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Enhancing Communication Between Nurses And Physicians On Patients With Sepsis

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Abstract

***Problem*:** The condition of sepsis is life-threatening, and its severity increases when there are delays in interventions. Communication challenges exist on medical-surgical units and are major contributors to poor management of patients with sepsis. Ineffective communication among health care team members continues to threaten patients` health outcomes. The purpose of this project was to implement a standardized form of communication between nurses and physicians of patients with sepsis.

Methods: An observational descriptive design with a retrospective chart review. A quality improvement PDSA cycle was used to implement an SBAR communication instrument.

***Results*:** A total of 16 medical records (N=16) were analyzed. In 2021, the first set of vital signs and antibiotic administration time after sepsis bundle activation improved, but were not statistically significant from the 2020 times (t(14)=1.54, p=.147; t(14)=1.66, p=.119, respectively). However, the blood culture acquisition time significantly improved in 2021, with an improvement of 28-minutes ($t(14)=4.57, p<.001$). Regardless, all bundle times were improved from the time of sepsis bundle activation.

Implications for practice: Improved times for sepsis bundle acquisitions was clinically significant as all times improved. The implementation of an SBAR communication instrument may have influenced bundle activation times.

Enhancing Communication Between Nurses And Physicians On Patients With Sepsis

The condition of sepsis is life-threatening. Sepsis is defined as a medical emergency occurring as a result of the body system`s severe response to infection which is critically endangering to patients (Centers for Disease Control and Prevention [CDC], 2019). The invading

organism can quickly infect different locations affecting major vital organs (i.e. lungs, kidneys, heart) despite an overwhelming inflammatory response by the immune system. The progression of sepsis is strongly influenced by the timing of interventions. The severity of sepsis increases when there are delays in interventions such as antibiotics (CDC, 2019).

Sepsis is a major contributor to morbidities and mortalities in hospitalized settings. In fact, sepsis accounts for 20% of all inpatient hospital mortality annually (Gauer, 2013). The CDC (2017) estimated 1.7 million adults in America develop sepsis each year. Statistical reports also show one in three patients who die in a hospital have sepsis (CDC, 2020). Unfortunately, the number of sepsis cases continues to increase at an alarming rate, rendering significant harm to patients` health and quality outcomes.

Sepsis is also a major financial burden to patients in the US healthcare system. The economic impact of sepsis can hardly be overlooked as sepsis management and treatment poses a significant financial burden. In 2013, over $24 billion of hospital expenses were directly attributed to sepsis and was 13% of total US hospital costs (Paoli, Reynolds, Sinha, Gitlin & Crouser, 2018). In contrast, the length of hospital stays during the same year accounted for only 3.6% of total hospital costs (Paoli et al., 2018).

There are recommended interventions for sepsis based on the best evidence. Several studies have suggested timing of these interventions as a core measure in reducing the adverse effects of sepsis (Kim & Park, 2019; Vincent, 2016; Hajj, Blaine, Salavaci & Jacoby, 2018). The timing of interventions during a sepsis condition is dependent upon early recognition of the medical emergency, efficient communication between treatment team members, and the timely implementation of the interventions. Despite the evidence for prompt recognition and treatment, there continues to be a high number of delays in early sepsis recognition (Hajj et al., 2018).

Often communication (or lack thereof) between medical team members contributes to a delay in treatment. Communication is a fundamental skill necessary for any organization to be effective. Formal and informal hierarchies exist in hospitals and affects all forms of communication. The Joint Commission (as cited in Dingley, Daugherty, Derieg, & Persing, 2008) reported communication failures were responsible for over 70% of sentinel events. A standardized approach to communication is important when reporting an acute event such as a patient with sepsis. Effective communication between nurses and physicians is important as it affects a patient`s clinical condition, may save time, and enhances implementation of appropriate interventions to prevent deterioration of the condition.

In a large urban midwestern hospital, there is an opportunity for improvement in recognizing sepsis. The purpose of this project was to implement a standardized form of communication between nurses and physicians of patients with sepsis. The Institute for Health Care Improvement (IHI) model for change, the Plan-Do-Study-Act (PDSA) cycle was used as the framework to guide this quality improvement initiative. The overall aim

of this project was to utilize a standardized communication instrument, the Situation-Background-Assessment- Recommendation (SBAR), in at least 25% of patients with sepsis over a three-month period. The primary outcome measure of interest was the number of identified SIRS criteria and the number of standardized SBAR communication instruments completed. The secondary outcome measure was the time of first vital signs in response to SIRS criteria, number of blood cultures collected before antibiotic administration and time of antibiotics administration. The question for study was: In hospitalized patients aged 18-65 years on a medical-surgical unit, what is the effect of an SBAR communication instrument when the SIRS criteria are identified in the EHR for recognition and intervention in sepsis over a three-month period?

Literature Review

The literature search was performed using CINAHL, Academic Search Complete, Pub Med and Cochrane Library search engines. Key search terms included *medical, surgical patients, sepsis, sirs criteria, early sepsis recognition, sepsis bundle, communication, sepsis outcomes, sepsis compliance, physicians and nurses* using Boolean operators AND and OR. The number of initial publications were 984. A more refined search was conducted using inclusion criteria of

inpatient on the medical-surgical unit, literature publications within the last eight years, adults aged 18-years and older with SIRS criteria, diagnosis of sepsis during hospitalization. Exclusion criteria were patients younger than 18-years of age, not an inpatient on the medical-surgical unit, and did not meet SIRS criteria. After the implementation of the criteria, the more refined search generated 314 results. Also, an ancestry approach was used on four publications. A total of 14 publications were selected

for this literature review (systematic reviews, integrative reviews, cross-sectional designs).

Sepsis occurs as a result of the presence of invading pathogens causing infection in the human body. The infecting microorganisms' releases toxins such as peptidoglycans, lipoteichoic acids and superantigens in the bloodstream. The body recognizes these antigens and signal the immune system. As a result of this infection, the white blood cells (WBCs) of the immune system initiate a proinflammatory response releasing interleukin, tumor necrosis factor and proinflammatory cytokines to combat the infection circulating in the blood stream (McCance & Huether, 2019). The effects from the WBCs` response also cause endothelial cell dysfunction which triggers a cascade of events such as capillary leak, microvascular thrombus, cell adhesion and vasodilation in the body. A lack of intervention at this stage of sepsis causes tissue hypoxia and apoptosis of cells, leading to multiple organ dysfunctions (MODs) (McCance & Huether, 2019). The MOD phase is a severe stage in sepsis and during this phase, clinical signs, and symptoms such as tachypnea, altered mental status, decreased urine output, hypotension tachycardia, increase lactate levels and poor capillary refill are clinically manifested. A failure to effectively treat and manage these symptoms ultimately leads to septic shock and death (McCance & Huether, 2019).

The *Surviving Sepsis Campaign* (SSC) guideline was created to understand, manage, and treat sepsis and septic shock in patients. The SSC guideline has undergone several revisions as a result of newer evidence-based findings identified to enhance sepsis management. The initial phase of sepsis begins with a systemic inflammatory response syndrome (SIRS) also known as the SIRS criteria. The SIRS criteria are composed of

four major categories however, patients who meet at least two out of the four categories are recognized to have met the SIRS criteria (Surviving Sepsis Campaign [SSC], 2018). The four components of the SIRS criteria are hyperthermia > 38.0°C or hypothermia < 36.0°C, tachycardia > 90 beats per minute, tachypnea > 20 breaths per minutes and Leukocytosis > 12,000 mm^3 or leucopenia < 4,000 mm^3 (SSC, 2018). SIRS criteria are helpful in screening for early signs of sepsis in patients.

The current recommendations from the SSC (2018) guideline merged the previous three- and six-hour bundle into a one-hour bundle element. The decision to utilize a single one-hour bundle element as the standard of measuring compliance in the management and treatment of sepsis was significantly associated with the severity and time sensitivity of sepsis (SSC, 2018). Sepsis has been identified as a potential life-threatening emergency and as such, current SSC guideline recommendations are for resuscitation efforts to be initiated to decrease the potential lethal inflammatory response. The one-hour bundle recommendation was designed to enhance earlier treatment and consists of five major interventions. The interventions are: 1) Measure lactate level and remeasure if initial lactate is >2 mmol/L. 2) Obtain blood cultures prior to administration of antibiotics. 3) Administer broad-spectrum antibiotics. 4) Begin rapid administration of 30ml/kg crystalloid for hypotension or lactate ≥ 4 mmol/L. 5) Administer vasopressors if patient is hypotensive during or after fluid resuscitation to maintain MAP ≥ 65 mm Hg (SSC, 2018). Best practice suggests adhering to the bundle elements as this may produce a synergistic effect as opposed to the implementation of a single intervention or delayed treatment. (Rhodes et al., 2017; SSC, 2018).

Compliance to bundle elements has been associated with improved sepsis outcomes and reduced mortality rates (Milano et al., 2018). A recent study conducted by Romero, Fry and Roche (2017) evaluated the effects of staff compliance on an evidence-based sepsis guideline in an emergency department (ED). The Romero et al. (2017) study was conducted over a period of 12-months using a pre-post randomized medical record audit of patients with a primary diagnosis of sepsis. The authors evaluated triage, assessment and treatment guidelines utilized in the ED. Romero et al. (2017) also implemented an Australian Triage Scale (ATS) to assist with implementation of sepsis guidelines. The ATS was designed for sepsis screening to prioritize the order of patients seen in the ED based on their presenting level of acuity. The Romero et al. (2017) study concluded adherence to sepsis guidelines improved early recognition and effective management of sepsis as there was a reported 230-minute reduction in time to antibiotics post- guideline implementation.

While adherence to sepsis guideline is associated with improved outcomes, there are challenges with compliance in clinical practice. Stoneking, Denninghoff, DeLuca, Keim and Munger (2019) performed a telephone survey and identified the obstacles to sepsis compliance were inadequate time, staffing shortages and inadequate knowledge or familiarity in understanding the concept of sepsis (Stoneking et al., 2019). In another study, compliance rates to sepsis bundle elements were evaluated in different hospital departments. Breen and Reese (2018) also conducted a survey to identify clinicians and nurses` perspectives on barriers to bundle compliance in clinical practice. Breen et al. (2018) found reported barriers to include lack of medical or nursing staff, difficult access to medications, delay in prescribing, poor communication between medical staff and

nurses, treatment and investigation not available at point of care, and difficult access to equipment. Stoneking et al. (2019) and Breen et al. (2018) identified inadequate staffing and limited knowledge as top barriers to sepsis bundle compliance. The authors recommended designing education programs to target each department specific needs to improve compliance with bundles and ultimately, reduce mortality from sepsis (Stoneking et al., 2019; Breen et al., 2018).

Health care systems depend on the collaborative efforts of multiple disciplines to deliver high quality care to patients. The level of hierarchies existing in hospitalized settings reinforces structure and order when managing and treating patients. Tan, Zhou, and Kelly (2017) conducted an integrative research study to understand the factors influencing nurse-physician communication and to identify ways in overcoming these challenges. Intrinsic differences in communication style was a major factor. Nurses were found to have a more descriptive communication approach as opposed to physicians who were mostly identified to have a succinct approach of communication (Rosenthal, 2013, as cited in Tan et al., 2017). Additionally, failure to recognize respective roles and a high disruptive environment was recorded as significant components of nurse-physician communication breakdown (O`Daniel & Rosenstein, 2008, cited in Tan et al., 2017).

Other contributing factors to communication challenges in hospitals include inadequate staffing and a perceived physician` dominance in decision making. Inadequate staffing increases burnout in clinical environments; therefore, negatively influencing the level of performance (Bujak & Bartholomew, 2011, cited in Tan et al., 2017). Organizational cultures supporting collaborative practices between physicians and nurses have been shown to enhance communication and improve the quality of care provided in

clinical settings (Manojlovich, 2005; Manojlovich & DeCicco, 2007, cited in Tan et al., 2017).

Furthermore, ineffective methods of communication were identified as safety issues and are a major cause of concern in clinical settings. Wang, Wan, Lin, Zhou, and Shang (2018) conducted an integrative review to understand ways to enhance nurse-physician communication in a critical inpatient unit. The authors identified numerous negative impacts from poor communication in a healthcare system. Some of these impacts were increased health costs, high levels of staff turnover, strains in working relationships due to increased frustrations, lack of autonomy among nurses and ultimately, a reduction in patients` safety and quality of care (Wang et al., 2018). The suggested interventions to improve communication included team training, the adoption of communication checklists, multidisciplinary structured work shift evaluation and SBAR assessment instruments. A major limitation to the study was the uncertainty in identifying the most effective intervention. Nevertheless, effective nurse-physician communication was signified as imperative in de-escalating acute health crises (Wang et al., 2018).

Eliminating barriers to communication across disciplines can assist healthcare professionals achieve optimal results when dealing with acute events. SBAR is a standardized communication instrument known to improve communication between nurses and physicians in clinical settings (Muller et al., 2018). The goal of using an SBAR instrument for communication is to ensure information is relayed in a concise and effective way (Muller et al., 2018). The instrument consists of four major components: Situation, Background, Assessment and Recommendation. The Situation component

should provide brief and concise information of the patient`s current condition and the primary reason for initiating the communication process should be established. The second component, Background, provides brief information about diagnosis and history to understand the patient`s clinical status. The Assessment component involves using clinical judgement to provide relevant information communicating the severity of the situation, for example, the SIRS criteria. Finally, Recommendation provides suggested interventions based on the evidence (Muller et al., 2018). Medical emergencies such as sepsis are time sensitive and outcomes are largely dependent on early recognition and communication. The implementation of a customized SBAR communication instrument can improve communication challenges between disciplines and enhance collaboration among multidisciplinary team members during emergent situations (Muller et al., 2018).

The IHI model of change, PDSA cycle was the framework to be utilized for this quality improvement initiative. The PDSA cycle is effective in testing change (Reed, Davey & Woodcock, 2016). In the Plan phase, the problem of the study has been identified as a delay in early sepsis recognition due to communication errors. In the Do phase, the SBAR instrument will be implemented on a medical-surgical unit. The Study phase will evaluate the implementation of the SBAR, and the Act phase is dependent upon the results in determining the next cycle. A key strength of the PDSA is continuous improvement with each cycle based on the results of the previous cycle (Johnson & Sollecito, 2020).

In summary, sepsis is a medical emergency threatening a patient`s health and quality outcome. The increase in the number of sepsis cases and its associated mortality in hospitalized settings are a major cause of concern. Compliance with sepsis bundles is

associated with improved outcomes. Clinicians have the responsibility to recognize sepsis in hospitalized settings, however, communication between members of the healthcare team can affect the timing of interventions and ultimately, patient outcomes. The use of a standardized communication SBAR instrument has been demonstrated to be effective in enhancing communication between healthcare team members.

Methods

Design

An observational, descriptive design. This was a quality improvement PDSA cycle implementing an SBAR instrument to enhance communication between physicians and nurses. A retrospective medical record review was performed between March 19th , 2020 through May 1st, 2020 for data without the use of SBAR (baseline), and then again from March 19th, 2021 through May 1st, 2021 when the SBAR was implemented.

Setting

A large, urban, midwestern hospital which is an academic medical institution. The hospital serves a population of 297,733 people**.** There are 31 hospitals within the metropolitan area. One medical-surgical unit with a 24-bed capacity and an average daily census of 24, was the unit for the study. The unit functions with one manager, one charge nurse per shift, two to three patient care technicians, and four to five registered nurses for each 12-hour shift.

Sample

A purposeful sample of hospitalized patients with signs and symptoms of sepsis. Inclusion criteria were inpatients on the medical-surgical unit, adults aged 18-years and older with SIRS criteria, and a diagnosis of sepsis during hospitalization. Exclusion

criteria were patients younger than 18-years of age, not an inpatient on the medical-surgical unit, did not meet SIRS criteria, and patients without a primary or secondary diagnosis of sepsis.

Data Collection

Data included demographics: age, gender, race. Additional data collected were the number of identified SIRS criteria, the number of standardized SBAR communication instruments completed, the time of first vital signs in response to SIRS criteria, number of blood cultures collected before antibiotic administration and time of antibiotic administration. All data was deidentified and coded. Data was stored on a password protected computer and removable drive owned by the primary investigator (PI). Data will be stored for a period of seven years. Data analysis included descriptive statistics and a two-tailed independent sample *t* test.

Approval Processes

Approval was obtained from hospital administration. Additional approvals included doctor of nursing practice committee, the graduate school, the hospital`s institutional review board (IRB), and the university`s IRB. The anticipated risk for this project was minimal as this was a retrospective medical record review. The anticipated benefit was enhanced communication between health care team members and improved patient outcomes in patients with sepsis.

Procedures

A meeting between the director of nursing excellence and professional practice and the PI was held to discuss sepsis care and potential areas for improvement. The decision was made to use an SBAR instrument to enhance communication between

health care team members on a medical-surgical unit. The initial phase of implementation began by providing all unit staff with a brief education on sepsis, SIRS criteria and recommended bundle elements to improve sepsis care for patients. An SBAR sepsis communication instrument was also introduced to staff on the unit. Staff were trained on the importance of identifying SIRS criteria for patients with sepsis. An SBAR communication instrument was posted at the nursing station and in break rooms to provide constant reminders to staff members to utilize this standardized form of communication during acute sepsis events. In addition, biweekly graphs and figures regarding sepsis bundle compliance were posted.

Results

The total number of medical records reviewed in 2020 and 2021 was 16 (N=16), with eight reviews in 2020 (n=8) and eight reviews in 2021 (n=8). The age of the patients ranged from 27-68 years, with one patient in the 25-35 year age range (n=1, 6.25%); three patients in the 36-45 year age range (n=3, 18.75%); four patients in the 46-55 year age range (n=4, 25%); and eight patients in the 56-68 year age range (n=8, 50%). There were more males (n=11, 68.75%) than females (n=5, 31.25%). Caucasians (n=9, 56.25%) were the most affected race; then, African Americans (n=6, 37.5%); and one Hispanic (n=1, 6.25%).

In 2020, the range of time for the first set of vital signs after sepsis bundle was activated was 5-18 minutes with a mean of 9.25 (SD= 4.80) minutes; whereas, in 2021 the range of time was 0-13 minutes with a mean of 5.88 (SD=3.94) minutes. A two-tailed independent samples t-test was conducted between the two means. The 2020 cohort had a longer mean time to the first set of vital signs (M=9.25, SD=4.80) than the 2021 cohort

(*M*=5.88, *SD*=3.94). The difference between the two means was not significant at the 0.05 level ($t(14) = 1.54$, $p=.147$). There was no difference between time of vital signs between 2020 and 2021 cohorts.

Likewise, in 2020 the range of time for blood culture collection from the time of sepsis bundle activation was 20-75 minutes with a mean of 44.75 (*SD*=17.14) minutes; whereas, in 2021 the range was 12-23 minutes with a mean of 16.25 (*SD*= 4.13) minutes. A two-tailed independent samples *t*-test revealed the 2020 cohort had a longer mean time to blood culture acquisition (*M*=44.75, *SD*=17.14) than the 2021 cohort (*M*=16.25, *SD*=4.13). The difference between the two means was significant at the 0.05 level ($t(14) = 4.57$, $p<.001$). The 2021 cohort had a significantly shorter time for blood culture acquisition.

Next, in 2020 the range of time for antibiotic administration from the time of sepsis bundle activation was 40-118 minutes with a mean of 68.75 (*SD*=26.47) minutes; whereas, in 2021 the range was 30-67 minutes with a mean of 51.38 (*SD*=13.18) minutes. A two- tailed independent samples *t*-test found the 2020 cohort had a longer mean time to antibiotic administration (*M*=68.75, *SD*=26.47) than the 2021 cohort (*M*=51.38, *SD*=13.18). The difference between the two means was not significant at the 0.05 level ($t(14) = 1.66$, $p=.119$). There was essentially no difference in antibiotic administration time between 2020 and 2021 (Appendix A).

Discussion

In adult patients with sepsis, the use of the SBAR communication instrument may have positively influenced vital signs, blood culture and antibiotic administration times. In 2021, the first set of vital signs and antibiotic administration time after sepsis bundle

activation improved, but were not statistically significant from the 2020 times. However, the blood culture acquisition time significantly improved in 2021, with an improvement of 28-minutes ($p < .001$). Hence, all times improved from the time of sepsis bundle activation after an SBAR communication instrument was implemented to improve communication between nurses and physicians.

The average time of vital sign acquisition was similar between the two cohorts (six- and nine-minutes, $p=.147$) after sepsis bundle activation and is within the recommended length of time by the SSC. Likewise, antibiotic administration in 2020 was 68-minutes, and 51-minutes in 2021 (a difference of 17-minutes, $p=.119$). Although these results were not statistically significant, there was a reduction in the length of time it took nurses to obtain vital signs and administer antibiotics from the initial sepsis bundle activation. The time of antibiotic administration was also less than the 60-minute recommendation by the SSC.

When comparing demographic information between the 2020 and 2021 cohorts, 50% of individuals age 56-68 years were identified as the highest risk group to have a sepsis bundle activation which suggests the older population may be at greater risk for sepsis. Also interesting to note among the highest risk age group, nearly 70% were of the male gender, and over half were Caucasian race.

A major strength of this evaluation included the comparison of baseline data with data accrued after implementation of a communication instrument on the same nursing unit. Limitations were a small size for both cohorts and a short time frame for study. Recommendations for further improvement would be to continue the use of the SBAR communication instrument but increase the sample size and the time for study.

Conclusion

The effectiveness of the use of an SBAR communication instrument in improving early recognition and intervention for patients with sepsis was analyzed. After the implementation of the SBAR communication instrument, the first set of vital signs and antibiotic administration time after sepsis bundle activation improved. Likewise, a significant improvement was also noted to the time of blood culture acquisition. All time intervals (first set of vital signs, blood culture acquisition and antibiotic administration) from sepsis bundle activation showed clinical improvement after the implementation of the SBAR communication instrument. Early recognition and intervention for patients with sepsis are crucial in improving health outcomes and overall quality of life. The implementation of a standardized form of communication instrument between nurses and physicians may increase the opportunities to improve recognition and treatments of patients with sepsis in a timely manner.

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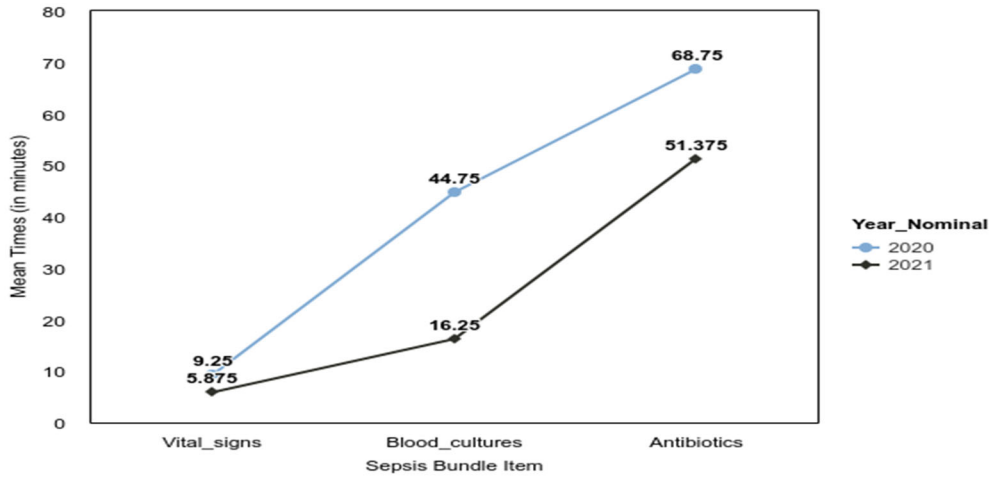
Appendix A

Figure 1. *2020 and 2021 comparison of Vital signs, Blood cultures, Antibiotics*



Note:

	2020	**2021**	**Independent Samples *t*-test**
Vital signs	9.25 (*SD*=4.80)	5.88 (*SD*=3.94)	(*t*(14) = 1.54, *p*=.147)
Blood cultures	44.75 (*SD*=17.14)	16.25 (*SD*= 4.13)	(*t*(14) = 4.57, *p*< .001)
Antibiotics	68.75 (*SD*=26.47)	51.375 (*SD*=13.18)	(*t*(14) = 1.66, *p*=.119)