



4-2014

## A Social Cognitive Learning Experience for Baccalaureate Nursing Students: Enhancing the Recognition and Management of the Patient with Sepsis

Lindsey Unterseher

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A Social Cognitive Learning Experience for Baccalaureate Nursing Students: Enhancing the  
Recognition and Management of the Patient with Sepsis

by

Lindsey Unterseher, BSN

An Independent Study

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of the requirements

for the degree of

Master of Science

Grand Forks, North Dakota

April

2014


PERMISSION

Title           A Social Cognitive Learning Experience for Baccalaureate Nursing Students:  
Enhancing the Recognition and Management of the Patient with Sepsis

Department   Nursing

Degree        Master of Science

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### Abstract

Sepsis is the leading cause of death in hospitals in the United States. Case fatality rate has remained between 30% - 50% for the past three decades. Furthermore, survivors of sepsis and septic shock are observed to have a higher 6- and 12-month mortality rate and a significantly lower health-related quality of life. Sepsis is characterized by an infection with a systemic inflammatory response and can have devastating consequences if not recognized and treated early. In the demanding environment of nursing education today, instruction on fundamental information related to the clinical picture of sepsis is provided. However, considering the potentially detrimental effects of the condition and the fact that all nurses will encounter some type of infection that could escalate to sepsis, a more comprehensive module needed to be instituted in pre-licensure programs. Furthermore, sepsis bundles have the ability to expedite and streamline the treatment process, yet little information on the effectiveness of bundles is taught to nursing students at this time. A thorough, combined online and didactic module on sepsis identification and management was created to prepare student nurses for this life-threatening condition. Through the use of Bandura's Social Cognitive Theory, this Independent Study, through a learning module, addressed early recognition of sepsis, immediate treatment, and continuing management. The teaching methodologies this module included were: an online component, class discussion, lecture, and group poster presentations. Assessment strategies included a true/false quiz, case study worksheet, and poster presentations. Finally, evaluation was performed through the use of an exam. Ensuring the competent response of the future nursing workforce to the clinical picture of sepsis will go far in improving patient morbidity and mortality.

## Introduction

Sepsis is the leading cause of death in hospitals in the United States and causes more deaths worldwide per year than prostate cancer, breast cancer, and HIV/AIDS combined (Lagu et al., 2012; Reinhart, Kisson, Daniels, & Jimenez, 2012). It is characterized by an infection with a systemic inflammatory response and can have devastating consequences if not recognized and treated early. Hypotension, hypoxemia, oliguria, metabolic acidosis, and thrombocytopenia can ensue (Porth & Matfin, 2009) and may progress to the point at which they are not compatible with life. “Case fatality rate has remained between 30 and 50% for the past three decades. Survivors of sepsis and septic shock are observed to have a higher 6- and 12-month mortality rate and a significantly lower health-related quality of life” (Raghavan & Marik, 2006, p. 185).

Due to implications of this life-threatening illness the Surviving Sepsis Campaign (SSC), a joint collaboration of the Society of Critical Care Medicine (SCC) and the European Society of Intensive Care Medicine (ESIM) was formed in 2002. This organization began making recommendations on the early diagnosis and treatment of sepsis. Sepsis bundles, or standardized order sets, were created to enhance treatment and prevent mortality. Originally, there were two different bundles; sepsis resuscitation six hour bundle and sepsis management 24 hour bundle. Chamberlain, Willis, and Bersten (2011) found that when the two bundles are used in combination, patients were 1.7 times more likely to survive than with standard care alone. The latest sepsis guideline focuses on the resuscitation bundle alone.

Speed and efficiency of early interventions greatly affect patient outcomes following identification of sepsis (Winterbottom, 2012). Although severe sepsis management occurs mostly in the critical care setting, identification is often made outside the Intensive care Unit (ICU). Furthermore, the SSC committee “believes that the greatest outcome improvement can

be made through education and process change for those caring for severe sepsis patients in the non-ICU setting and across the spectrum of acute care” (Dellinger et al., 2013, p. 583).

Therefore, the focus for improving patient outcomes is on educating the general care nurse to recognize sepsis early, initiate appropriate interventions in a timely manner, and facilitate transfer to the ICU as urgently as possible (Privette Nelson, LeMaster, Plost, & Zahner, 2009).

The goal of Baccalaureate nursing education setting is to prepare nurse generalists.

Whether they become nurses in the home health setting, intensive care unit (ICU), or medical-surgical unit; they will encounter some degree of infection in their patients that could progress to this life-threatening disorder.

### **Purpose**

Basic education on the presentation of sepsis is taught to baccalaureate nursing students; however it is necessary to comprehensively describe the full symptoms and implications of sepsis, severe sepsis, and septic shock (Robson & Newell, 2005 as cited in Inch, 2006). A lack of education is worrying considering the devastating consequences of sepsis; it is crucial that nursing students are able to identify early signs of sepsis prior to entry into practice.

Furthermore, nursing students are a great target audience to induce change as they are the future of the nursing profession. Exposing nursing students to the clinical picture of sepsis will help them to gain familiarity so they can set in motion life-saving interventions and speed up the delivery of care.



The purpose of this Independent Study was to formulate a thorough, combined online and didactic module on sepsis identification and management in order to prepare baccalaureate student nurses to respond expediently and appropriately to the patient with sepsis. The learning module addresses early recognition of sepsis, immediate treatment, and the basic principles of continuing management.

### **Significance**

Overall, current research is agreed that the use of interdisciplinary order sets reduce mortality rates of patients with sepsis (Chamberlain, Willis, & Bersten, 2011). The success of these sets is largely correlated to the ability to deliver the care quickly and efficiently. Reducing the time to diagnosis from the onset of severe sepsis is a critical component in reducing mortality from sepsis-related multiple organ dysfunction (Dellinger et al., 2013). The key to success is early recognition and mobilization of life-saving measures (Raghavan & Marik, 2006).

Without a comprehensive educational module, sepsis will continue to wreak havoc on healthcare spending. From 2003 to 2007, total hospital costs for all patients with sepsis increased from \$15.4 billion to \$24.3 billion (Lagu et al., 2012). Even more terrifying is the effect on patient outcomes; patients with sepsis are five times more likely to die than patients who have had myocardial infarctions (Reinhart et al., 2012).

For this reason, the importance of education for nursing students to recognize the signs and symptoms of sepsis and initiate treatment cannot be overstated. However, Inch (2006) notes that current literature highlights a lack of education on signs of sepsis and early management in nursing students and nurses. Therefore, this Independent Study contributes to the nursing profession by providing an organized educational module, through which nursing students can build baseline knowledge prior to their entry into practice.

## Theoretical Framework

### Introduction

The management of sepsis requires a multidisciplinary team approach including physicians, nurses, pharmacy, respiratory therapists, dieticians, and administrative support. Collaboration must occur between medicine, surgery, and emergency medicine to maximize successful treatment (Dellinger et al., 2013). Based upon this need, Bandura's Social Cognitive Theory (SCT) was chosen as a framework for the teaching methodologies. This theory emphasizes the importance of vicarious learning and modeling behaviors after others (Bahn, 2001). SCT initially revolved around social influence and was chosen because it now thoroughly incorporates cognitive, behavioral, and environmental factors; it does not solely rely upon biological factors to explain human behavior making it a truly dynamic theory (Bandura, 2001; Burke & Mancuso, 2012; Bussey & Bandura, 1999).

SCT has undergone a couple paradigm shifts since its creation. Bandura initially researched social influence on aggressive behavior. More specifically, his research team studied positive/negative reinforcement in addition to social modeling of aggressive behavior in children (Arieti, Hamburg, & Brodie, 1975). The theory was largely influenced by behaviorism and the emphasis was on imitation of a role model. In the monumental Bobo Doll Experiments, Bandura and his partners studied nursery school children behavior following different types of scenario exposure. The children were divided into groups and received any of the following stimuli: aggressive model where the behavior was rewarded; aggressive model where the behavior was punished; highly expressive but nonaggressive model (control); or no exposure to a model (second control) (Bandura, Ross, & Ross, 1963). The authors found that, in general, children were more inclined to reproduce behavior that was rewarded, including aggression. Girls

displayed less physical aggression than boys, even after viewing a positive reinforcement of aggressive behavior. Interestingly, the children accurately described the observed, aggressive behavior as “mean” or “wicked”, but still would reproduce this if it had been positively rewarded (Bandura et al., 1963).

The shift in this theory occurred as Bandura delved into aspects of cognition including internal processes and attributes of self (Bastable, 2008). More recently, the theory is focused on the social context in which learning or health promotion occurs. From a social cognitive viewpoint, individuals are not merely driven by internal forces, nor are they controlled by their external surroundings. The model of triadic reciprocity explains human functioning as the following terms operate as interacting determinates of each other: behavior; cognitive and other personal factors; and environmental events (Bandura, 1986). These three factors assert their control over human thought and action in different strengths depending on past experience. Following an event, cognitive or personal factors partially determine how an individual will view, analyze, and respond. They also help the individual to decide if it will have a lasting effect on them, or if it has value that would encourage them to store for later experiences (Bandura, 1978). Triadic reciprocity is the key assertion that makes SCT dynamic and applicable to a vast array of learning scenarios.

Observational learning is a basic component of SCT. “Observers can acquire cognitive skills and new patterns of behavior by observing the performance of others. The new learning can take varied forms, including new behavior patterns, judgmental standards, cognitive competencies, and generative rules for creating behaviors” (Bandura, 1986, p. 49). There are four constituent processes that govern observational learning: attentional, retention, production, and motivation. These will be described in the following paragraphs.

Attentional processes conclude that learning cannot occur unless the individual is focused on the learning and accurately perceives it. Selective attention can occur where the observer chooses what aspects they will imitate in the future (Bandura, 1986). It should be noted that the level of difficulty in the modeled activity may affect retention of it. Also, the model can deter or attract observers. Models that are generally viewed as interesting, or whose company is enjoyable or rewarding, will exert a stronger effect over the observer. Conversely, a model who lacks obvious attractive qualities may be ignored or rejected by the observer (Bandura, 1986; Bandura, 2001).

Retention processes refer to how a learner retains knowledge that is observed. In order for students to retrieve modeled information for later use, it must be represented in their memory symbolically. Using familiar aids helps symbol construction and improves retention by transforming the meaningless into what is already well known. This ability enables humans to reflect on experiences and plan foresightful courses of action rather than having to act out these behaviors at the risk of suffering consequences (Bandura, 1978). Retention is also enhanced by rehearsal and repetition (Bandura, 1986).

Production processes describe how retained information is converted into behavioral actions. SCT asserts that modeled behavior is learned as a whole process before it is broken down step-by-step in order to execute. An interesting and common problem is that individuals cannot fully observe their own behavior. For this reason, periodic feedback is crucial to reinforce or discourage behavior (Bandura, 1986). Additionally, this feedback aids self-regulation as the person can form goals for future action based on their present success or failures (Bandura, 1991).

Finally, motivational processes consist of influencing imitation of learned behavior.

Performance is affected by three sources of incentives: direct, vicarious, and self-produced (Bandura, 1986). This component is reflective of behaviorist influence as it describes how reward will cause an individual to repeat a learned behavior. Likewise, unrewarding or punishing actions will decrease the repetition of a behavior (Bandura et al., 1963).

It should also be noted that SCT distinguishes between acquisition and performance of a skill. For example, an observer may retain all the knowledge and capabilities in order to execute a modeled behavior but rarely or never perform it (Bandura, 1986). This reinforces vicarious learning, or learning that occurs without reproduction of the modeled behavior. However, positive incentives can encourage an individual to perform the activity.

A pivotal concept in the SCT that Bandura uses to describe human functioning is self-efficacy. Self-efficacy is defined as “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses” (Bandura, 1986, p. 391). Most educational programs framed by Bandura’s theory focus on enhancing the self-efficacy of the learner. Based upon its definition, it is clear how this is an important quality to foster. The basic idea that one individual will not know everything is a key thought in self-efficacy, as it emphasizes that the learner can perform tasks if they are knowledgeable and confident in their skills. Thus, teaching modalities should reinforce the student’s ability to strive just beyond their skill level in future learning situations (Martin, 2004). This will lead students to approach challenging tasks realistically and motivate their progressive self-improvement.

A person’s perceived self-efficacy will also affect the types of activities they undertake and whether they are optimistic or pessimistic about their capabilities. For instance, perceived

self-efficacy can be negatively affected by continual failures (Bandura, 1991). Additionally, self-efficacy can help in shaping who an individual becomes. This occurs because people will gain confidence in certain activities and continually place themselves in social situations where they will frequently perform these. In this way, external factors are also helping to shape the individual; however, they are doing this indirectly because the person's actions based upon their self-efficacy instigated the chain of events (Bandura, 2001). Therefore, this fortifies the idea that both internal and external factors affect human decision and action.

### **Theoretical Framework Literature Search**

The literature search on SCT was performed using CINAHL, Academic Search Premier, Education Resources Information Center (ERIC), PsycINFO, and Teacher Reference Center. Multiple key words were utilized to find articles discussing educational programs with SCT as a framework. To seek out education references the following terms were used: instructional design, teaching methodology, didactic, and education. To find information on the specific framework the following key words were used: social cognitive theory, social learning theory, and Bandura. These terms were combined in multiple ways in order to elicit appropriate results. Social learning theory, when used without Bandura as a key word, provided a lengthy list of articles that were not consistent with the intended topic. Additional key word identifiers, like instructional design and Bandura, were added in order to narrow the number of results. A similar strategy was used with the term social cognitive theory; this produced a more efficient search. After eliminating search results using social learning theory with only one additional key word, approximately 540 articles were retrieved. The article search was limited to adults and must have been published within the last 10 years in order to provide current research. Eleven articles were kept for inclusion in this independent study.

A social cognitive approach to observing human behavior gives insight on both sociostructural and personal factors (Bandura, 2007). One such personal factor, self-efficacy, is transferrable between educational environments and health promotion. In researching, it was noted that some studies used self-efficacy or self-efficacy theory interchangeably with SCT. Accordingly, a separate search was performed in an attempt to retrieve such articles within Academic Search Premier, CINAHL, ERIC, PsycINFO, and Teacher Reference Center. Instructional design, education, self-efficacy, and Bandura were combined in different ways to elicit appropriate results. The self-efficacy of the student or patient was used as an inclusion factor while studies older than 15 years and ones addressing self-efficacy of the teacher were excluded. Only three studies were retained for analysis. Furthermore, Bandura has instigated much of the research on the SCT in association with colleagues. These studies are included regardless of year published in order to provide adequate background and information on SCT from the author, himself; four articles were retained for analysis.

Different themes emerged upon analyzing the evidence: web-based learning environments, active learning, modeling, and self-efficacy. These different aspects relate to the present Independent Study as an online module is utilized for the first lesson. Active learning in groups and modeling after examples is stressed in order to promote observational learning. Finally, self-efficacy was fostered and enhanced through formative assessment, frequent feedback, and positive reinforcement. In the following paragraphs, how Bandura and other authors have used SCT will be discussed in order to examine its applicability.

**Bandura and associates.** The SCT was employed to describe human development, adaptation, and change from a cultural perspective. Bandura (2002) states that human nature has basic premises common to all people, self-efficacy being one of them. An intriguing idea he

presents is that even though self-efficacy is described as an individual's beliefs about their personal capabilities, a high level of it is conducive to socialization; further accentuating the idea that individuals act upon their environment just as much as they are acted upon by it.

Psychosocial development in adolescents was studied by Bandura, Vittorio Caprara, Barbaranelli, Gerbino, and Pastorelli (2003). Adolescence is a time of great change and growth; it is also frequently accompanied by anxiety, depression, peer-pressure, and a lack of self-confidence. The authors found that a strong sense of perceived self-efficacy was correlated with prosocial behavior and lower rates of delinquent behavior and depression in girls (Bandura et al., 2003). The implications of the study, in relation to this Independent Study, included reinforcing self-efficacy in individuals in order to promote better management of situational crises.

An interesting and original application of SCT was performed by Benight and Bandura (2004). This article presents a different viewpoint because it doesn't merely look at self-efficacy, but takes into account perceived coping self-efficacy following a traumatic event. A traumatic event of the caliber to cause Post-Traumatic Stress Disorder (PTSD) has the following characteristics: perilousness, unpredictability, uncontrollability, and is often unpreventable. In recovering from this type of event, self-efficacy will play a huge role as it determines an individual's ability to cope. "People are producers of life circumstances not just construers and reactors to them" (Benight & Bandura, 2004, p. 1132). Therefore, if someone is confronted with a potentially hazardous situation, their subsequent decision-making skills and plan of action will affect their anxiety level and whether they will experience traumatization. To summarize, their self-efficacy will be a key determinant in how they adapt to the environment around them and also if they can appropriately respond to disturbing thoughts about an event that cause stress.



Regardless of the type of traumatic event, affirming modeling, behavioral rehearsal, and supportive feedback were helpful in promoting coping self-efficacy (Benight & Bandura, 2004).

Bandura (2004) described health promotion and disease prevention through a social cognitive lens. In his article, he determined that there are core determinants that collectively affect health behavior: knowledge of health risks and the benefits of healthy behaviors; perceived self-efficacy to control their own health behaviors; outcome expectations about cost of poor health habits or benefits of healthy ones; health goals an individual sets and the plans to achieve them; and perceived facilitators and social/structural impediments to making changes. The internal and external influences on self are evident in his explanation of how to make health promotion successful. Motivation and self-regulation are key individual characteristics in making healthy choices, but the person must be in an environment that is supportive, or at the very least not detrimental to health. He summarized different ways to help promote healthy change including mass media campaigns focused on role modeling healthy behaviors. However, it is emphasized that these external forces are not the only powers at play. Bandura (2004) also asserted that effective-self management must be taught to people so that they are able to care for and motivate themselves.

**Web-based learning environments.** Studies retrieved that revolved around SCT often were aimed at increasing the social contact among participants. Several studies addressed web-based learning and increasing social connectedness. Couros (2009) sought to provide an open, social, connected environment in an online course. Multiple theories were utilized in forming the educational environment; however, it was reported that activities were founded on the factors that affect self-efficacy including experience, vicarious learning, social persuasion, and physiological factors. The different activities in the study were non-traditional and were

challenging for students at first; the activities included: absence of a course management system (e.g. Blackboard); wikis; podcasts; Google groups; and Google Reader. Feedback from the students showed that although they were unsure at first, they had increased confidence in their technological skills by the end of the course. This finding reinforced that self-efficacy can be enhanced by challenging students and forcing them to go just beyond their comfort zone. Moreover, the students verbalized that effective social networking aided their learning.

It is crucial that students are comfortable in Web-based learning environments (WBLE). A low self-efficacy in online courses has been shown to increase anxiety (Hill, Song, & West, 2009). Anxiety of a high magnitude is detrimental to course performance and overall learning. Therefore, identifying learner characteristics at the start of the course is necessary in order to determine what they already know about the learning environment. Such activities as technology orientation may aid their transition in the course. Furthermore, Hill, et al. (2009) found in their literature review that high instructor involvement provided modeled behavior from which the students could follow. In this way, the online environment can produce very similar results as face-to-face learning. Group interaction may help foster socialization and learning, as well. The key is to not make this a chore as some students would rather work alone. Providing an environment that is supportive of group processes and encourages students to regulate their own learning will best serve the students (Hill et al., 2009).

Another important characteristic of Web-based learning is that students need to self-regulate. Hsu, Ching, Mathews, and Carr-Chellman (2009) followed five undergraduate students through an online course to determine how their self-regulated learning was affected by triadic reciprocity in Web-based education. The physical environment consisted of an online calendar and gradebook which aided student self-regulation as they could plan out their course of action

in relation to due dates and also get feedback on their progression throughout the course. The social environment was characterized by the availability of the instructor and peers for discussion, help, and support. Having a supportive environment correlated to a higher level of student motivation (personal). Together, these affected how the student responded or self-regulated their learning (behavior) (Hsu et al., 2009). Implications of this study includes providing students with helpful, consistent tools to aid in their autonomous learning. Additionally, the instructor just being present can have a profound effect on the student's confidence in proceeding through a course. Knowing they have help readily available may increase their self-efficacy. In this study, the major social influence was the instructor whereas in a face-to-face learning environment peers will also play a role in each other's learning experiences.

**Active learning.** A feature of SCT is that behavior, in relation to the physical and internal environment, is considered equal in regards to exerting influence. For instance, as the present environment affects a person's behavior, likewise a person's behavior affects the environment. Accordingly, SCT is quite effective in inducing behavior change and promoting active learning. Diker et al. (2012) created an educational program for nutritional educators that reinforced healthy eating in children. SCT was used in addition to other theories as a framework for the three-hour training session. Outcome expectations, expectancy, observational learning, and reinforcement were the specific SCT facets that were utilized. These were accomplished as goals were set for implementing the nutrition program in the participants' respective counties; anticipated results of the program following implementation were discussed; observation of a video that described the elements of the teaching program followed by modeling of the curriculum; and recognition of accomplishments (both formative and summative) (Diker et al.,

2012). Post-training survey revealed that the students valued their experience, were satisfied with the class, and were more confident in their skills. Participants emphasized that active learning was key to understanding the information. They also reported that observational learning was helpful as they were not familiar with the new nutrition education program.

The effectiveness of active learning, based upon the SCT, was also noted by Stewart, DiClemente, and Ross (1999). These authors actually compared a fairly passive, didactic lecture to a SCT-based class for practicing nurses on the prevention of Human Immunodeficiency Virus (HIV) in adolescents. Several groups of up to 12 nurses were randomly assigned to one or the other training courses in order to increase their knowledge. The didactic lesson consisted of a 90 minute lecture followed by a question and answer session. In contrast, the SCT-based lesson contained a 30 minute lecture followed by 60 minutes of instructor modelling and active role-playing exercises. This study is one of very few experimentally controlled examinations of a theory-based training program for nurses that specifically addressed SCT. Although both educational sessions were effective in increasing short-term recall of information, the SCT-based program produced higher scores.

**Modeling.** The concept of modeling is a basic foundational principle of Bandura's SCT. By observing others, an individual is participating in observational learning, from this they can choose to replicate the behavior, or not. Having previously viewed a behavior, it is thought that the individual will more easily remember it; as such, more difficult skills can be observed and attempted. In 2009, Gramß and Struve created an imitation ticket-vending machine and purposefully made it less user-friendly. The vending machine, which theoretically would allow the user to purchase tickets to different types of cultural-themed programs, used illogical sequences, had a lack of icons, provided unsatisfying feedback, etc. The authors did this in order

to determine if video or textual based instruction aided older adults the most. They hypothesized that observing the behavior through a video would complement knowledge acquisition.

Furthermore, the authors anticipated that the elderly subjects would learn better from a model that had similar characteristics to them. Gramß and Struve's (2009) first hypothesis was correct: video instruction provided better performance and knowledge acquisition in the older adults.

However, the older adults rated the video version with a younger model guiding them through the tasks as more helpful than the video with an older adult model. This finding is interesting as it may confirm that the older adults found the younger model had more attractive characteristics, at least in regards to technology, and would focus more on the information presented by her.

Additionally, older adults may hold stereotypes against other older adults as being technologically illiterate.

Based upon the basic functions of modeling, this type of learning technique is instrumental in the clinical setting. Although, no recent literature addressed this in nursing students, Michalec (2012) researched medical students in the clinical setting. As medicine and nursing are different disciplines, the exact mechanisms and behaviors observed will vary, however, the findings of this study are generalizable to all professions. First, the medical students distinguished from positive and negative behaviors that were modeled based upon their preconceived notions of each; further, they vocalized a want to imitate the positive, professional behaviors. Next, whether an experience is positive or negative the student can learn something. Even in situations where the medical students observed behavior they viewed as disrespectful or negative, they worked through their feelings and were able to come away from the experience with a greater understanding of what their duty truly is (Michalec, 2012). This finding reinforces the SCT assertion that learning occurs regardless of imitation of the learned behavior.

**Self-efficacy.** Some research found focused primarily on promoting the self-efficacy of participants while some studies included it within the framework of SCT. As previously noted, the self-efficacy beliefs people have about themselves are affected by everything from past experience to the culture they currently surround themselves with. Self-efficacy and self-regulated learning were examined throughout a college science course by DiBenedetto and Bembenutty (2013); gender, ethnicity, and childhood and adolescent socialization were also studied as influences on self-efficacy. Self-efficacy, outcome expectancy, academic delay of gratification, homework self-regulation, help-seeking, childhood and adolescent socialization, parental education, and final course grades were collected on all 113 participants. It was found that self-efficacy beliefs and outcome expectancy were highly correlated with performance and final course grade (DiBenedetto & Bembenutty, 2013). Previous experiences and parental education were also closely related to how the students performed in the course. This is of concern as some experiences and parental history are not factors that can be influenced by the individual. In accordance with this, it is all the more important for educators to openly support students and encourage them despite their perceived hindrances. Additionally, assisting students to examine how their experiences and upbringing could potentially affect their capabilities may be helpful. If students recognize where their strengths lie they will feel more confident in attempting those actions in the future. On the other hand, if students work to understand their weaknesses or factors that may work against them, developing these skills will seem more manageable. As educators, we must approach instruction with the knowledge that the students sitting in our classrooms are not one-dimensional beings there to soak information up like a

sponge. They function on a complex arrangement based upon their past experiences, motivations, and understanding, so we need to reinforce behaviors with individualized interventions.

On the topic of enhancing self-efficacy, purposefully placing students in an environment where they will gain confidence and experience will boost achievement of this goal. For example, palliative care is often an unknown and frightening experience for those in health professions. Medical students placed in the setting ranked their attitude towards palliative care and self-efficacy in it higher following their clinical rotation (Mason & Ellershaw, 2008). This prospective study followed 217 fourth-year medical students through a palliative care rotation. Situated learning allows the student to practice skills and gain familiarity with the environment. The implications for this study include encouraging students to work outside their comfort zone in order to gain new skills. Also, educators must be prepared to strategically place students in situations where they will grow.

Another example of situated learning comes from Pike and O'Donnell (2010); they examined using simulation to promote self-efficacy among nursing students. In their article they quote Bandura on the four sources of information that are involved in constructing self-efficacy: enactive mastery experiences (an individual actual performs a task successfully), vicarious experience (an individual observes someone performing the behavior), verbal persuasions (positive feedback on abilities from others), and psychological/emotional states (e.g. anxiety, stress) (Pike & O'Donnell, 2010). All four of these are readily and frequently accomplished through the proper use of clinical simulation. Individuals have both the opportunity to practice skills and observe others while receiving formative feedback in a lower-stress environment than the actual clinical setting. Pike and O'Donnell (2010) surveyed students on what they think are

important aspects to be covered in clinical simulations. The two themes that emerged were the importance of providing opportunities to practice therapeutic communication and ensuring that the simulation provided an authentic experience.

Self-efficacy has also been studied in relation to patients and self-directed care. In patients with chronic conditions, having confidence in their health-maintenance behaviors is crucial. Add to this the issue that many people live in underserved or rural areas where treatment is not immediately accessible. A health education program for adults with diabetes living in rural areas was developed by (Rugh, 2011). Different levels of guidance were provided depending on the level of self-efficacy the patient already had. Level three was the highest level of care and consisted of structured guidance for individuals who felt their health disparities were beyond their management. This program included aspects of promoting health surroundings and support systems for the individual, consistent with the SCT. Additionally, participants were exposed to individuals with diabetes who modeled successful management of their condition in a group setting. These groups, consisting of 8 - 15 participants, met multiple times and provided not only education, but a venue to voice concerns whether emotional, mental, or physical. The education gave the participants a stronger sense of their medical condition and how to manage it. Furthermore, validation and support were readily given in order to provide positive reinforcement for the patients. The formation of groups in order to accomplish learning is unique to this article. The group learning technique was quite successful in regards to attaining goals of the program: increased knowledge and management of diabetes.

Bandura's SCT has informed the Independent Study in a multitude of ways. First, stimulating the growth of self-efficacy and self-regulation is crucial in nursing education. In order for nursing students to respond appropriately to the devastating effects of sepsis, they must



have confidence in their abilities. Self-efficacy is enhanced by frequent feedback, positive reinforcement, and placement of students in situations where they will succeed. Additionally, these situations must progressively get more difficult in order to promote the student's growth (Martin, 2004). In accordance with this assertion, goals for student achievement were set throughout this educational module and progressively became more difficult. Likewise, several opportunities for formative assessment were included to get a sense of how well the students were processing and responding to new information. Observational learning was also quite present in this educational program. Through the use of case studies, discussion, and examples students were able to get a sense of how to respond, from which they can model future behavior.

### **Definitions**

This Independent Study will utilize several terms that have detailed definitions.

Complete understanding of these topics is necessary in order fully comprehend the educational module. The terms are listed in the following paragraphs in alphabetical order.

Sepsis: characterized by the presence of infection in addition to two of the following: temperature > 38 degrees C or <36 degrees C; heart rate > 90bpm; respiratory rate > 20 breaths/min or PaCO<sub>2</sub> <32 mmHg; or white blood cells (WBC) >12,000, <4,000, or >10% bands (Winterbottom, Seoane, Sundell, Niazi, & Nash, 2011).

SSC 6-hour resuscitation bundle: addresses fluid resuscitation, blood culture obtainment, lab value monitoring, initiation of broad spectrum antibiotics, and the use of vasopressors for hypotension not responding to fluid resuscitation (Dellinger et al., 2013). Hemodynamic goals of early sepsis treatment are successful fluid resuscitation and adequate tissue perfusion. Successful resuscitation of septic patients is indicated by a central venous pressure (CVP) greater than 8 mg Hg. Adequate tissue perfusion is demonstrated by a mean arterial pressure (MAP)

greater than 65 mg Hg and central/mixed venous oxygen saturation (ScvO<sub>2</sub>/SvO<sub>2</sub>) greater than 70% (Winterbottom, Seoane, Sundell, Niazi, & Nash, 2011).

SSC 24-hour sepsis management bundle: involves the administration of low-dose corticosteroids, possible recombinant human activated protein C (rhAPC) therapy, maintenance of glycemic control (<180 mg/dl), and management of plateau airway pressures in mechanically ventilated patients (less than or equal to 30 cm H<sub>2</sub>O) (Chamberlain et al., 2011; Dellinger et al., 2013). Corticosteroids may prove to be helpful in vasopressor-dependent sepsis as adrenal insufficiency is a frequent consequence while activated protein C works as an anti-inflammatory and anticoagulant (Porth & Matfin, 2009). Maintenance of blood sugars aids the body's natural healing process. Finally, control of plateau airway pressures is extremely important as septic patients have an increased risk for acute respiratory failure (ARF).

## Review of the Literature

### Introduction

The process for researching and forming this Independent Study included several different literature searches but started with identifying how sepsis education has been implemented in the past. The lack of research on sepsis education programs for nursing students emphasized the need to institute one. Additionally, sepsis education programs that were evaluated did not have an underlying framework to organize and strengthen interventions.

After determining how sepsis education has been implemented, it was necessary to research what the focus should be. Early identification of sepsis and rapid treatment are the most influential factors on patient outcomes (Castellanos-Ortega et al., 2010; Dellinger et al., 2013). Sepsis bundles have the ability to expedite and streamline the treatment process, yet little information on the effectiveness of bundles is taught to nursing students. Creation of a national

clinical practice guideline in 2004 was instrumental in responding to this devastating condition. Numerous studies have researched its effectiveness since its original creation and two different updates of the guideline have been published. In the following paragraphs, the literature review and process for determining important components of these major, contributing topics will be discussed.

### **Sepsis Education and Sepsis Bundles Literature Search**

First, a literature search was performed to specifically elicit information on sepsis education programs. This search, abundant in helpful information, was performed through Academic Search Premier, CINAHL, ERIC, PsycINFO, and Teacher Reference Center. Sepsis and prevention education were initially searched and retrieved 279 articles. A few articles were helpful, but overall this did not provide articles specific to the topic. In attempting to narrow down this field the following key words were used: sepsis, recognition, and education. This search retrieved 44 articles and several were applicable to the topic; eight articles were retained.

Different themes were noted within the topic of sepsis education. A few studies addressed specific frameworks and ways of educating nurses and nursing students but did not necessarily provide an evaluation of the program. Review of these articles is crucial in order to determine what efforts have been made in the venue of sepsis education. Some educational programs were implemented along with sepsis bundles to provide comprehensive treatment of sepsis. These topics will be discussed in the next section.

In researching sepsis, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and Cochrane databases were used. There is a lack of consistent terminology regarding sepsis bundles so several different terms were searched including: bundle set, order set, interdisciplinary set, standardized order, and bundle. These terms were each paired

with the word sepsis in order to elicit appropriate results. Approximately 105 articles were found to match search criteria from CINAHL and PubMed, but 30 studies were immediately removed based upon irrelevance to topic. Over 50 abstracts were reviewed and 17 studies were retained for further analysis.

Literature on sepsis protocols was limited to the last 10 years in order to evaluate current evidence-based practice. The rationale for this is the first clinical practice guideline on sepsis care was published in 2004. Studies prior to this are not relevant to this Independent Study as they are not consistent with current practice of utilizing bundles. Finally, the National Guideline Clearinghouse (NGC) was searched using the term sepsis to find one appropriate guideline with two associated updates for further review. All three forms of the guideline were analyzed to get a historical picture.

### **Sepsis Education**

**Educational program.** Inch (2006) discussed an educational module administered via CD-ROM and website to post-anesthesia care unit (PACU) nurses on recognizing the symptoms of sepsis. The author asserted that care of the patient in the PACU has a direct effect on outcomes in intensive care. This interactive methodology was framed by Maslow's 'Hierarchy of Needs', but did not discuss results of implementation. The author reported that the CD-ROM and website provided education when there was not time for a live educational session. She also noted that education could be performed individually or in groups depending on preference. A positive feature of performing education on this ward was that students frequently spent clinical time there and were exposed to the learning package. Overall, the asynchronous features of the package made it flexible in terms of practicing nurses completing it. Additionally, a quiz was immediately administered at the end of the module so an evaluation component was present.

The author noted that initial, informal feedback from associates and students held promising results; however long-term evaluation of practice changes and patient outcomes is necessary to demonstrate effectiveness of the educational package.

In keeping with unit-based education, Pereira Lima Shiramizo et al. (2012) depicted an ICU-based learning module for sepsis care. They note that an interdisciplinary care team was formed including physicians, nurses, and respiratory therapists that met monthly to determine how to improve compliance with sepsis bundles and overall care. A one-week training program was developed that included lectures, quizzes, and simulation. Furthermore, posters that depicted key components in recognizing sepsis were distributed throughout the hospital and reminders were sent via email and posted on the institutional intranet. The institution experienced a decreased in mortality rates from 30% to 16% following the initiation of the educational program. Coinciding with this finding compliance with the sepsis bundle sets increased and early administration of antibiotics improved slightly (Pereira Lima Shiramizo et al., 2012). This was the only study that described a truly dynamic educational module on sepsis, making its results invaluable. Key features that made the education effective included the combination of lecture and simulation. Also, recognition of the patient with sepsis was emphasized heavily, so the key goal is similar to the educational module of this Independent Study.

A sepsis education program for medical students was investigated in a prospective multinational randomized study by Li et al. (2012). Ninety-eight residents were randomly assigned to either of the following groups: didactic lecture followed by a skills workshop and simulated case scenario or a skills workshop and simulated case scenario followed by a didactic lecture. Pre-tests and two post-tests were administered following each teaching methodology.

Pre and post-test results revealed that both modules increased knowledge on care of the patient with sepsis. An intriguing finding was that the didactic lecture first group scored significantly higher on their first post-test than the simulation first group. However, final post-test results were more consistent between the two groups suggesting that the lecture enhanced knowledge more handily alone than the simulation alone. The authors related this result to Kolb's learning theory and explained that the lecture first allowed the residents to learn all the steps of care and the rationale of each prior to implementing it. The implication of this study is that didactic lectures cannot be completely eliminated in favor of more active learning. Each strategy has its place in education, and it is crucial that students are exposed to both.

**Combined sepsis bundle with education component.** As previously noted, Dellinger et al. (2013) stated that the greatest improvement that can be made in care of the patient with sepsis is enhanced education for acute care nurses outside the ICU. Accordingly, Dodge (2010) outlined a systematic approach for medical-surgical nurses to screen patients for sepsis and included a review of suitable education for them. In his descriptive article, the author ranks surveillance as the key nursing intervention. Surveillance is accomplished both through education on proper identification of symptoms of sepsis and through the use of a screening tool. Dodge (2010) recommends that medical-surgical nurses receive similar education as ICU nurses without the components of invasive monitoring but to include: interpreting laboratory and pulmonary values quickly; understanding the implications of heart rhythm strips; thorough knowledge of neurologic system; and providing advanced life support, if necessary. These extra education measures should be added to a stable foundation knowledge on the pathophysiology of sepsis including acknowledged risk factors (Dodge, 2010). His plan is comprehensive in nature

and covers all major aspects acute care nurses should know. The actual implementation of such a program is not discussed, however.

Education is not merely about early recognition, but also about compliance with SSC guidelines which are proven to enhance patient outcomes. Gerber (2010) authored an article that depicted a non-experimental study to reveal compliance with SSC guidelines at one hospital. Audits were performed on several key units in order to collect data and, following this, several sub-projects were developed to meet the specific needs of each unit. One sub-project was focused on education and training. The aim was “to facilitate education and training on screening, identification and treatment of sepsis and septic shock” with the rationale being to draw attention to clinical features of sepsis in order for understanding that will enable early detection and treatment (Gerber, 2010, p. 146). A downfall of this study is that although the author alluded to positive results following program implementation, there are not specific numbers reported to prove this.

A few additional studies reported finding low compliance or sustained high mortality in patients with sepsis and thus chose to implement different programs or bundles for sepsis care. One such study by MacRedmond et al. (2010) performed a quasi-experimental study in which they implemented a bundle for sepsis care to observe if it had a positive effect on patient outcomes; this was performed in the ED setting. An educational component for ED nurses was outlined in addition to a sepsis algorithm to approach patient care; implementation of an order set; and initiation of invasive hemodynamic monitoring on septic patients. The educational component included review of symptoms that signal sepsis, advice on when to activate the sepsis protocol, hemodynamic monitoring setup, and hands-on experience where ED nurses were “buddied” with ICU nurses for practice. Subsequently, ED nurse sensitivity for correct

and clinical specialists to disperse that included: systemic inflammatory response syndrome, sepsis, severe sepsis, early identification, treatment/monitoring, and pathophysiology. This was the only study on sepsis education to emphasize the importance of useful feedback to care providers. This ensures that positive performance is commended and supported while negative performance is remediated; formative feedback is crucial to any educational module. Mortality rates in patient with sepsis dropped to 17.3% and the number of patients with sepsis recognized increased to 535. To add to their success story, the authors report that further education in the form of self-directed modules to review key points will be developed for staff members. They also note that they are going to perform similar strategies in expanding their recognition of acute myocardial infarction in the field program to include early identification of sepsis (Soo Hoo et al., 2009).

### **Sepsis Bundles**

**2004 Surviving Sepsis Campaign guidelines.** The first clinical guideline for the management and treatment of sepsis was published in 2004. It was created following research done by the International Sepsis Forum (ISF) in 2001. This guideline, that included efforts from three organizations (ISF, ESIM, SCCM) was published with the goal of providing evidence-based recommendations, from which care could be based and data collected to determine effect on patient outcomes (Dellinger et al., 2004). In it, the authors make several specific recommendations and a few suggestions in the management and supportive treatment of severe sepsis and septic shock. The authors found the greatest strength of evidence supporting the following interventions for hemodynamic support: immediate fluid resuscitation in patients with hypotension or elevated serum lactate  $>4\text{mmol/L}$ ; do not delay ICU admission; maintain CVP 8–12 mm Hg, MAP  $\geq 65$  mm Hg utilizing crystalloids, colloids, vasopressors, or inotropes



respectively; urine output  $\geq 0.5$  mL.kg<sup>-1</sup>.hr<sup>-1</sup>; ScvO<sub>2</sub> and SvO<sub>2</sub>  $\geq 70\%$ ; obtain appropriate cultures and initiate early antibiotic therapy; and identify source of infection and remove/treat if possible. In regards to supportive care, the authors recommend: maintain a hemoglobin of 7.0–9.0 g/dl by administering PRBCs if necessary; mechanical ventilation therapy; use sedation/analgesia for comfort; aim to keep blood glucose  $< 150$  mg/dl; initiate deep vein thrombosis and stress ulcer prophylaxis; and discuss likely outcomes and set realistic expectations with support persons in consideration of limitation of life-support.

Authors that tested this initial guideline are: Carter (2007); Peel (2008); Raghavan and Marik (2006); Zambon, Ceola, Almeida-de-Castro, Gullo, and Vincent (2008). Carter's (2007) research was different from the other studies in that it focused on outreach to patient care areas outside the ICU setting. Additionally, the main focus was on resuscitation bundles. 103 patients received the bundle; a distinction noted is patients admitted  $< 24$  hours and  $> 24$  hours from implementation of the bundle. Mortality rate for patients in the hospital over 24 hours was still high at 49%; however, the mortality rate in patients admitted  $< 24$  hours was 29%. Therefore, patients admitted with suspected sepsis through the ED had better outcomes; whereas, patients on the floor who developed sepsis suffered a higher mortality rate. These results support the need for extensive education for nurses, or nursing students, who will be working in acute care outside the ICU.

Peel (2008); Raghavan and Marik (2006); and Zambon et al. (2008) found decreased patient mortality overall with bundle implementation. Peel (2008) presented an interesting point of view as the study focused on a nurse-directed initiative. As such, educating nurses, in addition to implementation of the bundle, was attributed to the success and saved lives of patients diagnosed with sepsis as it enhanced early identification and mobilization of

interventions. Raghavan and Marik's (2006) review of over 190 studies and Zamon et al.'s (2008) prospective, observational study of 69 patients further reinforced the elements of the 2004 SSC guideline, with the added notation that compliance needed to be enforced.

**2008 Surviving Sepsis Campaign guidelines.** An update was published in 2008 by Dellinger et al. A major area it differed from the previous guideline was that recommendations were listed in order of evidentiary support within each category of intervention, not just by category. Furthermore, the grading system for determining strength of evidence was changed. They used the GRADE system (Grades of Recommendation, Assessment, Development and Evaluation) that provided a more structured and sequenced approach that resolved any sort of disputes that arouse among authors regarding strengths of studies (Dellinger et al., 2008). Minor changes were made to this guideline as they noted a difference in maintenance of ScvO<sub>2</sub> (>70%) and SvO<sub>2</sub> (>65%). This guideline further warned against the use of using corticosteroids to treat sepsis without shock, whereas the guidelines from 2004 suggested this practice was ok as long as it was done in maintenance doses.

A multitude of studies addressed this guideline by the following authors: Aitken et al. (2011); Barochia et al. (2010); Castellanos-Ortega et al. (2010); Chamberlain et al. (2011); Coba et al. (2011); Heppner et al. (2012); Laguna-Pérez et al. (2012); Pestaña et al. (2010); Rivers, Coba, and Whitmill, 2008); Thiel et al. (2009); Tromp et al. (2010); Wasan Patel, Roderman, Gehring, Saad, and Bartek, (2010); and Winterbottom et al. (2011). All studies supported the use of bundles by finding a decrease in patient mortality except Tromp et al. (2010); this was because the study was not intended to examine patient outcomes but compliance with bundle components. In fact, Coba et al. (2011) reported a three-fold decrease in critically ill patients compared to predicted mortality in the same group of patients. This reduction in

mortality rates is associated with bundle compliance, early screening implementation, and accurate documentation of interventions (Coba et al., 2011; Laguna-Pérez et al., 2012; Thiel et al., 2009; Tromp et al., 2010; Wasan Patel et al., 2010; Winterbottom et al., 2011).

The only study hesitant in fully supporting bundles for the treatment of sepsis was authored by Barochia et al. (2010). In this literature review, the authors noted a statistically significant increase in the survival odds in patients that were treated with a sepsis bundle. However, the only facet they recommended as significantly beneficial is early and appropriate antibiotic administration. They recommended further investigation of all other components of sepsis bundles to ensure proper treatment.

A literature review by Chamberlain et al. (2011) determined that the Resuscitation 6-hour Severe Sepsis Care Bundle significantly increased survival across 21 studies. In fact, patients were two times more likely to be associated with survival than those not treated with sepsis bundles. However, the authors were less certain that the 24-hour Management Bundle contributed a significant increase in patient survival. This phenomenon was noted by Castellanos-Ortega et al. (2010), as well. In this quasi-experimental study, the authors reported that both compliance with and benefit of the 6-hour resuscitation bundle were higher than the 24-hour management bundle.

Nearly all studies emphasized the importance of early antibiotic administration and noted that alone it was statistically significant to patient survival. Laguna-Pérez et al. (2012) even asserted that delayed antibiotic administration decreased survival rates among patients. Other individual bundle components found to be statistically beneficial to survival did vary minimally across studies. Chamberlain et al. (2011) reported that a maintenance of SvO<sub>2</sub> >70% and blood glucose between 120-150 mg/dl increased survival. Coba et al. (2011), with 498 patients

included in their study, reported that adequate fluid resuscitation decreased the use of vasopressor support and increased survival rates. On the same topic, a study focused on ED and ICU collaboration performed by Wasan Patel et al. (2010) asserted that fewer bundle patients required vasopressors related to aggressive fluid resuscitation.

Pestaña et al. (2010) specifically investigated the effects of a sepsis bundle on surgical sepsis, unlike the other literature. They found the sepsis bundle to increase patient survival rate. In fact, outcomes were directly related to the number of fulfilled therapeutic guidelines of the sepsis bundle. Also unlike other studies, the authors reported that the only individual intervention that significantly increased survival was administration of rhAPC.

Rivers, Coba, and Whitmill (2008), a literature review, was the only study that focused more specifically on early goal-directed therapy (EGDT). This type of therapy emphasizes monitoring current mortality rates of a facility, identifying septic patients early, mobilizing resources for intervention, aggressive reversal of hemodynamic abnormalities, dedication of staff members to the policy, and outcome evaluation. They summarize that EGDT results in significant reductions in morbidity, mortality, and healthcare resource consumption because it decreases systemic inflammation. This was also the only study to demonstrate the cost-effectiveness of these interventions. A particular facility in their study, Henry Ford Hospital, noted a \$23.4 million reduction in sepsis-related costs with the use of EGDT.

One hundred twenty-two elderly patients were the focus of a study by Heppner et al. (2012). They found that patients were more likely to have appropriate antibiotic administration and IV fluids within the first few hours when bundles were instituted. Thiel et al. (2009) also found this in their retrospective before-and-after study that included 200 patients in each group. A lower rate of organ failure was specifically noted in addition to increased survival among the

intervention group. A fascinating finding they noted was that outcomes following bundle implementation were better in the ICU and ED. This study was one of few to analyze how the non-ICU acute care floors deal with sepsis management. Winterbottom et al. (2011) concurred with this finding as the 662 patients admitted through the ED to ICU in their study had better outcomes than the 213 transferred from the floor to the ICU. They attributed this finding to late recognition of sepsis in patients on the floor. This study had a unique design as the staff education and bundle program was coordinated by a Clinical Nurse Specialist (CNS) in the ICU. The CNS held education sessions that highlighted “epidemiology, pathophysiology, sepsis classifications, clinical presentation, and treatment of sepsis. Early recognition and awareness of sepsis were emphasized with the aim of improving diagnosis and increasing appropriate treatment” (p. 182).

Education and training were key components in several of the studies. Furthermore, multidisciplinary collaboration was crucial to both initiation and success of bundle interventions (Thiel et al., 2009; Tromp et al., 2010; Wasan Patel et al., 2010; Winterbottom et al., 2011). A study performed by Wasan Patel et al. (2010) relied upon strong teamwork between the ED and ICU. In a community hospital, they identified that they may not have access to resources that many institutions have, making teamwork critical. The team determined that central venous access would be initiated on all identified patients with sepsis in the ED prior to transfer. There was a lower overall blood glucose and, more importantly, the mortality rate decrease from 61.1% to 20% post-intervention.

Tromp et al. (2010) is a prospective study with before and after intervention groups. Performed using 825 patients, this study was based on a nurse driven, care bundled, sepsis protocol. The authors noted that the role of nurses is not formalized in guidelines. Therefore,

specific training and performance feedback were done with ED nurses. Training occurred in groups in order to enhance teamwork. The interventions implemented improved the recognition of patients with sepsis as a greatly improved compliance with bundle elements was noted. Furthermore, the authors emphasized that nurses playing a great role in the recognition and treatment of patients with sepsis enhanced multidisciplinary team action because they are central to caring for patients and communicating among team members

To support the role of nurses in the care of the patient with sepsis, Aitken et al. (2011) wrote nursing recommendations to accompany the 2008 SSC guidelines. The article is split into six sections: infection prevention, infection management, initial resuscitation, hemodynamic support, other supportive nursing care, and pediatrics.

Aitken et al. (2011) characterize infection prevention being enhanced by interactive, multifaceted, longitudinal education programs; an environment of accountability among nurses to maintain patient safety; hand hygiene using soap and water or alcohol-based sanitizers and strict glove use; and interventions to decrease the occurrence of ventilator-associated pneumonia (VAP), catheter-related bloodstream infection (CR-BSI), surgical site infection (SSI), and urinary tract infection (UTI). Removing lines when not indicated is a major intervention to decrease these site-specific infections.

Infection management includes prompt removal of lines for culture obtainment in patients with proven bloodstream infection and new lines should be placed for administration of antibiotics and medications (Aitken et al., 2011). Transmission-based precautions must be instituted in patients suspected or known to have an infection or colonized bacteria.

Nurses play a major role in initial resuscitation as they are often the ones with the opportunity to recognize deterioration in patient status and potential sepsis. As such, screening

and communication tools can ease the initiation of interventions. Adequate resources (e.g. IVF bags) and staffing are also key components in initial resuscitation (Aitken et al., 2011).

The next category, as reported by Aitken et al. (2011) is hemodynamic support; this includes continuous measurement of tissue oxygenation and point of care lactate levels as they are quicker to obtain than traditional serum lactate levels. Using stroke volume variation in patients without a central line can be effective in determining hemodynamic status and using a PICC line is necessary in patients who are not candidates for central line placement.

Supportive care of the patient with sepsis includes: nutrition therapy (enteral nutrition within 24-48 hours from ICU admission); eye care; and pressure ulcer prevention and management through the use of specialty mattresses/surfaces and repositioning (Aitken et al., 2011). The authors report that more research on nursing-based guidelines would be beneficial to strengthen support of interventions and ensure evidence-based practice (EBP).

**2013 Surviving Sepsis Campaign guidelines.** The most recent clinical guideline for sepsis treatment was authored by Dellinger et al. (2013). This is an update of the 2008 guideline and is quite consistent with those recommendations. However, a key improvement is that they discuss screening and education to prevent the progression of an infection from sepsis to septic shock. They also report on ways to decrease VAP, which was not discussed in previous guidelines. With performance improvement in mind, the authors assert that the main focus of institutions should be on compliance with sepsis quality indicators. A core set (bundle) was developed to improve outcomes and cost-effectiveness; data was gathered on it through September 2011 (Dellinger et al., 2013). Positive data analysis of these patients resulted in the management bundle being dropped from the 2013 guideline and the division of the resuscitation bundle into two modified parts. Measurement of lactate level, blood culture obtainment prior to

antibiotics, administration of antibiotics, and 30 ml/kg crystalloid bolus for hypotension or lactate  $\geq 4$  mmol/L must be completed within three hours of identifying sepsis. Within six hours application of vasopressors for hypotension unresponsive to fluid resuscitation; CVP and ScvO<sub>2</sub> measurement in persistent arterial hypotension; and remeasurement of serum lactate if initial was elevated must be accomplished.

This most recent guideline is the comprehensive work compiled from research performed in the last decade. It is finely tuned and focused on the specific interventions most shown to decrease patient mortality rates. No current studies have been based solely on the 2013 guidelines, so continued monitoring of patient outcomes is necessary to prove its success.

## Discussion

### Dissemination

This Independent Study, a sepsis education program for baccalaureate nursing students, contained two modules. The first was a PowerPoint (Appendix A) available online for students to access prior to face-to-face class time. The purpose of this module was to get them acquainted with the SSC guidelines for care of the patient with sepsis. The interventions outlined in this guideline served as the basis for care to be taught as they were assembled by international experts. The worth of these guidelines cannot be understated, yet students are rarely exposed to them prior to entry into practice. The most recent publication (2013) of this guideline is a grounded on a compilation of literature up through the fall of 2012, thereby giving the most recent data on sepsis care. Furthermore, each component is based upon evidence that is graded based upon its strength in order to demonstrate which interventions are most strongly supported by research (Dellinger et al., 2013).



The second module (Appendix C) was focused heavily on identification of signs and symptoms of sepsis and subsequent treatment. This module is delivered via face-to-face lecture so that students may participate in discussions and group learning. Recognizing sepsis in patients is the first and most crucial intervention that can be performed. Achieving early detection is the main focus in caring for the patient with sepsis, as delayed recognition is linked to higher mortality rates (Carter, 2007; Dellinger et al., 2013; Heppner et al., 2012; Peel, 2008; Winterbottom et al., 2011). Face-to-face classroom lessons easily enabled students to participate in teamwork in order to learn. This was beneficial as sepsis is best treated by a team-based approach to care (Dellinger et al., 2013; Gerber, 2010; Soo Hoo et al., 2009).

Effectiveness of the first module was assessed utilizing a true/false quiz (Appendix B). True/false questions target student recall and comprehension of facts. The rationale for using a type of question that targets lower level knowledge is that most students are not aware of SSC guidelines; this information is completely new. There is little room for error in answering true/false questions and they have a high degree of reliability and validity (Oermann & Gaberson, 2009).

The second module was assessed utilizing a case-study worksheet assignment (Appendix D) that was performed in class and poster presentations; both were performed in groups. Case-studies with context dependent questions aid in transferring classroom knowledge to clinical reasoning (Su, 2007). Furthermore, a sense of salience is strengthened by allowing students to work through the details of the case study in order to determine what is important and what is not, thereby integrating classroom and clinical teaching (Benner, Sutphen, Leonard, & Day, 2010). The poster presentations were carried out by allowing students to choose groups of four to five. One of the following topics is assigned to each group: a (pathophysiology, systemic

inflammatory response syndrome [SIRS] signs and symptoms); b (sepsis signs and symptoms); c (severe sepsis signs and symptoms); d (septic shock signs and symptoms); e (treatment); and f (potential complications). These were worked on by the student groups on their own time and were displayed in the college for others to view. Posters are an effective way of outlining and presenting key information (Newbrey & Baltezone, 2006). Not only do the students who viewed the poster benefit from the condensed information, but the presenting students gained experience in public health promotion. Additionally, students were given the opportunity to act as an “expert” on the topic, reinforcing mastery of the newly formed knowledge.

The final and true test to affirm effectiveness of this educational program will be patient outcomes. This outcome is difficult to analyze as students will travel to various organizations following their graduation. However, this fact requires acknowledgement since the ultimate goal of this Independent Study was improved care of the patient with sepsis through the use of more intense education for nursing students. Stakeholders in this educational program are the nursing students and hospitals/facilities where they will work. Therefore, surveys could be sent to both following a year of practice. This timespan would allow for the novice nurses to have completed an orientation program and work on their own prior to filling out the survey. Monitoring infection and mortality rates could shed light on whether the new education is improving patient outcomes. Additionally, schools that are directly affiliated with hospitals often hold meetings between the two sets of administration. Clear communication of the education and goals between the college of nursing and hospital will shed light on how to best evaluate effectiveness of the educational module. Furthermore, the hospital administration may have recommendations on how to better serve their needs as a facility hiring new graduate nurses.

## Interpretation

This Independent Study is largely based upon recent literature and the theoretical framework. SCT provides a great framework for understanding human behavior because of its interrelated concepts. First, the processes that constitute observational learning according to Bandura's SCT form a great foundation upon which education can be established; these are attentional, retention, production, and motivational. In order to provide an optimal learning experience for the baccalaureate nursing students, close attention was paid to enhance these processes. The details will be discussed in the following paragraphs.

The attentional processes of the learner were supported by an effective educational environment. For instance, students must choose to focus on learning in order to accurately perceive it; therefore, a calm, supportive, dynamic, and flexible environment is necessary. Proper preparation on the part of the model (in this case, the teacher) ensured that they were viewed as interesting and knowledgeable to the students (Bandura, 1986). Interactive teaching methodologies such as group work and poster presentations furthered this endeavor as student attention was also directed at fellow classmates in order to learn. This give and take dynamic among the students reinforced a team atmosphere and vicarious learning. The experience students gained working together is crucial for familiarity with being a part of the interdisciplinary team; effectively treating the patient with sepsis will depend on them working within this team (Dellinger et al., 2013; Soo Hoo et al., 2009; Thiel et al., 2009; Tromp et al., 2010; Wasan Patel et al., 2010; Winterbottom et al., 2011).

The students' retention processes are less susceptible to external control mostly because they rely upon individual ability and habits in studying. However, allowing the students appropriate practice to apply newly formed knowledge can reinforce rehearsal (Bandura, 1986).

The true/false worksheet following the first module allowed the students an opportunity to do so. Furthermore, in-class discussion is an exceptional way to encourage students to engage in reflection. This helped enable students to find meaning in their experiences and thoughts in order to form ideas that can affect later action.

In a classroom environment, production processes are not always emphasized heavily. These types of behaviors are more easily practiced in a simulation or clinical setting. However, application of knowledge is most definitely possible. In this Independent Study, most notably associated with application was the case study worksheet (Appendix D). Exposure to questions regarding treatment of a patient with sepsis allowed them to determine the best course of action. Additionally, this worksheet served as formative assessment and allowed the opportunity for the instructor to give positive/negative feedback. Feedback is crucial to ensure that students accurately perceive their own strengths and weaknesses and shapes how they will respond in the future (Bandura, 1986). The student's self-efficacy in managing the patient with sepsis was formed mainly through this activity.

The last process, motivational, includes feedback from the educator. Direct and vicarious motivational processes were largely controlled by the instructor as they consist of feedback both to the individual and their peers. However, self-produced motivation depends upon the student's internal factors, history with learning, and self-perception. If the student receives positive feedback, they will be more likely to continue in their way of thinking. On the same note, negative feedback will cause them to re-evaluate their skills and adjust accordingly (Bandura et al., 1963). This basic behaviorist notion emphasizes why frequent feedback for students is necessary for their learning.

The SCT has been applied multiple times to web-based learning environments. This learning program contained one module that was viewed online by students, so it did not occur strictly in an asynchronous environment. However, many of the concepts were utilized in implementation of the module. First, ensuring students were comfortable and without anxiety about using alternative strategies was key (Couros, 2009; Hill et al., 2009). Learning cannot take place in a stressful environment. Providing students with both individual and group learning opportunities was helpful in order to reach a multitude of learning styles. Some students prefer to work alone, but often socialization fosters learning (Couros, 2009).

Observational and active learning have proven to be successful and are key components of this learning program. Students had the opportunity to passively observe lecture material and were then assigned to work with others to expand their knowledge. Observational learning is quite useful when the topic is new to the students (Diker et al., 2012). Providing observational teaching methodologies followed by more active ones enabled the students to first become familiar with new information and then to model their behavior appropriately. Additionally, active learning strategies pushed the students to be accountable as self-directed adults. Allowing them space to choose their own groups and perform activities within their own schedules allowed them to have flexibility, as well.

Finally, the main teaching mantra repeated throughout the course of the educational module was, "what can you change?" This basic statement played completely on the multifaceted nature of the SCT; the students' actions affected the environment just as much as the environment affected their actions. With every discussion about patient status deteriorating, as frequently occurs with sepsis, this motivational question was repeated to students as a call to action.

## Implications

**Education.** The major implication following this Independent Study is more intensive education on sepsis for baccalaureate nursing students. It is absolutely crucial for nursing students to fully grasp the complexities of patients with sepsis and how to improve their role in caring for them. However, this implication is further specified as nursing students must be well-versed in the signs and symptoms of sepsis and recognizing these in their clinical practice. As educators, we must train students to constantly be on guard for this devastating, life-threatening condition; their patients depend on it. This intervention on nursing students alone will not create the change in practice that is necessary to save lives; but it's a start. To tolerate a sepsis mortality rate of between 30% - 50% is unacceptable (Raghavan & Marik, 2006). By starting with nursing students, we can change the way nurses respond to deterioration in patient status. Acquainting them with life-saving measures will ensure the speedy deliver when time is of the essence. We can, and must, do better for our patients.

Sepsis education has been performed, but never with a theoretical framework that has complemented it so well. The SCT provides structure with reason and rationale while reinforcing teamwork. Our efforts must be focused on education and process change for the nurses caring for patients who develop sepsis; this is where the greatest improvement in care can be made (Dellinger et al., 2013). Furthermore, students gain experience in communicating within a team which will simulate how they will need to communicate within the interdisciplinary team in their future careers. In order to effectively recognize and treat sepsis, the nursing students will need to learn how to rely upon each other, yet hold one another accountable for their actions.

Recommendations for assessment strategies based upon this Independent Study include use of a case study in groups. The case-study worksheet (Appendix D) was performed in class following the second module (Appendix C). Students conversed in groups and, in listening to their conversations, they worked through answers collaboratively. Based upon verbal report from the students, this assessment method served to emphasize key points from the lecture and gave them the opportunity to apply newly gained knowledge to a clinical scenario. In contrast, the true/false preparatory quiz (Appendix B) basically served as assurance that students completed their prep-work. Students were able to complete it using the first module (Appendix A) and verbally reported no difficulty. In the future, a more effective strategy for ensuring learning of the students should be utilized.

**Practice.** In nursing practice, registered nurses may benefit from a similar educational program. Could this type of education be implemented in the hospital or public care setting to reduce patient mortality? Answering this question could change the practice of how we educate nurses, as well. It is anticipated following a comprehensive educational module, the future nursing workforce will be more equipped to respond to this devastating condition.

Based upon the research, interdisciplinary education and collaboration should be a major area of practice change in sepsis education/bundle implementation. Utilizing a multidisciplinary team to oversee the policy change can provide more dynamic and collaborative education (Soo Hoo et al., 2009). Using a team-based approach among healthcare disciplines decreases patient mortality rates as compliance with bundle elements increase (Dellinger et al., 2013; Thiel et al., 2009; Tromp et al., 2010; Wasan Patel et al., 2010; Winterbottom et al., 2011).

**Research.** Further research could be directed at examining patient outcomes following a structured, intense educational module on sepsis. Are we adequately preparing nursing students

to identify sepsis quickly? Do they understand the pathophysiology well enough in order to implement life-saving treatments efficiently? Are NCLEX scores reflecting enhanced knowledge of infection and sepsis? There are many questions that could be researched further in order to shed light on where our shortcomings are and how to fix them.

**Policy.** Policies that could be implemented include intensive educational modules on sepsis for nursing students and nurses and sepsis treatment bundles. Between January 2005 and March 2008, 252 qualifying facilities, for a total of 15,775 patients, participated in data collection in order to determine how SSC guidelines should be revised. Compliance with bundle elements increased over time while patient mortality decreased in 30 countries (Levy et al., 2010). The usefulness of these guidelines is evident by the extensive research conducted in order to develop and maintain current practice. Every hospital should have SSC bundle policies instituted in order to provide for patient safety.

### Summary

This learning module was developed to address gaps in sepsis education in baccalaureate nursing students. More specifically, it was created to promote recognition and early management of sepsis, as this is a major area where care could be substantially improved (Dellinger et al., 2013). In order to lower patient mortality rates, we must push our students to be constantly alert to changes in patient status. They must learn to pay close attention to patient symptoms and labs while also trusting their instincts. Furthermore, they must work together efficiently and competently in order to speed up care (Thiel et al., 2009; Tromp et al., 2010; Wasan Patel et al., 2010; Winterbottom et al., 2011). Time is truly of the essence with sepsis.

Using a dynamic theory such as Bandura's SCT provides a framework from which multiple elements of teaching and learning can be instituted. Attentional, retention, production,



and motivation processes can be specifically addressed to provide an optimal learning environment. However, the physical environment is just one component of the model of triadic reciprocity that helps guide how the instructor can expect students to respond to teaching methodologies. Linking and predicting how the students' behavior, cognitive/personal factors, and environment will affect each other can give instructors a deeper understanding of how to make teaching student-centered. Reinforcing the importance of this type of education and relating to the student can make it significant. This significance will help the student to determine if the information is valuable and whether they should store it for later experiences (Bandura, 1978).

Finally, enhancing the self-efficacy of nursing students using formative assessment strategies and frequent feedback will build their confidence. In the future, these nursing students will approach the task of treating the patient with sepsis confidently and appropriately. They will be more likely to undertake this challenge, because of their experience and knowledge base (Bandura, 2001). Ultimately, teaching nursing students comes down to making them competent practitioners that will have the abilities to safely care for their patients. We must give them the tools they need to be successful and save patient lives.

## References

- Aitken, L. M., Williams, G., Harvey, M., Blot, S., Kleinpell, R., Labeau, S., ... Ahrens, T. (2011). Nursing considerations to complement the Surviving Sepsis Campaign guidelines. *Critical Care Medicine*, *39*(7), 1800-1818. <http://dx.doi.org/10.1097/CCM.0b013e31821867cc>
- Arieti, S., Hamburg, D. A., & Brodie, K. H. (Eds.). (1975). *Handbook of psychiatry* (2nd ed., Vols. 1-6). New York, NY: Basic Books, Inc.
- Bahn, D. (2001). Social learning theory: Its application in the context of nurse education. *Nurse Education Today*, *21*, 110-117. <http://dx.doi.org/10.1054/nedt.2000.0522>
- Bandura, A. (1978, April). The self system in reciprocal determinism. *American Psychologist*, *33*, 344-358.
- Bandura, A. (1986). *Social foundation of thought & action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes*, *50*, 248-287.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*, 1-26.
- Bandura, A. (2002). Social cognitive theory in cultural context. *Applied Psychology: An International Review*, *51*(2), 269-290.
- Bandura, A. (2004, April). Health promotion by social cognitive means. *Health Education & Behavior*, *31*(2), 143-164. <http://dx.doi.org/10.1177/1090198104263660>

- Bandura, A. (2007, December 19). Health promotion from the perspective of social cognitive theory. *Psychology & Health, 13*(4), 623-649.  
<http://dx.doi.org/10.1080/08870449808407422>
- Bandura, A., Ross, D., & Ross, S. A. (1963). Vicarious reinforcement and imitative learning. *Journal of Abnormal and Social Psychology, 67*(6), 601-607.
- Bandura, A., Vittorio Caprara, G., Barbaranelli, C., Gerbino, M., & Pastorelli, C. (2003, May/June). Role of affective self-regulatory efficacy in diverse spheres of psychosocial functioning. *Child Development, 74*(3), 769-782.
- Barochia, A. V., Cui, X., Vitberg, D., Suffredini, A. F., O'Grady, N. P., Banks, S. M., ... Eichacker, P. Q. (2010). Bundled care for septic shock: An analysis of clinical trials. *Critical Care Medicine, 38*(2), 668-678.  
<http://dx.doi.org/10.1097/CCM.0b013e3181cb0ddf>
- Bastable, S. B. (2008). *Nurse as educator: Principles of teaching and learning for nursing practice* (3rd ed.). Sudbury, MA: Jones and Bartlett Publishers.
- Benight, C. C., & Bandura, A. (2004). Social cognitive theory of posttraumatic recovery: The role of perceived self-efficacy. *Behaviour Research and Therapy, 42*, 1129-1148.  
<http://dx.doi.org/10.1016/j.brat.2003.08.008>
- Benner, P., Sutphen, M., Leonard, V., & Day, L. (2010). *Educating nurses: A call for radical transformation*. San Francisco, CA: Jossey-Bass.
- Burke, H., & Mancuso, L. (2012, August 20). Social cognitive theory, metacognition, and simulation learning in nursing education. *Journal of Nursing Education, 51*(10), 543-548. <http://dx.doi.org/10.3928/01484834-20120820-02>

- Bussey, K., & Bandura, A. (1999). Social cognitive theory of gender development and differentiation. *Psychological Review*, *106*(4), 676-713.
- Carter, C. (2007). Implementing the severe sepsis care bundles outside the ICU by outreach. *British Association of Critical Care Nurses*, *12*(5), 225-230.
- Castellanos-Ortega, A., Suberviola, B., García-Astudillo, L. A., Holanda, M. S., Ortiz, F., Llorca, J., & Delgado-Rodríguez, M. (2010). Impact of the Surviving Sepsis Campaign protocols on hospital length of stay and mortality in septic shock patients: Results of a three-year follow-up quasi-experimental study. *Critical Care Medicine*, *38*(4), 1036-1043. <http://dx.doi.org/10.1097/CCM.0b0bl3e3181d455b6>
- Chamberlain, D. J., Willis, E. M., & Bersten, A. B. (2011). The severe sepsis bundles as processes of care: A meta-analysis. *Australian Critical Care*, *24*, 229-243.
- Coba, V., Whitmill, M., Mooney, R., Horst, H. M., Brandt, M. M., Digiovine, B., ... Jordan, J. (2011). Resuscitation Bundle Compliance in Severe sepsis and septic shock: Improves survival, is better late than never. *Journal of Intensive Care Medicine*, *26*(5), 304-313. <http://dx.doi.org/10.1177/0885066610392499>
- Couros, A. (2009). Open, connected, social--Implications for educational design. *Campus-Wide Information Systems*, *26*(3), 232-239. <http://dx.doi.org/10.1108/10650740910967393>
- Dellinger, R. P., Carlet, J. M., Masur, H., Gerlach, H., Calandra, T., Cohen, J., ... Levy, M. M. (2004, March). Surviving Sepsis Campaign guidelines for management of severe sepsis and septic shock. *Critical Care Medicine*, *32*(3), 858-873. <http://dx.doi.org/10.1097/01.CCM.0000117317.18092.E4>

- Dellinger, R. P., Levy, M. M., Carlet, J. M., Bion, J., Parker, M. M., Jaeschke, R., ... Vincent, J. (2008). Surviving Sepsis Campaign: International guidelines for management of severe sepsis and septic shock: 2008. *Intensive Care Medicine*, *34*, 17-60.  
<http://dx.doi.org/10.1007/s00134-007-0934-2>
- Dellinger, R. P., Levy, M. M., Rhodes, A., Annane, D., Gerlach, H., Opal, S. M., ... Moreno, R. (2013, February). Surviving sepsis campaign: International guidelines for management of severe sepsis and septic shock: 2012. *Critical Care Medicine*, *41*(2), 580-637. <http://dx.doi.org/10.1097/CCM.0b013e31827e83af>
- DiBenedetto, M. K., & Bembenuity, H. (2013). Within the pipeline: Self-regulated learning, self-efficacy, and socialization among college students in science courses. *Learning and Individual Differences*, *23*, 218-224. Retrieved from [www.elsevier.com/locate/lindif](http://www.elsevier.com/locate/lindif)
- Diker, A., Cunningham-Sabo, L., Bachman, K., Stacey, J. E., Walters, L. M., & Wells, L. (2012, July). Effective training design: Use of theory and formative assessment. *Health Promotion Practice*, *13*(4), 496-505. <http://dx.doi.org/10.1177/1524839910386909>
- Dodge, M. (2010, January/February). SIRS: A systematic approach for medical-surgical nurses to stop the progression to sepsis. *MEDSURG Nursing*, *19*(1), 11-16.
- Gerber, K. (2010, May/June). Surviving sepsis: A trust-wide approach. A multi-disciplinary team approach to implementing evidence-based guidelines. *Nursing in Critical Care*, *15*(3), 141-151.
- Gramß, D., & Struve, D. (2009). Instructional videos for supporting older adults who use interactive systems. *Educational Gerontology*, *35*, 164-176.  
<http://dx.doi.org/10.1080/03601270802421434>

- Heppner, H. J., Singler, K., Kwetkat, A., Popp, S., Esslinger, A. S., Bahrmann, P., ... Christ, M. (2012). Do clinical guidelines improve management of sepsis in critically ill elderly patients? A before-and-after study of the implementation of a sepsis protocol. *The Central European Journal of Medicine*, *124*, 692-698. <http://dx.doi.org/10.1007/s00508-012-0229-7>
- Hill, J. R., Song, L., & West, R. E. (2009). Social learning theory and web-based learning environments: A review of research and discussion of implications. *American Journal of Distance Education*, *23*(2), 88-103. <http://dx.doi.org/10.1080/08923640902857713>
- Hsu, Y., Ching, Y., Mathews, J., & Carr-Chellman, A. (2009). Undergraduate students' self-regulated learning experience in web-based learning environments. *The Quarterly Review of Distance Education*, *10*(2), 109-121.
- Inch, J. (2006, August). The implementation of a 'signs of sepsis' learning resource for a post-anaesthetic care unit. *British Journal of Anaesthetic & Recovery Nursing*, *7*(3), 22-26. <http://dx.doi.org/10.1017/S174264560600009X>
- Lagu, T., Rothberg, M. B., Shieh, M., Pekow, P. S., Steingrub, J. S., & Lindenauer, P. K. (2012). Hospitalizations, costs, and outcomes of severe sepsis in the United States 2003 to 2007. *Critical Care Medicine*, *40*(3), 754-761. <http://dx.doi.org/10.1097/CCM.0b013e318232db65>
- Laguna-Pérez, A., Chilet-Rosell, E., Delgado Lacosta, M., Alvarez-Dardet, C., Uris Selles, J., & Muñoz-Mendoza, C. L. (2012). Clinical pathway intervention compliance and effectiveness when used in the treatment of patients with severe sepsis and septic shock at an Intensive Care Unit in Spain. *Rev Lat Am Enfermagem*, *20*(4), 635-643. Retrieved from [www.eerp.usp.br/rlae](http://www.eerp.usp.br/rlae)

- Levy, M. M., Dellinger, R. P., Townsend, S. R., Linde-Zwirble, W. T., Marshall, J. C., Bion, J., ... Angus, D. C. (2010). The Surviving Sepsis Campaign: Results of an international guidelinebased performance improvement program targeting severe sepsis. *Critical Care Medicine, 38*(2), 367-374.
- Li, C., Kin, W., Mahadevan, M., Daniel-Underwood, L., Chiu, T., & Nguyen, H. B. (2012). A multinational randomised study comparing didactic lessons with case scenario in a severe sepsis medical simulation course. *Emergency Medicine Journal, 29*, 559-564.  
<http://dx.doi.org/10.1136/emered-2011-200068>
- MacRedmond, R., Hollohan, K., Stenstrom, R., Nebre, R., Jaswal, D., & Dodek, P. (2010). Introduction of a comprehensive management protocol for severe sepsis is associated with sustained improvements in timeliness of care and survival. *Quality & Safety in Health Care, 19*(5). <http://dx.doi.org/10.1136/qshc.2009.033407>
- Martin, J. (2004). Self-regulated learning, social cognitive theory, and agency. *Educational Psychologist, 39*(2), 135-145.
- Mason, S. R., & Ellershaw, J. E. (2008). Preparing for palliative medicine; evaluation of an education programme for fourth year medical undergraduates. *Palliative Medicine, 22*, 687-692.
- Michalec, B. (2012). Clinical experiences during preclinical training: The function of modeled behavior and the evidence of professionalism principles. *International Journal of Medical Education, 3*, 37-45. <http://dx.doi.org/10.5116/ijme.4f42.5c99>
- Minton, J., Clayton, J., Sandoe, J., McGann, H., & Wilcox, M. (2008, February 23). Improving early management of bloodstream infection: A quality improvement project. *British Medical Journal, 336*, 440-443. <http://dx.doi.org/10.1136/bmj.39454.634502.80>

Newbrey, M. G., & Baltezare, J. M. (2006, November/December). Poster presentations:

Conceptualizing, constructing & critiquing. *American Biology Teacher*, 68(9), 550-554.

Oermann, M. H., & Gaberson, K. B. (2009). *Evaluation and testing in nursing education* (3rd ed.). New York, NY: Springer Publishing Company.

Peel, M. (2008, November 19). Care bundles: Resuscitation of patients with severe sepsis.

*Nursing Standard*, 23(11), 41-46.

Pereira Lima Shiramizo, S. C., Santucci Cesar, M., Pardini, A., Santos, A., Capone Neto, A., &

Silva, E. (2012). In our unit. Keep your eyes on sepsis. *Critical Care Nurse*, 32(6), 74-

75. <http://dx.doi.org/10.4037/ccn2012221>

Pestaña, D., Espinosa, E., Sangüesa-Molina, J. R., Ramos, R., Pèrez-Fernàndez, E., Duque, M.,

& Martinez-Casanova, E. (2010, November). Compliance with a sepsis bundle and its

effect on intensive care unit mortality in surgical septic shock patients. *The Journal of*

*Trauma*, 69(5), 1282-1287. <http://dx.doi.org/10.1097/TA.0b013e3181c4539f>

Pike, T., & O'Donnell, V. (2010). The impact of clinical simulation on learner self-efficacy in pre-registration nursing education. *Nurse Education Today*, 30, 405-410.

<http://dx.doi.org/10.1016/j.nedt.2009.09.013>

Porth, C. M., & Matfin, G. (2009). *Pathophysiology: Concepts of altered health states* (8th

ed.). Philadelphia, PA: Wolters Kluwer Health | Lippincott Williams & Wilkins.

Privette Nelson, D., LeMaster, T. H., Plost, G. N., & Zahner, M. L. (2009, March).

Recognizing sepsis in the adult patient. *American Journal of Nursing*, 109(3), 40-45.

Retrieved from [ajnonline.com](http://ajnonline.com)



- Raghavan, M., & Marik, P. E. (2006). Management of sepsis during the early "golden hours". *The Journal of Emergency Medicine, 31*(2), 185-199.  
<http://dx.doi.org/10.1016/j.jemermed.2006.05.008>
- Reinhart, K., Kissoon, N., Daniels, R., & Jimenez, E. J. (2012). Stop sepsis—save lives: A call to join the global coalition for the World Sepsis Day. *Journal of Critical Care, 27*(4), 410-413. <http://dx.doi.org/10.1016/j.jcrc.2012.06.010>
- Rivers, E. P., Coba, V., & Whitmill, M. (2008). Early goal-directed therapy in severe sepsis and septic shock: a contemporary review of the literature. *Current Opinion in Anesthesiology, 21*, 128-140.
- Rugh, D. (2011). Design of a rural diabetes self-directed care program. *Social Work in Health Care, 50*(10), 775-786. <http://dx.doi.org/10.1080/00981389.2011.597496>
- Soo Hoo, W. E., Muehlberg, K., Ferraro, R. G., & Charo Jumaoas, M. (2009, July/August). Successes and lessons learned implementing the sepsis bundle. *Journal for Healthcare Quality, 31*(4), 9-15.
- Stewart, K. E., DiClemente, R. J., & Ross, D. (1999). Adolescent and HIV: Theory-based approaches to education of nurses. *Journal of Advanced Nursing, 30*(3), 687-696.
- Su, W. M. (2007, January-February). Writing context-dependent item sets that reflect critical thinking learning outcomes. *Nurse Educator, 32*(1), 11-15. Retrieved from <http://www.wolterskluwerhealth.com>
- Thiel, S. W., Asghar, M. F., Micek, S. T., Reichley, R. M., Doherty, J. A., & Kollef, M. H. (2009). Hospital-wide impact of a standardized order set for the management of bacteremic severe sepsis. *Critical Care Medicine, 37*(3), 819-824.  
<http://dx.doi.org/10.1097/CCM.0b013e318196206b>

- Tromp, M., Hulscher, M., Bleeker-Rovers, C. P., Peters, L., Van den Berg, D. T., Borm, G. F., ... Pickkers, P. (2010). The role of nurses in the recognition and treatment of patients with sepsis in the emergency department: A prospective before-and-after intervention study. *International Journal of Nursing Studies*, *47*, 1464–1473.  
<http://dx.doi.org/10.1016/j.ijnurstu.2010.04.007>
- Wasan Patel, G., Roderman, N., Gehring, H., Saad, J., & Bartek, W. (2010, November). Assessing the effect of the Surviving Sepsis Campaign treatment guidelines on clinical outcomes in a community hospital. *The Annals of Pharmacotherapy*, *44*, 1733-1738.  
Retrieved from [theannals.com](http://theannals.com)
- Winterbottom, F. (2012). Nurses' critical role in identifying sepsis and implementing early goal-directed therapy. *Journal of Continuing Education in Nursing*, *43*(6), 247-248.  
<http://dx.doi.org/10.3928/00220124-2>
- Winterbottom, F., Seoane, L., Sundell, E., Niazi, J., & Nash, T. (2011, July/August). Improving sepsis outcomes for acutely ill adults using interdisciplinary order sets. *Clinical Nurse Specialist*, *25*(4), 180-185.
- Zambon, M., Ceola, M., Almeida-de-Castro, R., Gullo, A., & Vincent, J. (2008). Implementation of the Surviving Sepsis Campaign guidelines for severe sepsis and septic shock: We could go faster. *Journal of Critical Care*, *23*, 455-460.  
<http://dx.doi.org/10.1016/j.jcrc.2007.08.003>