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Improving Early Sepsis Identification on Inpatient Units

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Abstract

Sepsis is a life threatening medical emergency that if left untreated could ultimately lead to death. It is defined as the body's extreme response to infection which can rapidly worsen if not identified and managed quickly. As sepsis worsens, it leads to extended hospital stays, poor patient prognoses and increased hospital costs. In an effort to combat these negative outcomes, efficient protocols must be implemented hospital wide. A 5 P's microsystem assessment was preformed to assess the purpose, patients, professionals, processes and patterns. Additionally, assessments were conducted to collect baseline nursing knowledge regarding sepsis criteria, treatment, and hospital protocol. A root cause analysis was used to identify any discrepancies in compliance with completing the sepsis screening in a timely manner, expose contributing factors in sepsis treatment delays, and ensure the sepsis process map is reflective of hospital policy and easy to follow. To confirm nurses were correctly documenting the sepsis screening within the correct timeframe, the surveyors, under the direction of the Sepsis Committee Director, developed a Sepsis Screening Observation Checklist to observe the nurses on the unit and determine if it was completed. A chart audit was conducted as well and looked at 100 patient's sepsis screenings in five different units for both morning and evening shift. Finally, a nursing questionnaire was handed out to assess their baseline knowledge of sepsis and the hospital protocol regarding sepsis treatment. Results demonstrated vital signs are reported to the nurse only 50% of the time, the greatest contributor to delays in treatment of sepsis are the labs, and only 38% of nurses feel adequate educational resources regarding sepsis are provided for them. This provided an arena for development with both clinical nursing knowledge, and overall process improvement.

Improving Early Sepsis Identification on Impatient Units

Sepsis is a serious and fatal medical emergency which results from infection. The causative organism may be bacterial, fungal, parasitic, or unknown. It is defined as the presence of a suspected or confirmed infection coupled with at least two systemic manifestations of infection. These are known as the Systemic Inflammatory Response Syndrome (SIRS), and include the following criteria: fever (>100.4 F) or hypothermia (<98.6 F), tachycardia (>90 bpm), tachypnea (>20 breaths per minute), or abnormal white blood cell count (<4,000 or >12,000) (Jones, et al., 2015).

Sepsis is a growing concern in the healthcare sector due to its increasing morbidity and mortality rates. The Centers for Disease Control and Prevention (CDC) report more than 1.5 million people in the United States grapple with sepsis annually, approximately one in three patients who die in the hospital have sepsis, and at least 250,000 Americans die due to sepsis every year (CDC, 2017). Early sepsis identification and treatment must remain a hospital priority in order to combat the staggering sepsis death rates. If this is achieved, it may have an impact in decreasing the steady death rates rise, which provides an evidence-based basis for the importance of this thesis project (Novosad et al., 2016).

Literature Review

A literature review using CINHAL Complete and PubMed search engine was conducted. Keywords included sepsis, evidence-based practice, nurse-driven, sepsis screening, and early sepsis identification. The search was further refined by selecting English articles published within the last five years. The literature review revealed numerous solutions but the ones with the strongest support were nurse driven screening tools and protocol paired with education. Thus, nurses at the bedside are in a vital position to identify early stages of sepsis.

An observational study of community acquired sepsis compared intensive and non-intensive patients. The study was conducted by performing a one year prospective observation study and follower survivors for five years. It showed the time to first antibiotic administration was longer in ICU patients. Concurrently, these ICU patients developed more organ dysfunction, had longer hospital stays, and higher five-year mortality rates (Nygard, Skrede, Langeland, & Flaatten, 2017).

One article by Bruce, Maiden, Fedullo, and Kim (2015), explained a nurse-initiated emergency department sepsis protocol's impact on time to initial antibiotic administration. It also assessed the compliance with the three hour Surviving Sepsis Campaign goals and identified predictors of in-hospital sepsis mortality. The project used retrospective chart reviews, pre- and post- protocol implementation data, and multivariate logistic regression analysis. The results indicated that after implementing the nurse driven sepsis protocol, the median time to initial antibiotic administration was improved.

A project aimed at improving interprofessional collaboration to enhance sepsis care and survival was created by Tedesco, Whiteman, Heuston, Swanson-Biearman, and Stephens (2017). An algorithm tool was created using the Surviving Sepsis Guidelines, and unit staff was then educated regarding sepsis identification, the three-hour bundle, bedside lactate screening, and use of the new algorithm. Mortality from sepsis had a significant decrease and compliance with the three-hour bundle improved as well as the identification and screening of patients with suspected sepsis.

A study done by Torsvik et al., (2016), investigated whether the combination of a clinical tool for triage of SIRS, an alert and treatment flow chart, and educational reinforcement would improve hospital survival among sepsis patients. The key findings were that early recognition

and prompt management can prevent patients from progressing along the fatal sepsis continuum. It can also decrease length of stay in the ICU and can increase 30-day survival. These implementations also showed an improvement in vital signs and is believed to aide nurses in the early identification of sepsis.

Drahnak , Hravnak, Renm Haines, & Tuite (2016) aimed to improve sepsis treatment by adopting the Surviving Sepsis Campaign and IHI bundles, nurse education interventions and EMR sepsis screening tool. A gap analysis was performed to identify the current state of sepsis care and it concluded by using pre-and post-surveys along with chart reviews that providing nurses with current evidence and appropriate tools builds the necessary foundation for adequate sepsis treatment.

Theoretical Framework

The Donabedian Healthcare Quality Triad will be used as the theoretical framework for this project. Since its focus is on structure, process, and outcome, it is relevant to the structure of this project. Structure refers to the organization and physical properties where care is given, process is the actual care involving patients and providers, and outcomes are the products of change in processes (Ayanian & Markel, 2016). This is applicable because it involves the alteration, and evaluation of early sepsis identification protocols.

Methods

Microsystem Assessment

This large metropolitan hospital houses 384 beds on eight floors including Emergency, Medical-Surgical, Pediatrics, Obstetrics, Telemetry, Oncology, Neurology, and Cardiac. it is a general acute care hospital, and functions as a level II trauma center, and the only non-profit health institution serving the one million residents of its surrounding city (X).

Recently, this hospital has begun a large transition regarding ownership, which has sparked a move towards improving protocols, ratings, and overall patient satisfaction. Since the start of this transition, drastic changes have begun including management, policy, and over all hospital functioning. The following assessment is an overview of the needs of the microsystem based mainly on the medical surgical floors 2 East, 4, 6, and 8.

Purpose

This hospital was established in 1945 as a registered not for profit hospital (X). It is the only corporate member of its own foundation, which raises funds through grants, special events and donors to pay for the facilities and services. Services provided by this large metropolitan hospital include emergency, trauma care, cardiovascular, oncology, pediatrics, behavioral health, and maternity and child (X). The mission and vision has since changed due to the hospital's transition in leadership, and now focuses on creating a healthier community together with family, patients, community members and local leaders. Additionally, the hospital is transforming the ways they deliver care to the community focusing on affordable, accessible, and most importantly quality patient care (X). These statements provide very promising platforms for nurses and other healthcare professionals to work in an atmosphere that promotes excellence, education and the best possible practices.

Since the hospital is undergoing major internal reconstruction, sepsis identification and management is an ongoing priority. A survey of California hospitals found sepsis to be a factor of 55% or hospital deaths between 2010 and 2012 (Maclay, 2017). Effective management of sepsis can lead to shorter hospital stays, improved patient satisfaction, cost savings, and ultimately lower mortality rates (Maclay, 2017). This hospital has ongoing sepsis identification and treatment projects in both the Emergency Departments and the Intensive Care Units, thus the

current need for this macrosystem involves management of sepsis care on inpatient units. The purpose of continuing sepsis interventions within inpatient units is to train nurses on these units for those patients medically stable enough to transfer to a medical-surgical floor, but still at risk for sepsis development, to be adequately prepared to respond to early recognition with ample resources and easy pre-established protocol algorithms for safe and fast management of sepsis development.

Patients

This hospital averages a daily census of 240 patients with an average patient length of stay of 4.7 day. 2,023 employees work at the hospital, 387 of them being physicians (X). Services range among the floors from oncology to telemetry, but all the floors assessed were labeled medical-surgical. The main procedures completed on each floor range depending on the patient's medical condition. These patient procedures range from coronary angiographies to Dysphagia evaluations for stroke patients as well as MRIs to assess damage. Oncology patients mostly receive blood transfusions frequently as well as blood draws and isolative precautions. These patients are often immunocompromised due to their cancer, and thus become more susceptible to secondary infections. Many patients, however, are at risk for developing infections in a hospital setting, and sepsis remains the 10th leading cause of death in the United States (Palleschi, Sirianni, O'Connor, & Hasenau, 2014). These units are designed similarly with a unit manager and a charge nurse present during the day shift. The unit manager is the formal leader during this shift, and is responsible for making shift assignments or managing any issues that arise. Once she leaves, the night charge nurse becomes the formal leader of the unit. Informally, the nurses appear to take charge on their own. Unity and collaboration are scarce within the units

along with an overarching lack of overall desire sharpen their skills, grow with the changing practices, and keep patients best interest at the forefront.

The foundational patient care model is termed the Professional Model. It promotes comprehensive healthcare, healthy families and stewardship through collaboration. The Vincentian Values Optimizing Our Mission Model (VVOOM) is what structures the Professional Practice Model. It is adapted from Jean Watson's Transpersonal Caring theory and the Synergy Model developed by the American Association of Critical- Care Nurses (AACN). The goal was to create a way to formulate caring relationships coupled with improving nurse competencies of family center care (X). The key elements of the Values Based Professional Model of Care, include dignity and respect, information sharing, participation and collaboration. It is a pyramid model which includes the patient at the center, family, health and servant leadership (X).

Safety. When compared to previous hospitals, staff safety is a new and emerging toping of concern for this hospital. Many nurses do not adhere to safety procedures in place, nor do they have the opportunity to learn through the hospital. For example, many hospitals encourage nurses to participate in clinical projects focused on best practice for safety of the patient and staff. These projects are then presented and posted for nurses to reference as needed. This hospital does not appear to have that in place. According to the Leapfrog Consumer Report for 2012, it received a safety score of 43% ("How Safe", 2012.). Although this is not from the current year, issues such as infection control, access and knowledge of hospital resources and communication are still relevant. Overall, safety is a major gap in this unit, which is detrimental to improving patient outcomes.

Education. Education for the staff and patients is not a priority. The extent of patient education includes discharge packets, and medication overview for new prescriptions. Many

patients are Spanish speaking, and since translators are severely lacking on the units, if another RN or CNA is unavailable for translation, the conversations are kept very short and unhelpful. Concurrently, annual education updates based on current evidence-based best practices is not provided, and nurses are lacking competency in vital arenas of care, such as sepsis. This is both an issue with lacking education and safety.

Professionals

These medical-surgical units usually consisted of three nurses per pod, two CNAs per floor, and one charge nurse. Physicians come and go as they need, and only a handful communicate effectively with the nurses caring for their patients. Respiratory Therapy, Occupational Therapy, and Physical Therapy work on these floors as well, and usually visit during the day shift. Translators are seen very rarely on the seventh floor along with case managers. These ancillary divisions are vital to patient care, but seldom make appearances on the unit. Unfortunately, interdisciplinary care is not streamlined, which leaves much room for improvement.

Processes

Technology. Technology within this hospital has slowly been improving over the years. A Pyxis system was installed on every pod, along with scanning armbands along with the medication at the bedside. Their IV therapy uses Baxter infusion pumps, ARCIS computer charting, and DINAMAP ProCare 220 vital sign monitors. Unfortunately, vital sign monitors are scarce on the unit floor. Additionally, their ARCIS charting system is extremely convoluted and tedious. The communication between the emergency department and the inpatient units does not exist, which makes transferring patient's charts inefficient. Additionally, several nurses have stated their dislike for this particular charting system as it takes too much time to complete tasks.

Many doctor's orders are still written in the paper chart, which leaves room for major error. Often attempting to decipher physician handwriting results in frustration. Major improvements could come with more advanced technology on these units. It would then come down to educating the nurses and staff on its use and benefit, which would be an additional hurdle to cross.

Patterns

Communication. Overall, the top three positive aspects of St. Francis include their mission and vision statements, the transition to electronic scanning, and nurse comradery. The mission and vision statements are truly beautiful and inspiring. They are comforting to patients and provide insight into what the hospital is dedicated to. The move towards electronic scanning has aided in decreasing the risk for medical error, and nurse to nurse comradery promotes teamwork, and a comfortable working environment. On the contrast, their lack of education opportunities, concern for safety and scarce interdisciplinary communication leave plenty of room for renovation.

A root cause analysis was preformed to identify disparities targeting infection control, particularly sepsis. Since the ICU manager stressed their need for sepsis education integrated onto inpatient units, this was chosen as the area of concern. Additionally, a systematic review of the inpatient units' sepsis protocol maps, policy, algorithm, and screening tool was conducted to identify inconsistencies and improve these materials. The data was collected via nursing observation audits, chart reviews, and surveys. During the observation portion, surveyors noted whether nurses were completing their sepsis screening between 7:00 AM and 10:00 AM (see Appendix **A** for sepsis screening observation checklist). Although this time frame is not mentioned within their hospital protocol, it is what the manager delineated as required, and it is

what time the electronic charting system labeled it due. Chart audits were conducted to further evaluate electronic nurse documentation. 100 patient charts were reviewed yielding 199 sepsis screenings for both morning and evening shifts from all five inpatient units. The inclusion criteria were patients 18 years or older and started at day 2 post admission (see Appendix **B** for chart audit form). Surveying the nurses consisted of questions regarding their knowledge about the sepsis protocol, and baseline knowledge of sepsis and treatment (see Appendix C for nursing questionnaire). These forms were gathered from 32 nurses spanning across the five inpatient units. IRB approval was not needed to proceed with this project. Permission was received from the Director of the Sepsis Committee to approve all materials for data collection.

Observational visits were coordinated with the Director of the Sepsis Committee. Generally, the observations took place in two days during the week with five students attending each day. Post-conferences took place after observing to discuss findings and identify the next objective. The total number of patients audited was 66. If more time and larger access was permitted, this project would have benefitted from more observational audits during both the morning and night shifts to gain a more comprehensive data set and identify barriers pertinent to both shifts. By shadowing nurses during their entire shift or until they completed their screening, both morning and evening, data would be more accurate. It would give a better idea of when the majority of the screenings are being completed, and potential barriers. The nature of the screening was, however, kept from the nurses that were screened in an attempt to remove skewed data.

Results

Sepsis Screening Observation

The surveyors completed sepsis screening observations by shadowing nurses on an inpatient unity and identifying whether the sepsis screening was completed during the three-hour window from 7:00 am-10:00 am. The results showed that out of 66 patients, only 28 patients (42%) had the sepsis screening completed within the first three hours of the morning shift while the other 38 patients (58%) did not (See Figure F1in Appendix F). Out of the 28 patients with completed sepsis screenings, 26 were assessed using vital signs between 5:00am and 10:00 am, with two patients outside of this parameter. The screenings displayed nurses suspected infections from 32% of the 28 completed screenings. There were five positive sepsis screenings, of which, only two were followed by the initiation of the sepsis protocol (See Figure F2 in Appendix F).

Sepsis Screening Chart Audit

The retrospective sepsis screening chart audit was conducted by reviewing the EMR charts for 100 patients during the day and night shifts. A total of 199 screenings were review. The results found that 72% of the screenings were preformed within the first three hours of the nursing shift. There was a total of six positive sepsis screenings, but only two were followed by the initiation of the sepsis bundle (See Figure G1 in Appendix G).

Nursing Sepsis Survey

The nursing sepsis survey was developed to assess the baseline knowledge of inpatient nurses of early sepsis identification and hospital protocol. The results showed 88% of the surveyed nurses correctly identified the definition of a positive sepsis screening, and 94% were able to identify correct SIRS criteria. 53% of nurses were unable to identify the incorrect nursing interventions for a positive sepsis screening. 66% of nurses could not identify the criteria required for a code sepsis. 97% correctly identified the interventions required within three hours of the presentation of severe sepsis (See Figure H1 in Appendix H).

The greatest contributors to delays in sepsis treatment were lab delays, knowledge deficit, lack of recognition of potential sepsis in triage, followed by a delay in diagnosis of sepsis, lack of necessary equipment, and nursing delays (See Figure H4 in Appendix H). Lastly, the hospitals EMR was found to be the most utilized resource when looking for the nurse driven protocol for sepsis followed by the policy and procedure manual. Google was found to be rarely used for this purpose (See Figure H5 in Appendix H).

Implementation

The primary focus of this project was nursing knowledge of sepsis on inpatient units. After assessing the microsystem as well as sepsis screening compliance, past sepsis screening compliance, and baseline nursing knowledge, it became evident the current resources were insufficient. To combat this, a new sepsis process map was creative to mirror the hospital sepsis policy, but still be simple to follow. Previously, a sepsis algorithm specific for inpatient units that completely matched hospital policy did not exist. Additionally, the flow sheets in use did not provide operational definitions or adequate explanations for acronyms such as NDP, or Nurse Driven Protocol (see Appendix D for Sepsis Algorithm). Furthermore, in an attempt to make sepsis identifiers easily accessible, a badge card was created delineated SIRS criteria, nurse driven protocol for sepsis treatment, and the sepsis panel required when a patient is positive for sepsis. This way nurses can remain confident when dealing with sepsis patients having the resources they need at their fingertips (see Appendix E for sepsis badge card inserts).

Additionally, recommendations for staff education regarding sepsis included notifying nurses concerning the importance of completing their sepsis screening for each patient between 7:00am and 10:00am. Since the current EMR allows nurses to time stamp their charting for anytime without logging when it was actually completed, there is no true way to identify if the

screenings were done by 10:00am or 10:00pm. During the unit observations, however, not all nurses completed their sepsis screening in a timely manner. To combat this, educational pieces on the importance of early sepsis screening for early treatment is imperative. Furthermore, inconsistencies were identified regarding SIRS criteria. For instance, one nurse would state the patient does have a current infection, and the evening shift nurse would state there is no infection present. Without clear definitions, patient's sepsis screenings can easily be incorrectly documented. By including streamlined education regarding what is considered an infection, and what vital signs are positive for SIRS Criteria sepsis screenings will be more precise and reliable.

Lastly, creating a SIRS/Sepsis champion within each of the impatient units will foster increased monitoring of high risk patients with suspected SIRS or those who are already septic. This role will ideally be an ICU nurse with experience in sepsis and its complexity. The SIRS/Sepsis champion can serve as a resource for nurses to use as a reference when dealing with septic patients. This will both increase the efficiency of patient treatment, and increase the nurses' sepsis knowledge on these units.

Cost Analysis

The 2013 Healthcare Cost and Utilization Project claimed sepsis was the most expensive condition to treat in the United States. It accounts for 3.6% of hospital stays and is responsible for $23.7 billion of the aggregate costs for all hospitalizations, which accounts for 6.2% of national costs (Torio & Moore, 2016). The average expense associated with sepsis is $18,000 per stay, whereas other conditions averaging only $10,000 (Torio & Moore, 2016). This hospital's Sepsis Committee Director estimates the hospital sees an average of 23-31 patients with sepsis per week. This is 1,176 to 1,584 patients per year, and an annual spending of $21-28 million for sepsis patient care.

The CDC claims patients with sepsis have an average length of stay (LOS) of 8.5 days (2017). By reducing the total average LOS by 0.5 days per patient, the hospital would save an estimated $1.2- $1.7 million annually. With increased education and preparedness among inpatient nurses, a hypothesized 1% reduction in sepsis patients would reduce the number of cases to 12-16 per year. This would result in an average annual savings of $252,000.

The estimated cost for this project's startup, including materials and labor, is $1,462. The largest expenses are nurse wages at an average of $45 per hour for 32 nurses to attend the annual training (Table 1). The cost also includes paper, and lamination for the sepsis process maps, and badge cards. The 0.5 day decreased length of stay, and the 1% reduction in sepsis patients results in new benefits of $1,700,538. A cost benefit analysis shows that for every dollar spent on this project, there will be a net savings of $1,164 (Table 2).

TABLE 1 Estimated Costs for Materials and Labor for First Year

Materials and Labor	First Year Costs
32 RN Wages @ $45/hour	$1,440
Paper/Lamination Services	$22.00
Total	$1,462

TABLE 2 Cost Benefit Analysis	
	2017
Total Annual Cost	-$1,462
Benefits	
Reduction in length of stay	$1,450,000
Reduction of sepsis patients	$252,000
Total Benefit	$1,702,000
Net Benefits	**$1,700,538**
Benefit-cost (B/C) Ratio:	$1,164

Evaluation

Project evaluation is imperative to glean how effective the interventions were, and what can be improved moving forward. Evaluation will be based on a modified Roberta Straessle Abruzzese (RSA) evaluation model. This model focuses on four types of evaluation in relation to one another. The four types include process, content, outcome, and impact (Bastable, 2014). The process evaluation will be conducted by assessing for adjustments in materials, learning objectives, and student educations as the project is being implemented. This will help prevent problems before they arise. Content evaluation will be performed to determine if the nurses have acquired the knowledge during the learning module. Furthermore, the nursing sepsis survey will be re-administered immediately after the training. The newly acquired information will then be compared with the baseline data to evaluate a change. In addition, audits will be performed after the installation of the new sepsis map to measure compliance. The outcome of the project will be evaluated by administering the nursing sepsis survey three months after the training, and

compared with baseline data to measure how much change has lasted. Lastly, the impact of the project will be evaluated to find the effects related to the hospital. A chart review will be performed six months after the training to check whether the project resulted in long term change. This new data will be compared against baseline data to evaluate the change in early identification and treatment of sepsis. The metrics will include sepsis screening times, positive sepsis screenings, and sepsis bundle initiations.

Discussion

This project had 2 key components. First, identifying if the sepsis screening was being completed by the nurses between 7:00am- 10:00am and 7:00pm-10:00pm. Results indicated that the majority of nurses did not complete the sepsis screening when observed during their shift, but when auditing charts, indicated it was done during the appropriate time frame. This illuminates a discrepancy regarding the facility's EMR system, nursing compliance of the sepsis screening, and nursing knowledge of both the necessary time of completion and importance of their timeliness. Second, by surveying the nurses' clinical knowledge of sepsis, gaps were identified regarding a lack of competency regarding what sepsis is, and how the hospital requires nurses to treat it. The first attempt at handing out this survey was met with resistance as multiple questions contained multiple right answers, which confused and frustrated the nurses. Once the survey was reformatted, participation increased. Participation did remain, however, a large barrier within this project. Surveys were handed out to every nurse on every floor multiple days, and only 32 surveys were collected. The only time to hand out these surveys was at the start of the morning shift, which is the most hectic time on the unit. This could have contributed to the lack of participation. Additionally, the data provided only a small sample size. If time and resources allowed, surveying more nurses would have provided a larger sample size ideal for exposing

additional gaps and providing a stronger basis for the ones discussed. Another potential limitation was the accuracy of the data collected. Since the time of surveying was inconvenient for the nurses, inadequate time for reading and answering questions could lead to inaccurate responses.

Nursing Relevance

Nurses play an invaluable role in assessment and monitoring patients. Since nurses interact with patients more than most healthcare professionals, their critical thinking and assessment skills must be precise. During the observational portion of this project, it was evident nurses were not fully assessing their patients, nor were they using accurate vital signs before completing the sepsis screening. By exposing this gap, improvements can be made to the nursing role regarding awareness that it is within the nursing role monitor and identify patients for indicators of sepsis by conducting comprehensive assessments at the designated time, to make certain early recognition is possible.

In regard to nursing knowledge and education, identifying gaps in the inpatient nurses' knowledge of sepsis identification and treatment provided grounds for improving resource materials for these units. This will ultimately aid in nurses' capability to provide higher quality of care and improve patient outcomes. In order for the nurses on these units to align their care with this hospital's values they must recognize that they are at the forefront of patient care. The healthcare team highly depends on their clinical judgement and patients rely on them to advocate on their behalf. Nurses must remain informed in evidence based protocols for managing patients with sepsis to ultimately lead to better outcomes for both the hospital and its patients.

CNL Relevance

The CNL is equipped to be a catalyst for change with a goal of creating a microsystem centered around accountability, knowledge seeking, and integrity. The CNL can act as an effective liaison between the interdisciplinary team, management and health informatics regarding the EMR system and its weaknesses. The CNL would work towards implementing methods aimed at improving sepsis screening compliance, and charting the screening in real time. Furthermore, communication between the emergency department and inpatient units must be improved. This type of quality improvement is within the scope of a CNL. Specifically working within the health informatics realm, the CNL can help bring about drastic improvements.

The CNL is proficient in organizational systems leadership by demonstrating a working knowledge of the healthcare system, and assumes a role of leadership to focus on patient care, quality and cost effectiveness, evaluate evidence-based practices on a microsystem and collaborate with professionals to implement improvements (AACN, 2013). This competency was at the forefront of this project. By working to improve early identification of sepsis and forming a community based on expertise, and knowledge, improved patient outcomes will result. By consistently assessing the microsystems needs, the CNL promotes a culture of continual quality improvement. As a proponent for health policy and advocacy, the CNL would work towards including sepsis education as a part of nurses' annual competency training. Furthermore, the CNL would work to broaden the reach of this project to other healthcare sectors and professionals to make certain sepsis does not go unnoticed. Finally, as a Master's prepared nurse, the CNL is competent in conducting continual assessments, root cause analyses, and strategies for the continually changing microsystems in order to formulate tailored projects that would benefit their particular microsystems the most.

Future Directions

Overall, changes to the process would include increased time, larger samples, and focused assessments. Allowing surveyors to be on the floor for entire morning and night shifts would give more accurate results and larger sample sizes. By conducting more in-depth chart audits, the surveyor could identify more gaps and areas for potential improvement. Additionally, by focusing on only one unit, a detailed microsystem assessment could provide for more detailed and specific materials and process improvements catered to the specific unit. Since this assessment was for multiple floors, the outcome needed to remain generalized. Next steps include a formalized education program for nurses on inpatient units. This could take place as online modules, unit in-services, or simulations based on septic patients and treatment. Additionally, a Sepsis champion will be piloted on units and the effectiveness would be assessed.

Ultimately, this project provided a solid foundation for future students to work towards continued improvement of sepsis education and clinical treatment. It brought to light some serious inconsistencies regarding sepsis on inpatient units and provided an avenue for future students to create change and improvement. With more time, additional, resources and greater hospital access, this project could be implemented on a greater and more impactful scale. Involving a CNL in this process would expedite its implementation, and assist in its adoption hospital wide.

References

Ayanian, J. Z., & Markel, H. (2016). Donabedian's Lasting Framework for Health Care Quality. *The New England journal of medicine*, *375*(3), 205-207.

AACN. (2013). Competencies and curricular expectations for clinical nurse leader education and practice. Retrieved from http://www.aacnnursing.org/Portals/42/AcademicNursing/CirriculumGuidelines/CNL-Competencies-October-2013.pdf

Bastable, S. (2014). *Nurse as education: Principles of teaching and learning for nursing practice.* Burlington, MA: Jones & Bartlett Learning.

Bruce, H. R., Maiden, J., Fedullo, P. F., & Kim, S. C. (2015). Impact of nurse-initiated ED sepsis protocol on compliance with sepsis bundles, time to initial antibiotic administration, and in-hospital mortality. *Journal of Emergency Nursing*, *41*(2), 130-137.

Centers for Disease Control and Prevention. (2017). Sepsis. Retrieved from https://www.cdc.gov/sepsis/datareports/index.html

Drahnak, D. M., Hravnak, M., Ren, D., Haines, A. J., & Tuite, P. (2016). Scripting nurse communication to improve sepsis care. *MedSurg Nursing*, *25*(4), 233-239.

Jones, S., Ashton, C., Kiehne, L., Gigliotti, E., Bell-Gordon, C., Disbot, M.,… & Wray, N. (2015). Reductions in sepsis mortality and costs after design and implementation of a nurse-based early recognition and response program. *The Joint Commission Journal on Quality and Patient Safety, 41*(11), 483-AP3.

Maclay, T. (2017). In our unit: the impact of early identification and a critical care- based sepsis response team on sepsis outcomes. *Critical Care Nurse, 37*(6), 88-91.

Novosad, S., Sapiano, M., Grigg C., Lake, J., Robyn, M., Dumyati, G., & … Epstein, L. (2016). Vital signs: Epidemiology of sepsis: Prevalence of health care factors and opportunities for prevention. *Morbidity and Mortality Weekly Report*. P. 864

Nygård, S. T., Skrede, S., Langeland, N., & Flaatten, H. K. (2017). An observational study of community-acquired severe sepsis comparing intensive care and non-intensive care patients. *Acta Anaesthesiologica Scandinavica*, *61*(2), 194-204.

Palleschi, M., Sirianni, S., O' Connor, N., & Hasenau, S.(2014). An interprofessional process to improve early identification and treatment for sepsis. *Journal For Healthcare Quality: Promoting Excellence in Healthcare, 36*(4), 23-31. Doi: 10.111/jhq.12006

Tedesco, E. R., Whiteman, K., Heuston, M., Swanson-Biearman, B., & Stephens, K. (2017). Interprofessional Collaboration to Improve Sepsis Care and Survival Within a Tertiary Care Emergency Department. *Journal of Emergency Nursing*.

Torio, C., & Moore, B. (May 2016). National inpatient hospital costs: The most expensive conditions by paper, 2013. Retrieved from https://www.hcup-us.ahrq.gov/reports/statbriefs/sb204-Most-Expensive-Hospital-Conditions.jsp?utm_source=AHRQ&utm_medium=AHRQSTAT&utm_content=Content&utm_term=HCUP&utm_campaign=AHRQ_SB_204_2016

Torsvik, M., Gustad, L. T., Mehl, A., Bangstad, I. L., Vinje, L. J., Damås, J. K., & Solligård, E. (2016). Early identification of sepsis in hospital inpatients by ward nurses increases 30-day survival. *Critical Care*, *20*(1), 244.

x. The references which can identify the hospital were purposefully omitted in order to protect the hospital where this work was done.

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 NOT 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 NOT 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 greatest 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?

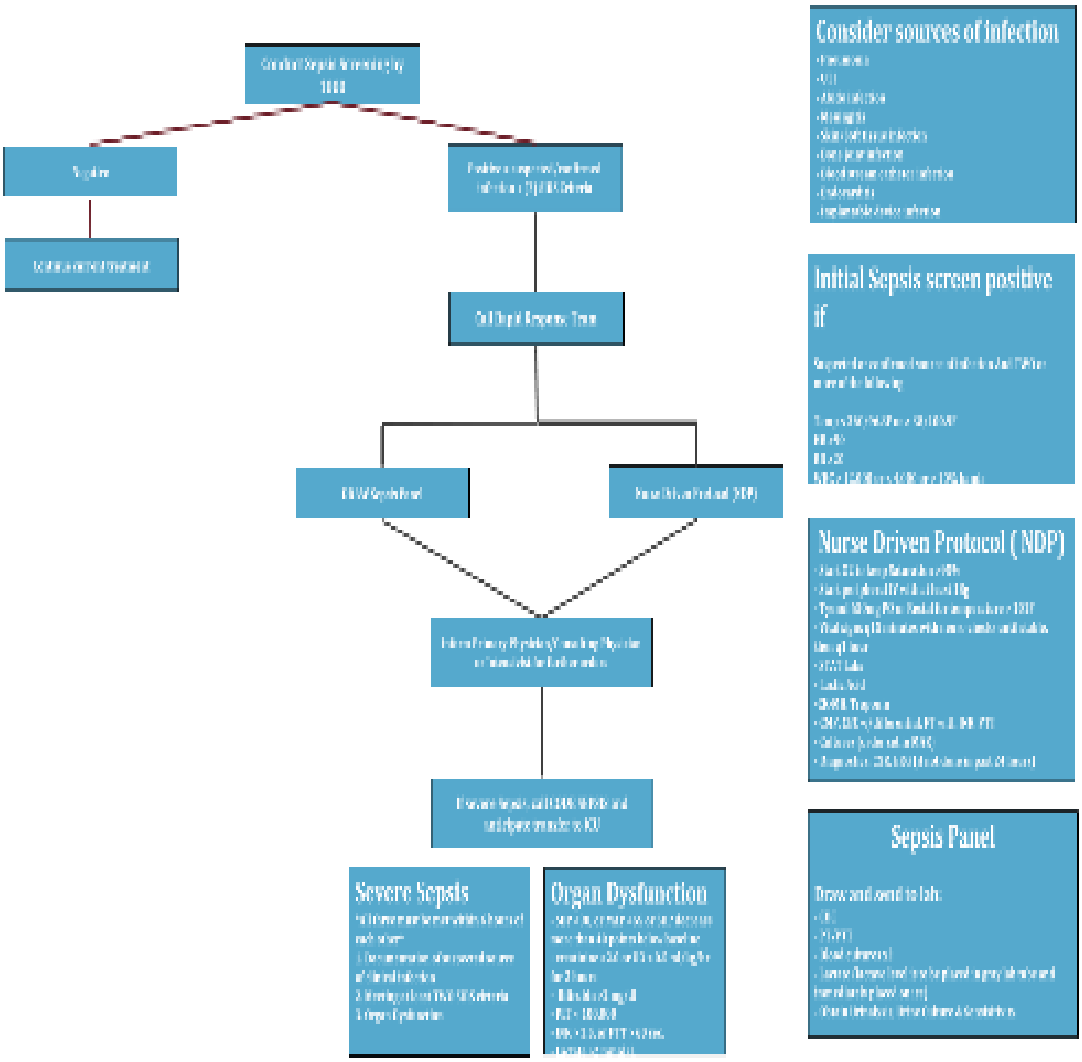
. Arcis (electronic medical record)
a. Policy and Procedure Manual
b. Google

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

_____
_____

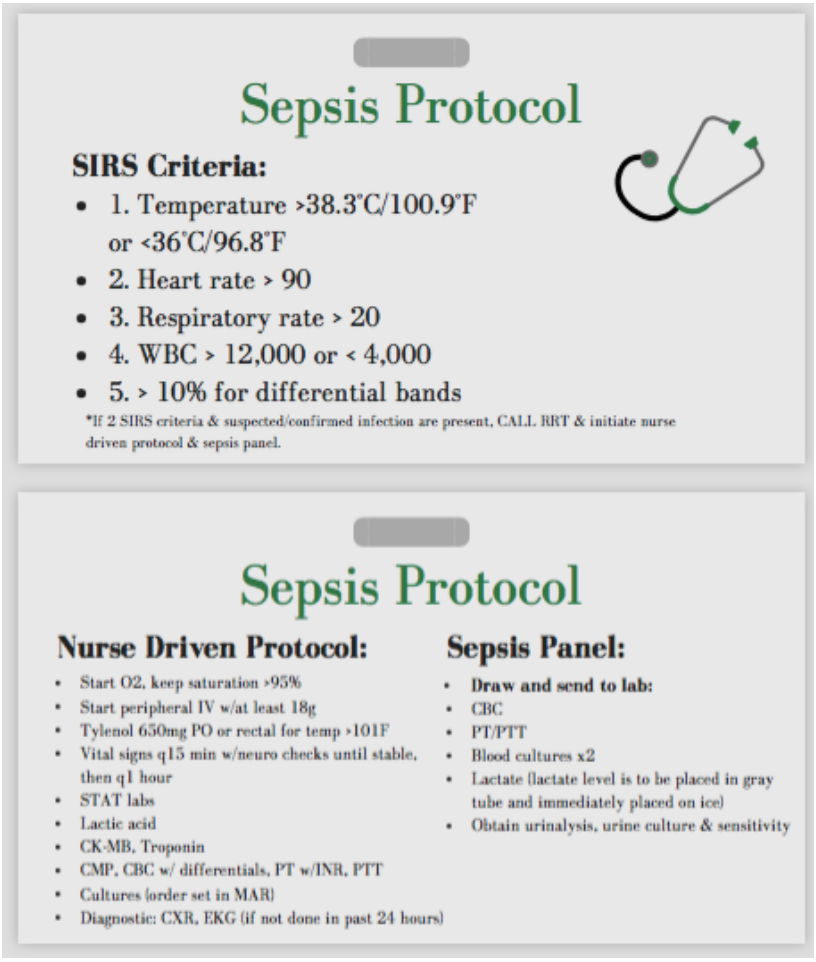
Appendix D

Sepsis Algorithm



Appendix E

Sepsis Badge Card Insert



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 F

Sepsis Screening Observations Results

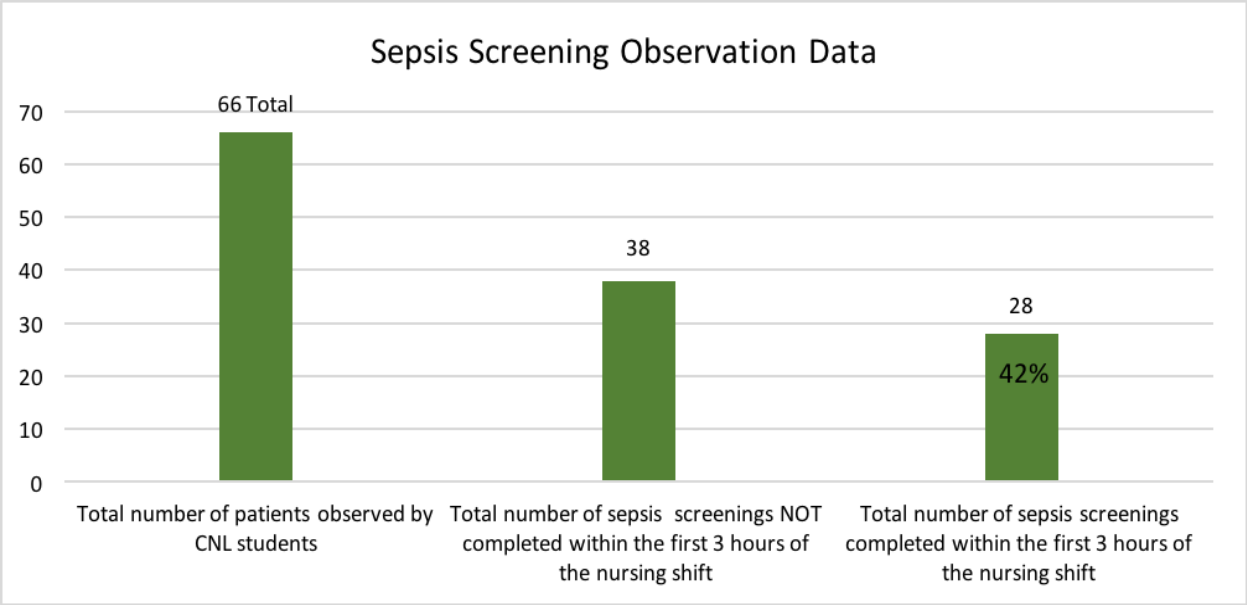


Figure F1

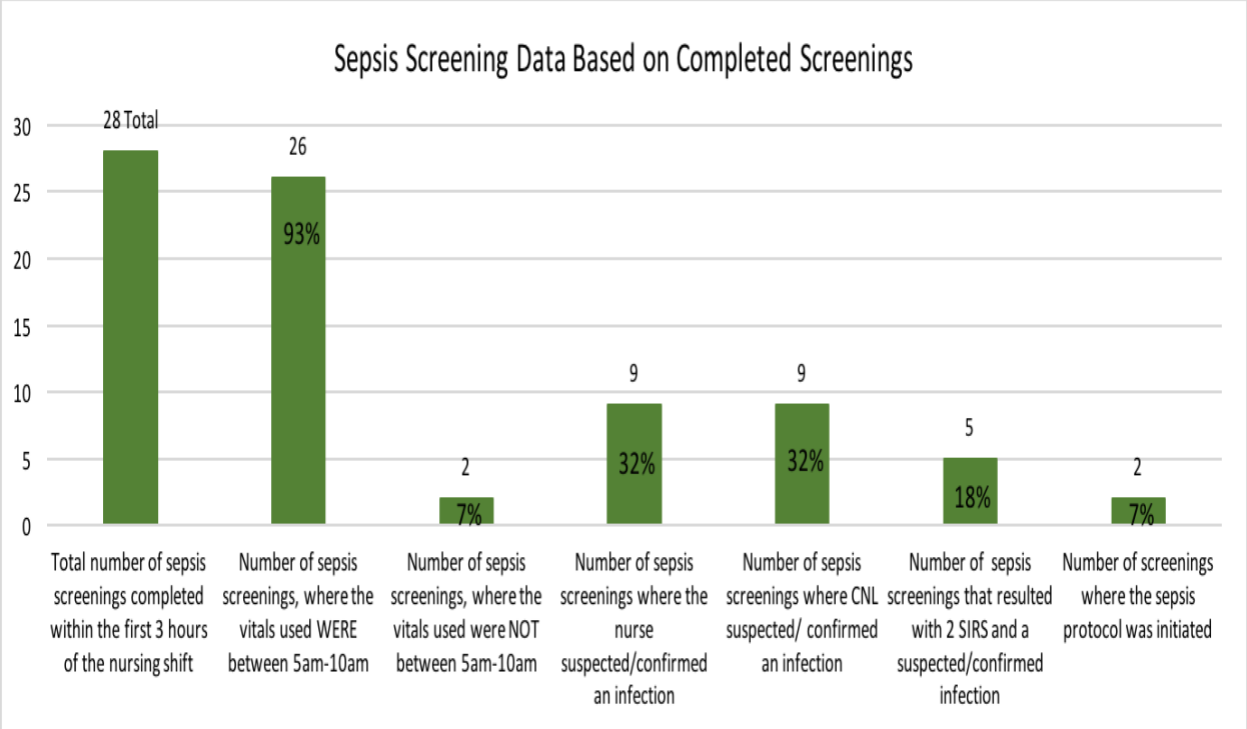


Figure F2

Appendix G

Sepsis Screening Chart Audit Results

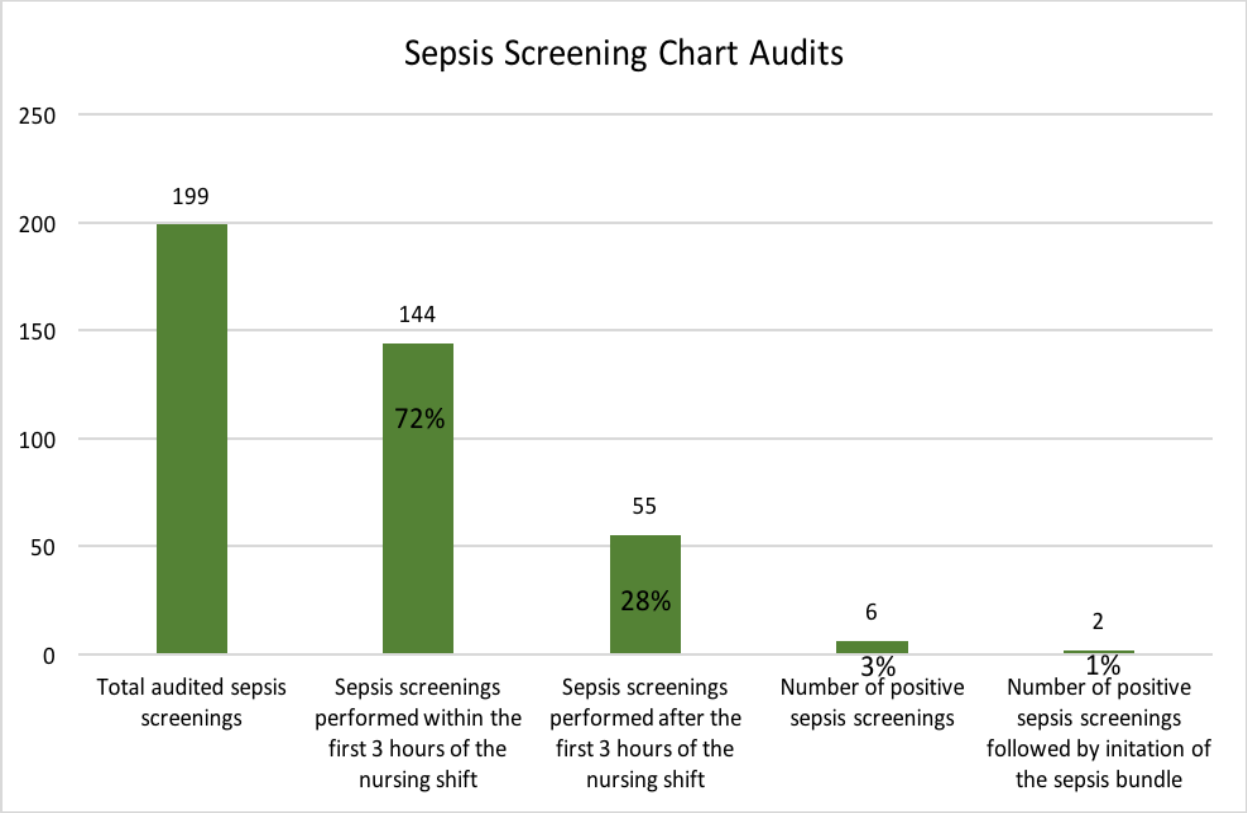


Figure G1

Appendix H

Nursing Sepsis Survey Results

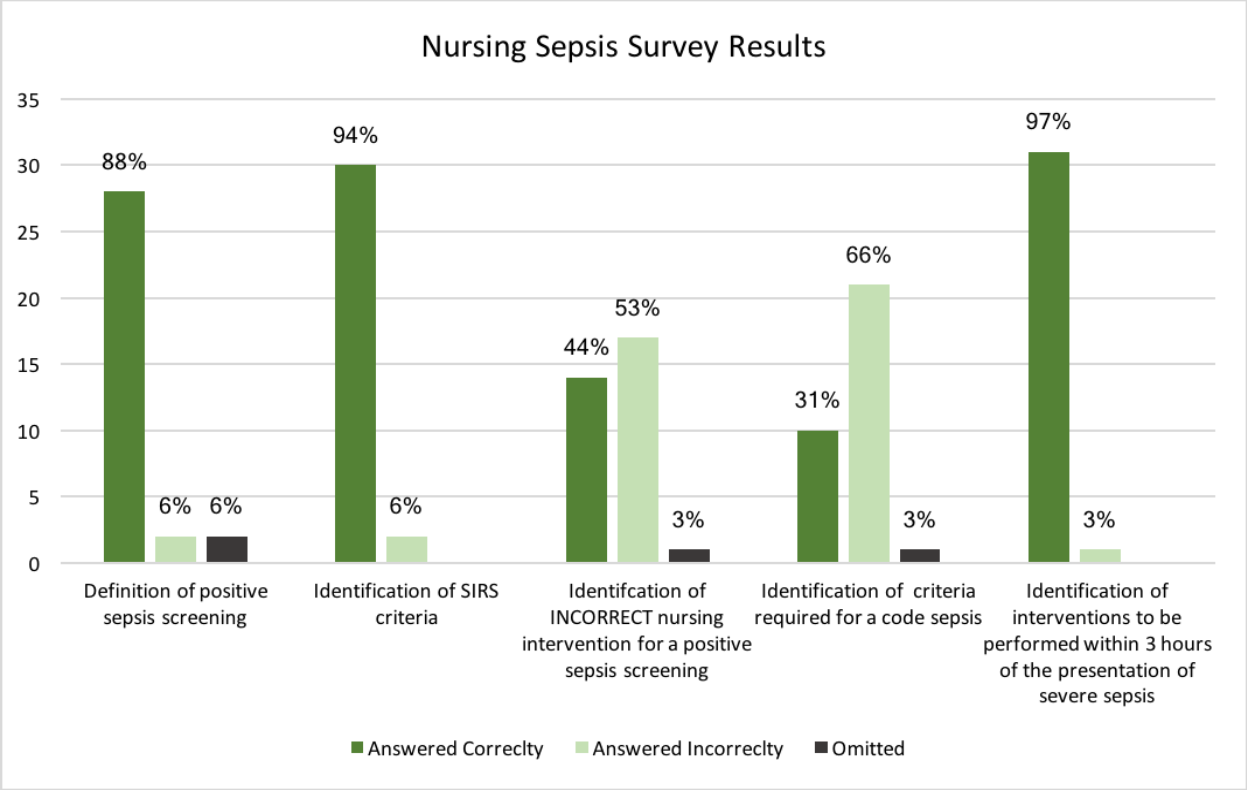


Figure H1

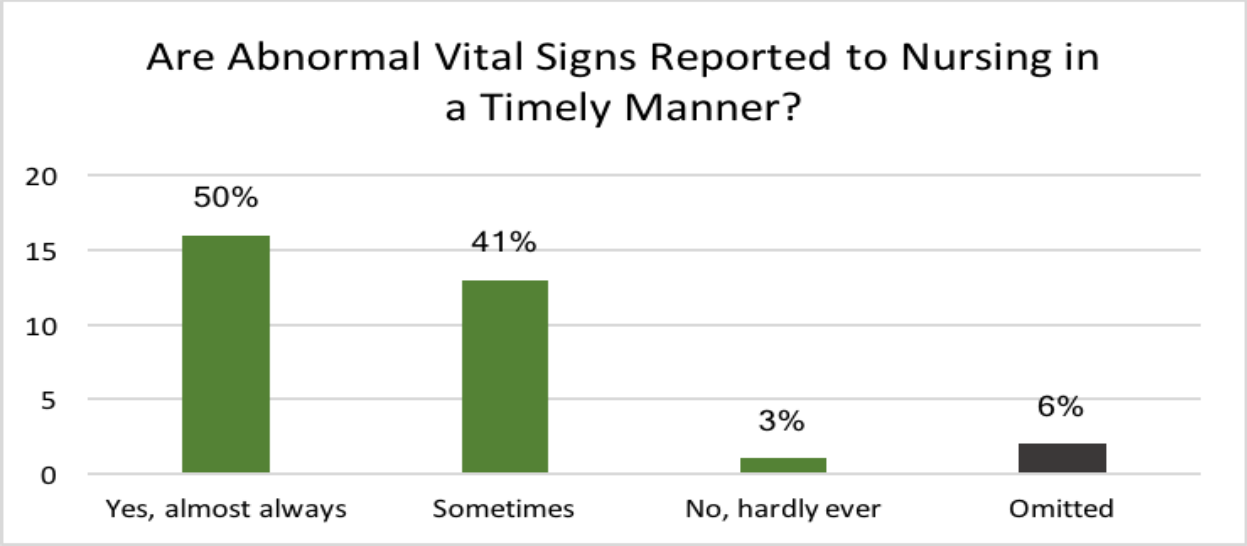


Figure H2

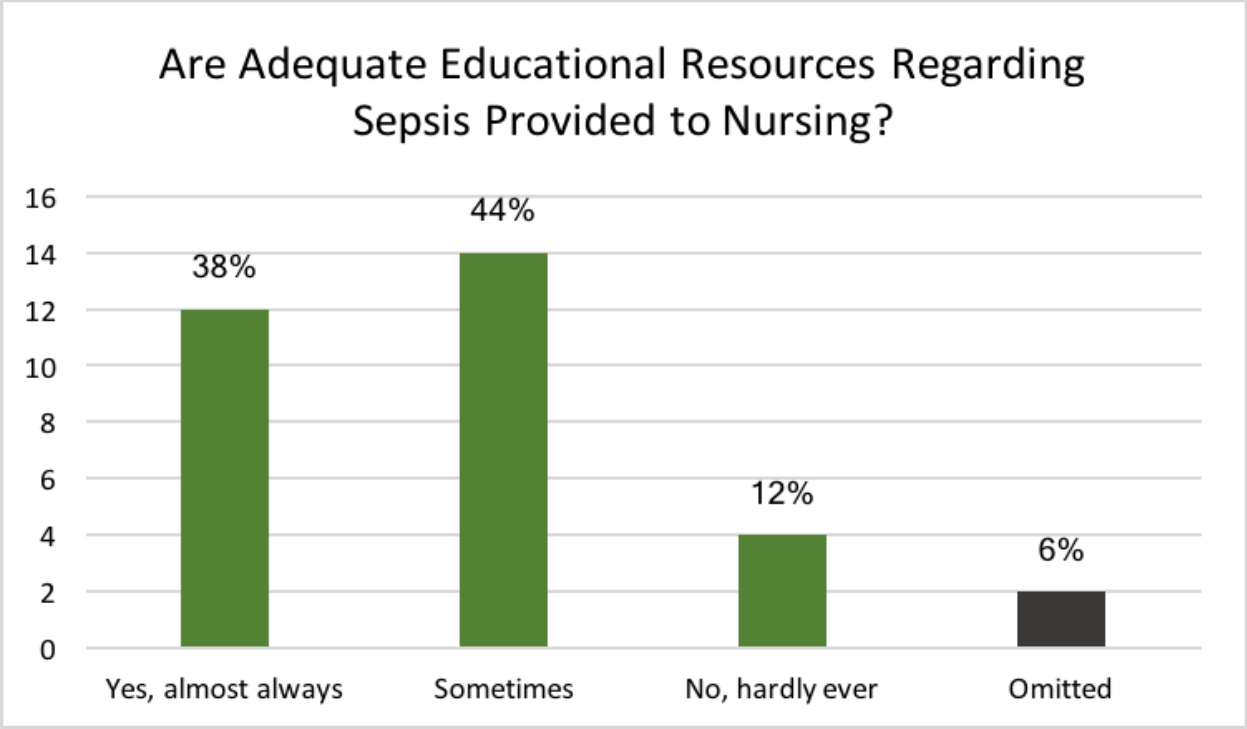


Figure H3

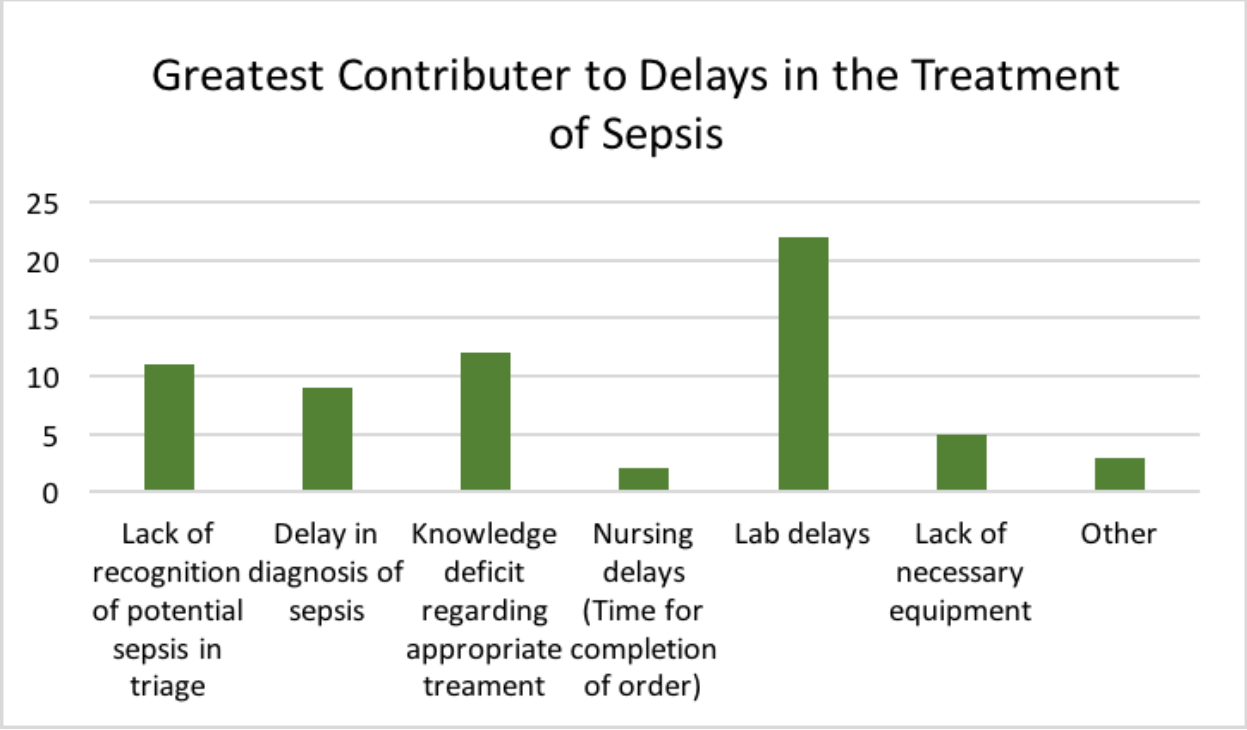


Figure H4

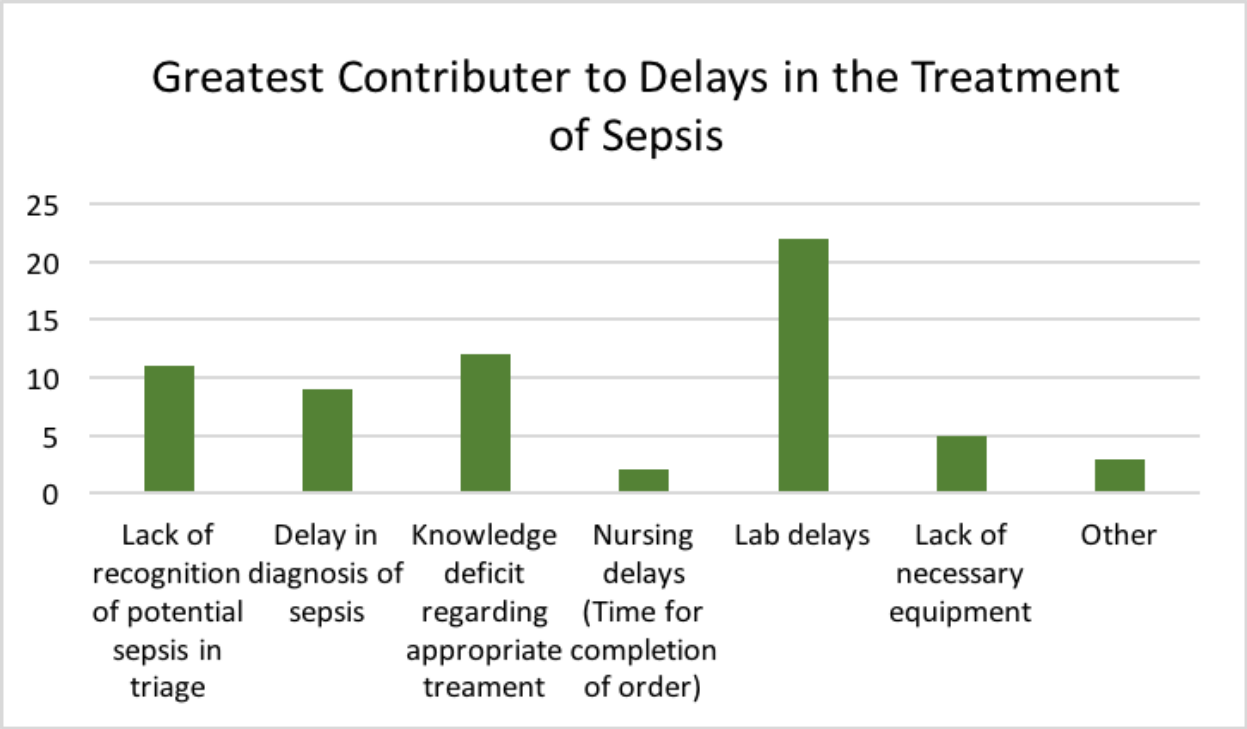

Greatest Contributer to Delays in the Treatment of Sepsis
25
20
15
10
5
0
Lack of recognition of potential sepsis in triage
Delay in diagnosis of sepsis
Knowledge deficit regarding appropriate treament
Nursing delays (Time for completion of order)
Lab delays
Lack of necessary equipment
Other

Figure H5