the nurse feel that the patient has a suspected or confirmed infection?
    a. No
    b. Yes. If so,why?

4. Do you think the patient has a suspected or confirmed infection?
    a. No
    b. Yes. If so, why?

5. Did the patient have 2 SIRS and a suspected/confirmed source of infection?
    a. No
    b. Yes

6. Was the sepsis protocol initiated?
    a. No
    b. Yes

Appendix B

Sepsis Chart Review Form

1. Was sepsis screening done?
2. What time
3. What time were vitals taken which were used for the sepsis screening
4. What were the lab values related to the SIRS criteria?
    a. Temperature
    b. RR rate
    c. WBC count
    d. HR
5. Did patient present positive for sepsis screening
6. Was the sepsis bundle initiated
7. Was the patient transferred to a higher level of care
8. How long was the patient on the floor before transfer was completed?

Appendix C

Nurses' Questionnaire

1. **True or false.** A positive sepsis screening is defined as 2 SIRS + a suspected or confirmed source of infection.

2. **Which of the following is <u>NOT</u> considered SIRS criteria?**

a. Body temperature >38.3°C/100.9°F or body temperature <36°C/96.8°F
b. Tachycardia
c. WBC >12,000/mm3 or <4,000 or 10% bands
d. Bradypnea

3. **If patient presents with positive sepsis screening, which of the following is <u>NOT</u> nursing intervention(s) to be implemented?**

. Call RRT
a. Draw sepsis panel labs
b. Call Code Sepsis
c. Obtain urinalysis and culture/sensitivity

4. **True or False (circle one):** only call "code sepsis" if in the ED, ICU or if Severe Sepsis.

5. **Which of the following must be performed within 3 hours of presentation of severe sepsis?**

. Obtain blood cultures prior to administering antibiotics
a. Measure lactate level
b. Administer broad spectrum antibiotics
c. Administer 30mL/kg crystalloid for hypotension or lactate >2mmol/dL
d. All of the above

6. **Do you feel that abnormal vital signs are reported to you in a timely fashion?**

a. Yes, almost always
b. Sometimes
c. No, hardly ever

7. **In your experience, what is the <u>greatest</u> contributor to delays in treatment of sepsis in your department? (Select all that apply.)**

. Lack of recognition of potential sepsis in triage
a. Delay in diagnosis of sepsis
b. Knowledge deficit regarding appropriate management
c. Nursing delays (time to completion of orders)
d. Lab delays
e. Lack of necessary equipment (Please explain.) _____
f. Other (Please explain.) _____

8. Do you feel that this facility provides adequate educational resources regarding sepsis for nurses?

. Yes, almost always
a. Sometimes
b. No, hardly ever

9. When needed, what resource do you use to reference the Nurse Driven Protocol for sepsis?

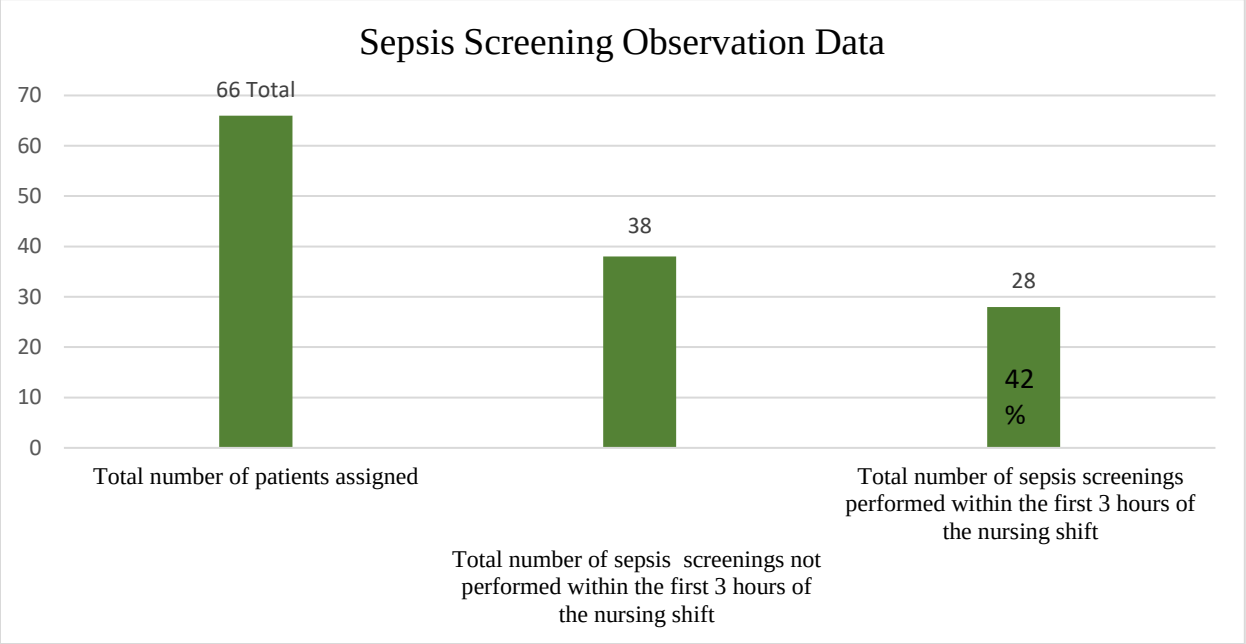
. Arcis (electronic medical record)
a. Policy and Procedure Manual
b. Google

10. What additional resources/information would you like to have regarding sepsis?

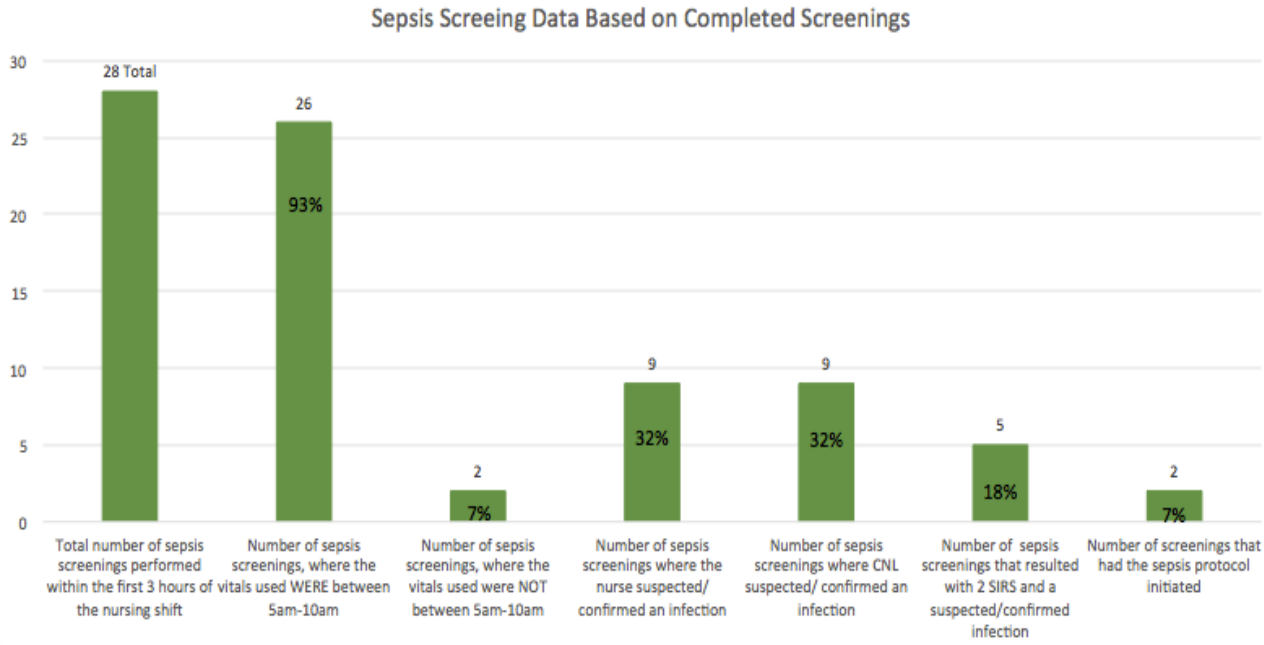
_____
_____

Appendix D

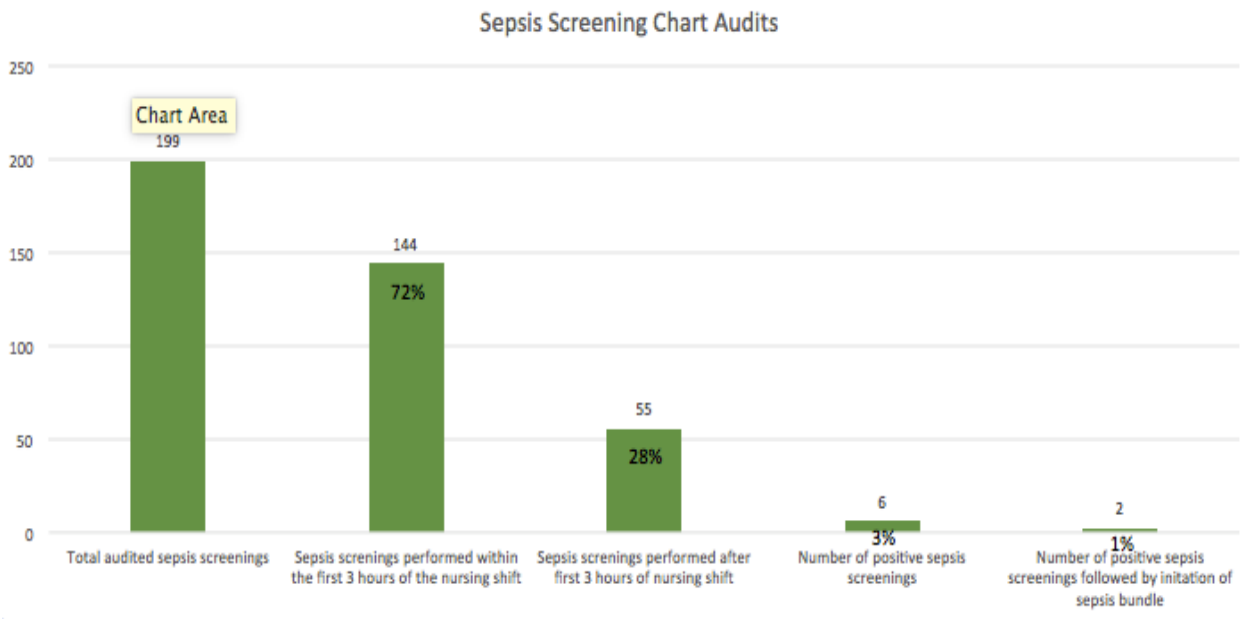
Graph D.1



Graph D.2

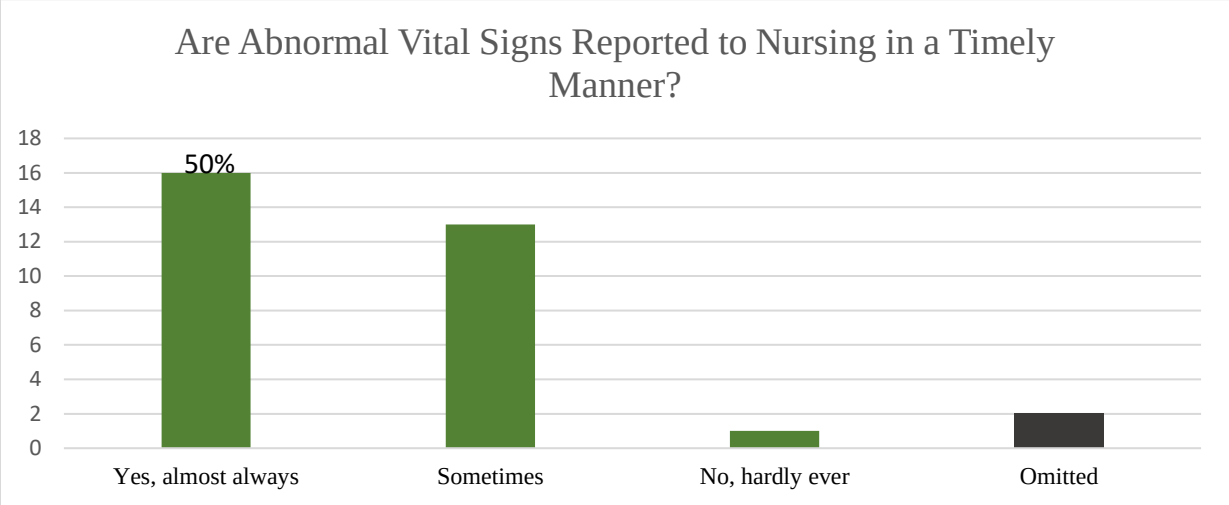


Appendix E

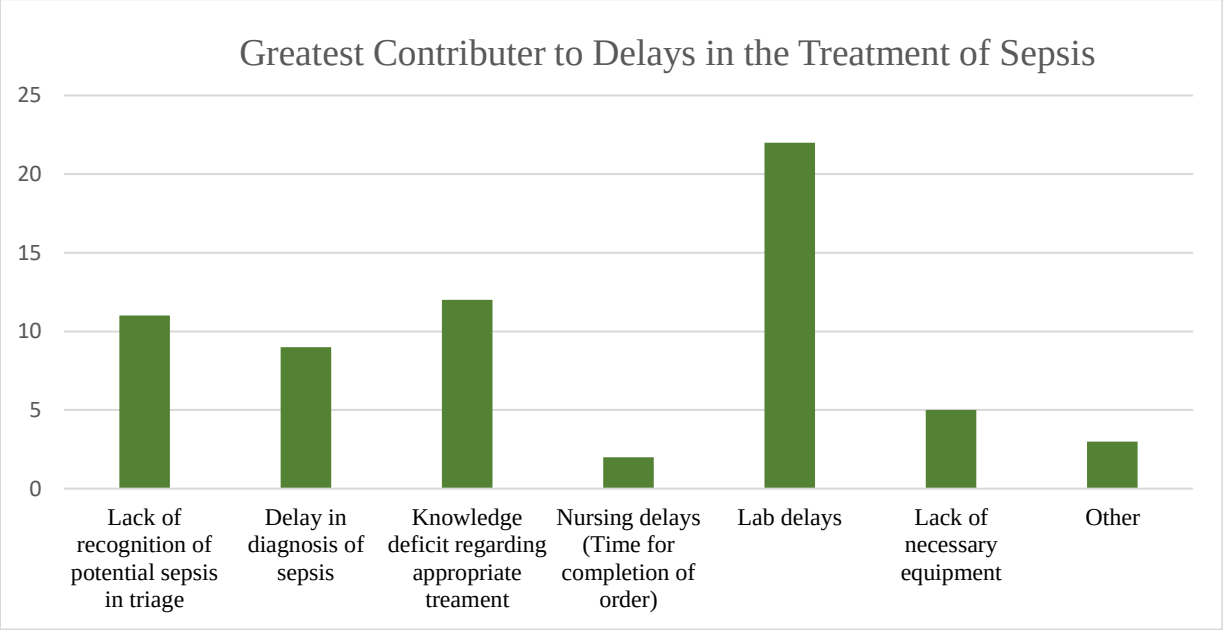

Sepsis Screening Chart Audits
250
200
150
100
50
0
Chart Area
199
144
72%
55
28%
6
3%
2
1%
Total audited sepsis screenings
Sepsis screenings performed within the first 3 hours of the nursing shift
Sepsis screenings performed after first 3 hours of nursing shift
Number of positive sepsis screenings
Number of positive sepsis screenings followed by initation of sepsis bundle

Appendix F

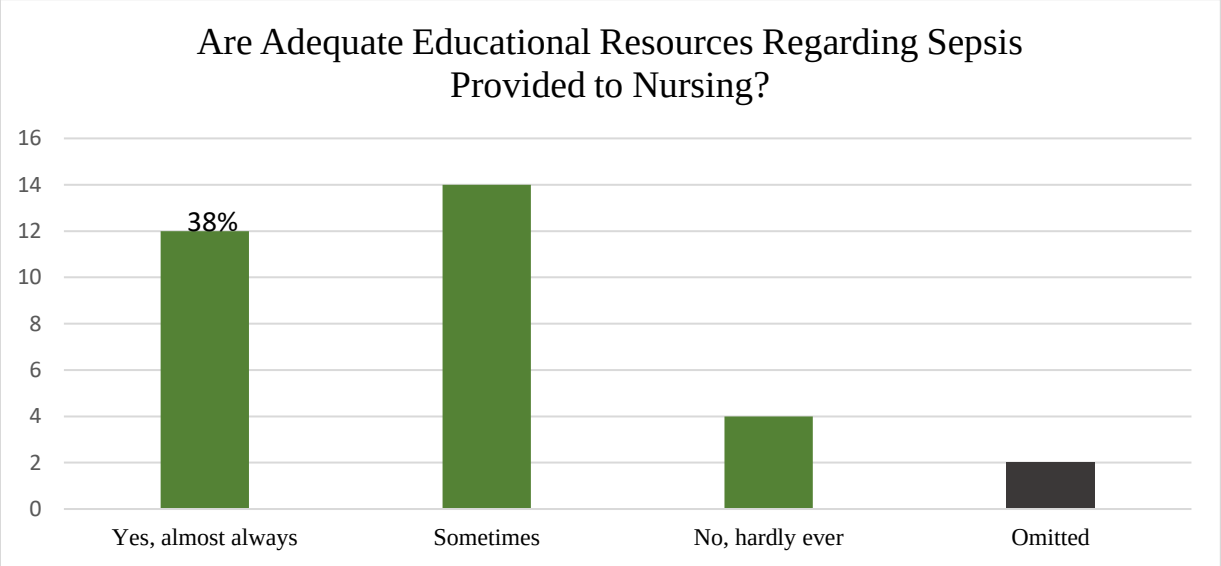
Graph F.1



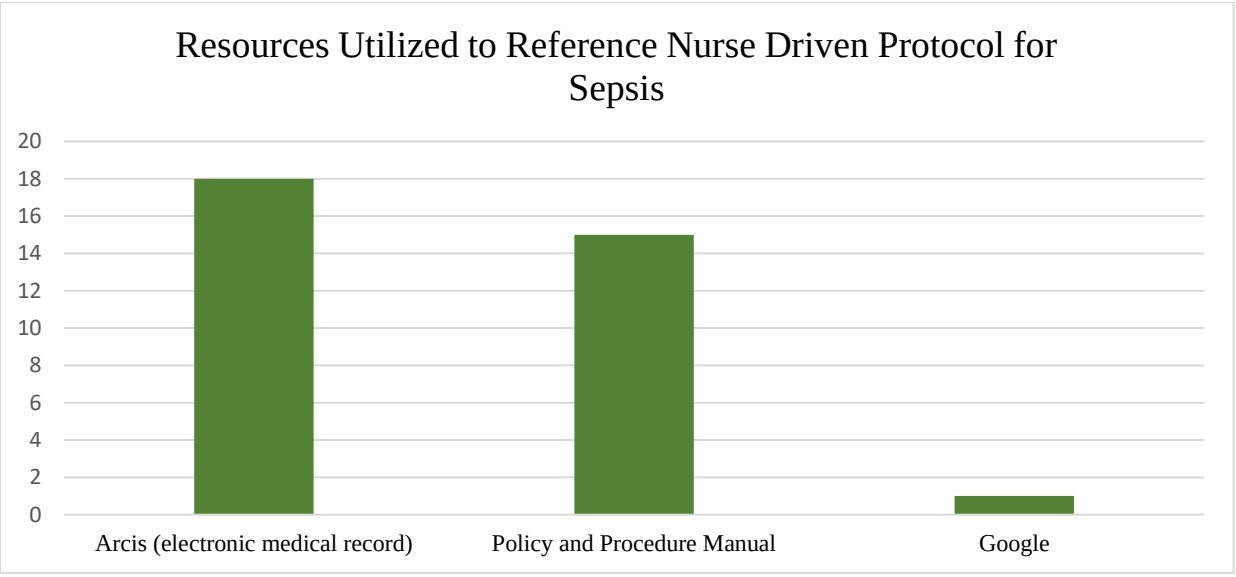
Graph F.2



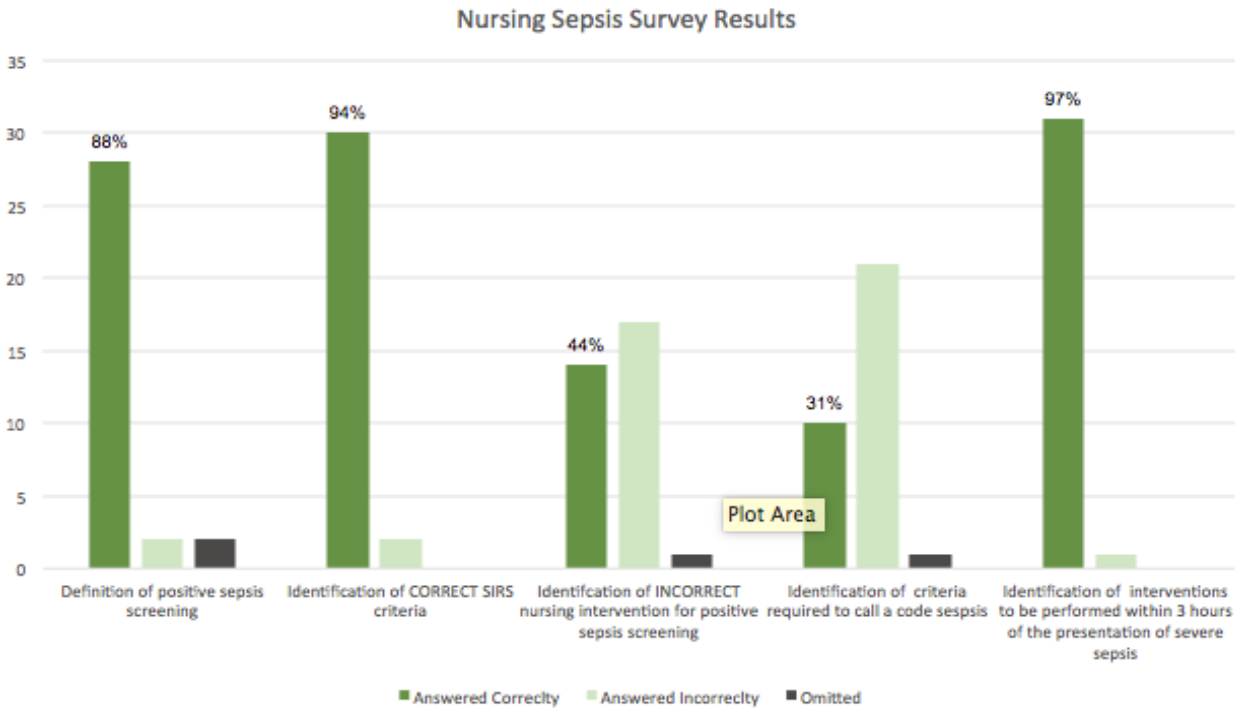
Graph F.3



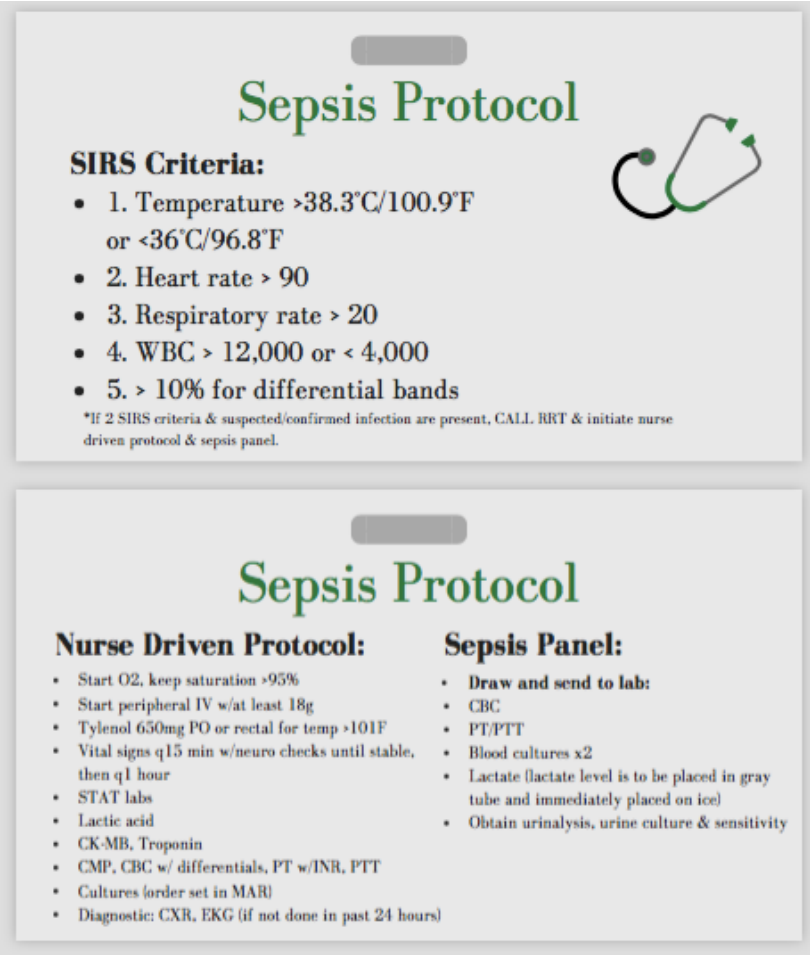
Graph F.4



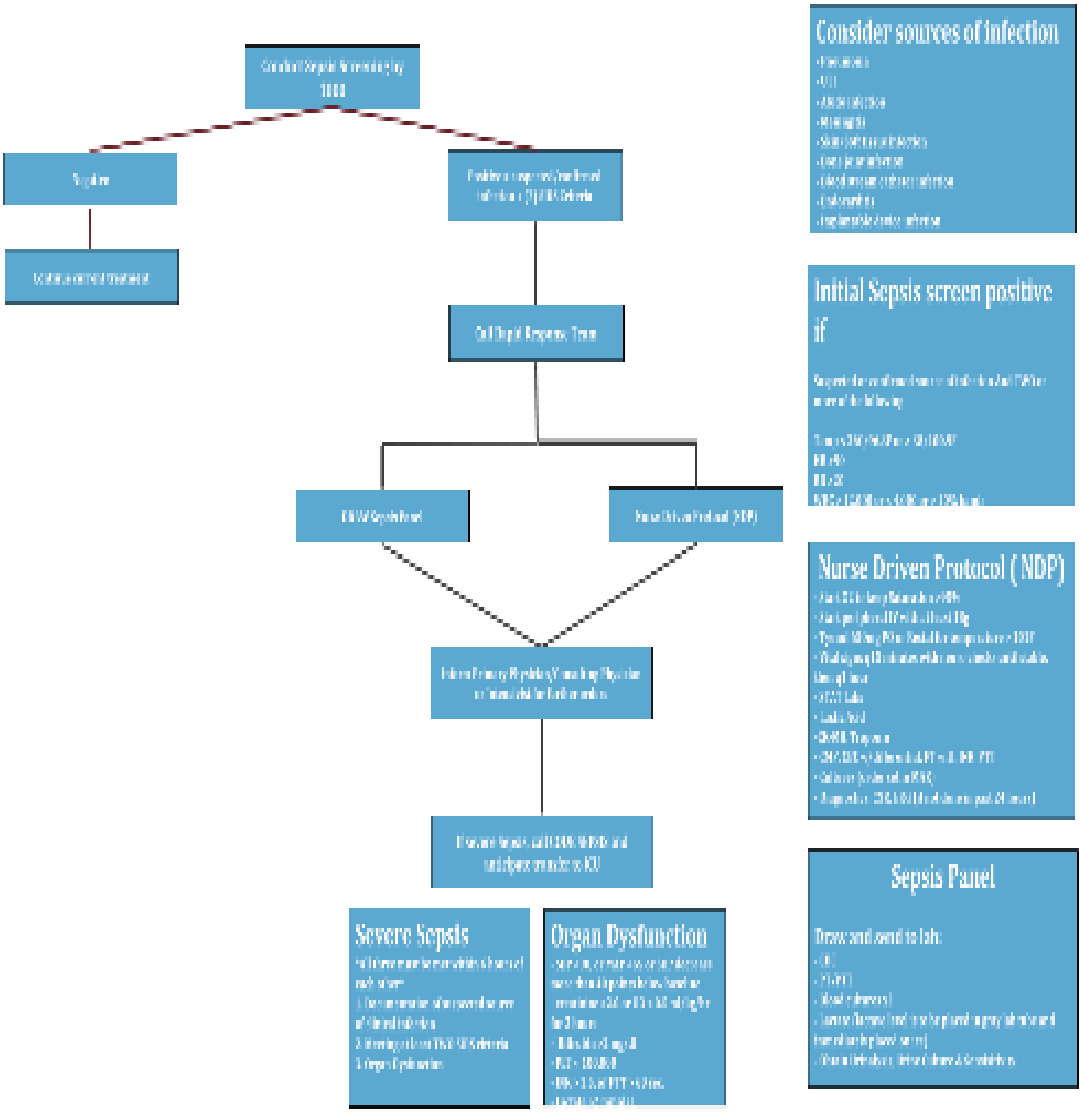
Graph F.5


Nursing Sepsis Survey Results
35
30
25
20
15
10
5
0
88%
94%
44%
31%
97%
Plot Area
Definition of positive sepsis screening
Identification of CORRECT SIRS criteria
Identifcation of INCORRECT nursing intervention for positive sepsis screening
Identification of criteria required to call a code sespsis
Identification of interventions to be performed within 3 hours of the presentation of severe sepsis
Answered Correclty
Answered Incorreclty
Omitted

Appendix G


Sepsis Protocol
SIRS Criteria:
1. Temperature >38.3°C/100.9°F or <36°C/96.8°F
2. Heart rate > 90
3. Respiratory rate > 20
4. WBC > 12,000 or < 4,000
5. > 10% for differential bands
*If 2 SIRS criteria & suspected/confirmed infection are present, CALL RRT & initiate nurse driven protocol & sepsis panel.
Sepsis Protocol
Nurse Driven Protocol:
Start O2, keep saturation >95%
Start peripheral IV w/at least 18g
Tylenol 650mg PO or rectal for temp >101F
Vital signs q15 min w/neuro checks until stable, then q1 hour
STAT labs
Lactic acid
CK-MB, Troponin
CMP, CBC w/ differentials, PT w/INR, PTT
Cultures (order set in MAR)
Diagnostic: CXR, EKG (if not done in past 24 hours)
Sepsis Panel:
Draw and send to lab:
CBC
PT/PTT
Blood cultures x2
Lactate (lactate level is to be placed in gray tube and immediately placed on ice)
Obtain urinalysis, urine culture & sensitivity

Appendix H


Consider sources of infection
Initial Sepsis screen positive if
Nurse Driven Protocol (NDP)
Sepsis Panel
Severe Sepsis
Organ Dysfunction