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Improving Sedation Practice in Adult Intensive Care Units

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IMPROVING SEDATION PRACTICE IN ADULT INTENSIVE CARE UNITS

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by

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Abstract

Background: The purpose of sedation for patients receiving ventilator support is to achieve comfort and optimize patient-ventilator synchrony. Overuse of sedation has been shown to have adverse effects. National and international guidelines recommend a sedation-as-needed approach; however, evidence suggests poor guideline adherence.

Purpose: The purpose of this study was to decrease practice variation in sedation management during the weaning process from mechanical ventilation through an educational intervention based on current guidelines for sedation practices in the intensive care unit. Two project questions were formulated: (a) What are some of the reasons given by critical care nurses as to why once daily sedation interruption is not utilized for all mechanically-ventilated patients in the ICU? (b) How would an educational intervention affect nurses' knowledge of sedation guidelines during the weaning process?

Theoretical framework: The Donabedian model, which identifies three key components: structure, process, and outcome.

Methods: A pretest/ posttest design with an educational intervention was used. The pretest entailed a self-administered survey evaluating the most salient factors of nurses' sedation and weaning practice in the ICU. The educational intervention encompassed an active component for systematic assessment of mechanically-ventilated patients, with passive reinforcements. The posttest assessed participants' knowledge acquisition through responses to patient vignettes.

Results: For the first question, critical care nurses cited (a) the possibility of respiratory compromise (34%), (b) patient-initiated device removal (29%), and (c) compromising

patient comfort (11%). A total of 41% used a sedation protocol despite institutional guidelines within their ICU, and less than 53% performed daily sedation interruption 100% of the time. After the educational intervention, 100%-75% of participants properly identified indications and contraindications for daily sedation interruption. A total of 79% properly identified the need to assess and treat pain before sedation, and 86% properly identified the need to seek underlying causes of agitation. Fewer than 65% felt nurses' contributions influence decisions on mechanical ventilation.

Conclusions: An active educational intervention with the use of vignettes proved useful in improving critical care nurses' guideline knowledge application. More emphasis should be placed on continuous professional development in mechanical ventilation and sedation, as well as nurses' involvement in guideline development.

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DEDICATION

To the light of my world and inspiration in life, my son

Ishmael Hunter

TABLE OF CONTENTS

LIST OF FIGURES

SECTION ONE

INTRODUCTION

Sedation management in the critical care setting is a nursing intervention. The purpose of sedation on patients receiving ventilator support is to achieve comfort and optimize patient-ventilator synchrony (Beck, 2008; Ramoo, Abdulla, Tan, Wong, & Chua, 2014). According to Wunsch (2009), in the United States half of the patients on mechanical ventilation receive intravenous sedation for more than 70% of their ventilation time (as cited in Chen et al., 2015). The most commonly ordered sedatives are Propofol, Midazolam, and Lorazepam, as well as analgesics (Barr et al., 2013; Chen et al., 2015). These agents have been associated with adverse effects and delay awakening after long-term infusion (Chen et al., 2015). Current guidelines advocate for the practice of healthcare professionals' addressing pain and discomfort first, and then adding sedation if necessary (Barr et al., 2013; Egerod, Jensen, Herling, & Welling, 2010).

Overuse of sedation has shown to have adverse effects with repercussions beyond critical care (Tanaka et al., 2014). Judicious management of sedation has implications that extend beyond patient comfort (Shapiro et al., 2007). Even though national and international guidelines have recommended a sedation-as-needed approach for patients on mechanical ventilation, evidence suggests that adherence to these guidelines is poor (Burns, 2012; Miller, Bosk, Iwashyna, & Krein, 2012; Tanios, Wit, Epstein, & Devlin, 2009). Further, not enough information, materials, or guidance are reflected in literature on the use of sedation during the weaning process.

Some of the barriers to guideline adherence have been alluded to as structural processes, lack of nursing acceptance, and concerns for patient safety (Burns, 2012;

Tanios et al., 2009). Nevertheless, it is believed that given the right tools, education, and support, critical care nurses could make objective decisions. These decisions would advocate for better outcomes and improve the quality of care that mechanically-ventilated patients receive in the intensive care unit (ICU).

Background of the Project

Mechanical ventilation is required in more than 90% of critically ill adults in ICUs (McLean, Jensen, Schroeder, Gibney, & Skjodt, 2006). Prolonged mechanical ventilation, defined as mechanical ventilation for more than 3 days, can increase healthcare costs as a result of longer hospitalization and unnecessary medical complications (McLean et al., 2006). The risks associated with prolonged mechanical ventilation include increased mortality; ventilator-associated pneumonia (VAP); airway trauma; increased need for sedation; and decreased satisfaction among staff, patients, and patients' families. Even though prolonged exposure to mechanical ventilation could be harmful, premature discontinuation could contribute to unsuccessful extubation requiring reintubation. That is, reinsertion of the breathing tube would be necessary after its removal (Bruton & McPherson, 2004; McLean et al., 2006).

The process of weaning from mechanical ventilation refers to the gradual discontinuation of ventilatory support, with the ultimate goal of mechanical liberation (Brochard & Tille, 2009; Perrem & Brochard, 2013). Although a variety of approaches are available to wean patients from mechanical ventilation, evidence from clinical trials suggests that protocol-directed weaning is safe when compared to usual care. Studies have consistently shown that weaning reduces the time on mechanical ventilation without overt complications (Rumpke & Zimmerman, 2010; White, Currey, & Botti, 2011).

Essential Elements of the Weaning Process

An essential element of the weaning process is the judicious management of sedation. However, few reports have been published about how to transfer this knowledge into practice. A study by Kress et al. (1999, as cited in Luetz, Goldmann, Weber-Carstens, & Spies, 2012) on sedation management during the weaning process showed that performing daily spontaneous awakening trials (SATs), which entailed the daily interruption of sedation, significantly reduced ventilator time and the incidence of iatrogenic complications. In another study by Girard et al. (2010), this concept was extended and wakeup trials were coordinated with spontaneous breathing trials. This coordination of care demonstrated a significant reduction in hospital length of stay, a reduction in the incidence of long-term brain dysfunction at 3 months, and a 14% absolute risk reduction in mortality at 1 year (as cited in Luetz et al., 2012).

Attitudes About Standardized Care

Although the use of protocols in healthcare has been shown to reduce variation, standardized care can potentially create resentment and frustration among healthcare professionals. Procedural care may be perceived as removal of clinical judgment without consideration of all facets of the patients involved (Woien & Bjork, 2012). Adherence of evidence-based into practice could be improved by addressment of such barriers. An improvement in staff's perceptions related to a proposed protocol has been associated with decreases in the number of errors, lengths of stay, and employee attrition (Bruton & McPherson, 2004).

Factors Affecting Weaning

Weaning a patient from mechanical ventilation is one of the main challenges of critical care (Perren & Brochard, 2013). Between 25% and 40% of patients who are ventilated have difficulty with this process (Brochard &Thille, 2009; Perren & Brochard, 2013). A patient who is difficult to wean requires up to three spontaneous breathing trials (SBTs), or as long as 7 days from the last SBT, to be successfully extubated (Perren & Brochard, 2013). Ongoing ventilation dependency is caused by both disease factors (i.e., respiratory, cardiac, neuromuscular, and metabolic alterations) and clinician management factors (i.e., accumulation of sedative drugs; MacIntyre, 2007; Perren & Brochard, 2013). The latter also include ignoring the patient's potential for weaning and inappropriate management of ventilator settings and or sedation mismanagement (Perren & Brochard, 2013). Undue prolongation of mechanical ventilation has been associated with negative sequelae (McLean et al., 2006). It is therefore imperative to identify the correct timing of therapeutic steps for weaning and extubation (Lellouche et al., 2006; Perren & Brochard, 2013).

Alternate Findings About Protocol Utilization

Although the introduction of weaning protocols have been associated with better outcome (Caroleo, Agnello, Abdallah, Santangelo, & Amantea, 2007; Luetz et al., 2012), the evidence is not consistent across all populations (Blackwood et al., 2010; Krishnan, Moore, Robeson, Rand, & Fessler, 2004; Rose, Nelson, Johnston, & Presneill, 2007). For example, in the Krishnan et al. (2004) study, the introduction of a protocol within the context of a closed-ICU did not improve care. A closed-ICU implies that the intensivist dictates the medical management of mechanically- ventilated patients (Brilli et al., 2001).

Krishnan et al. (2004) concluded that protocol-directed weaning may be unnecessary in a closed-ICU with generous physician staffing and structured rounds.

Nurse-to-patient ratio along with the scope of practice could impact the quality of sedation and weaning outcomes. According to an international study by Rose et al. (2007), the weaning process and ventilator management in Australia and New Zealand falls under the scope of practice of critical care nurses. All units reported a 1:1 nurse-to-patient ratio for ventilated patients. In this international study, nurses, in collaboration with doctors, were the healthcare practitioner primarily responsible for the management of the ventilator (Rose et al., 2007). In the United States, however, making changes to ventilator settings and overall management fall under the responsibility of the intensivist and/or respiratory therapist (Rose et al., 2007).

Nurse Competence and Protocol Utilization

Weaning and sedation protocols are intended to reduce practice variation by replacing subjectivity with objectivity (Blackwood et al., 2010). The concepts “clinical worsening” (Caroleo et al., 2007, p. 420) and “comfort zone” (Lellouche et al., 2006, p. 894) within which the patient should be kept are highlighted in recent research as key assessments made through use of standardized tools. This emphasis may indicate that the use of a protocol should not exclude healthcare professionals’ individual considerations and clinical judgment. Research also shows a connection between weaning time and the qualifications and experience of intensive care nurses (MacIntyre et al., 2001; Thorens, Kaelin, Jolliet, & Chevrolet, 1995). The significant aspects of the context and the qualities important in the nurse-patient relationship in weaning have not yet been sufficiently described (Rose & Nelson, 2006). In a recent literature review, it is

emphasized that more empirical research is needed to examine competence in intensive and critical care nursing (Aäri, Tarja, & Helena, 2008).

Problem Statement

The problem is that there is poor adherence to sedation protocols in the ICU when weaning patients off mechanical ventilation. Deep levels of sedation have been associated with poor neurocognitive outcomes (Goodwin, Lewin, & Mirski, 2012). A study by Newman et al. (2001, as cited in Goodwin et al., 2012) found that 53% of patients demonstrated cognitive dysfunction at hospital discharge and 42% still exhibited some level of neurocognitive dysfunction at a 5-year follow-up visit. Drug-induced coma has also been correlated with the development of delirium in mechanically-ventilated patients (Ely et al., 2004). Delirium was found to be an independent high risk for mortality at 6-months and longer length of stay (Ely et al., 2004).

Purpose

The purpose of this study was to decrease practice variation in sedation management during the weaning process from mechanical ventilation through an educational intervention based on current guidelines for sedation practices in the intensive care unit.

Definitions

- **Adherence**: This term refers to an active decision to support clinical practice and make behavior changes accordingly (Kiyoshi-Teo, Cabana, Froelicher, & Blege, 2014).
- **Analgo-sedation**: This is the practice of addressing pain and discomfort and then adding sedation if necessary (Barr et al., 2013; Egerod et al., 2010).

- **Guidelines**: These are systematically derived statements that help practitioners to make decisions about care in specific clinical circumstances. The guidelines should be research- or evidence-based ((“Nursing resources: Standard, Guideline, Protocol, Policy,” 2014).
- **Protocol**: This is an agreed framework outlining the care that will be provided to patients in a designated area of practice. Protocols do not describe how a procedure is performed, but why, where, when, and by whom the care is given (“Nursing resources: Standard, Guideline, Protocol, Policy,” 2014).
- **Weaning**: With regard to mechanical ventilation, weaning implies a stepwise transition from mechanical support to spontaneous breathing (Mancebo, 1996, as cited in Rose & Nelson, 2006). The overall aim of the weaning process is to enable the patient to assume a greater ventilator workload by reduction of the support given by the ventilator (Hess, 2002, as cited in Nelson, 2006).

Project Objectives

1. Use the guidelines published by the Society of Critical Care Medicine in 2013 on pain, agitation, and delirium to guide an educational intervention.
2. Identify barriers to guideline adherence on sedation management for mechanically-ventilated patients in ICU through the use of a survey tool.
3. Present parameters for weaning readiness on mechanically-ventilated patients.
4. Present validated assessment scale recommended by the Society of Critical Care Medicine (SCCM; Barr et al., 2013) guidelines for sedated patients on mechanical ventilation.

Project Questions

1. What are some of the reasons given by critical care nurses as to why once daily sedation interruption is not utilized for all mechanically-ventilated patients in the ICU?
2. How would an educational intervention affect nurses' knowledge of sedation guidelines during the weaning process?

Theoretical Framework

The conceptual framework guiding this scholarly project was the Donabedian model (Donabedian, 2003). The three key components of this model are structure, process, and outcome (Bellin & Dubler, 2001; Sollecito, & Johnson, 2013). Donabedian noted that quality is ordinarily a contemporaneous reflection of society at large (Sollecito, & Johnson, 2013). He identified three aspects of care that one might choose to measure quality: structure, process, and outcome (Donabedian, 2003; Sollecito, & Johnson 2013). Structure refers to the resources readily available to provide adequate healthcare (Donabedian, 2003), such as the setting, staff, training, and technology. Process, in turn, entails the extent to which professionals perform according to accepted standards (i.e., established protocols/guidelines; Sollecito, & Johnson 2013). And finally, outcome is the effect of the care rendered, or the lack thereof, on the patient's well-being (Donabedian, 2003).

According to Dykes and Collins (2013), the Donabedian structure-process-outcome model provides the foundation for evaluation of the quality of care in healthcare organizations (Figure 1). Donabedian's framework is useful because many factors may influence patient outcomes. By identifying relationships between structural aspects of patient care (i.e., nursing hours per patient days, or nosocomial infections), the processes

of care (i.e., weaning and sedation protocols), and patient outcomes (i.e., ventilator-associated pneumonia, or ICU length of stay), nurses can make informed inferences about the quality of care patients are actually receiving (Dykes & Collins, 2013).

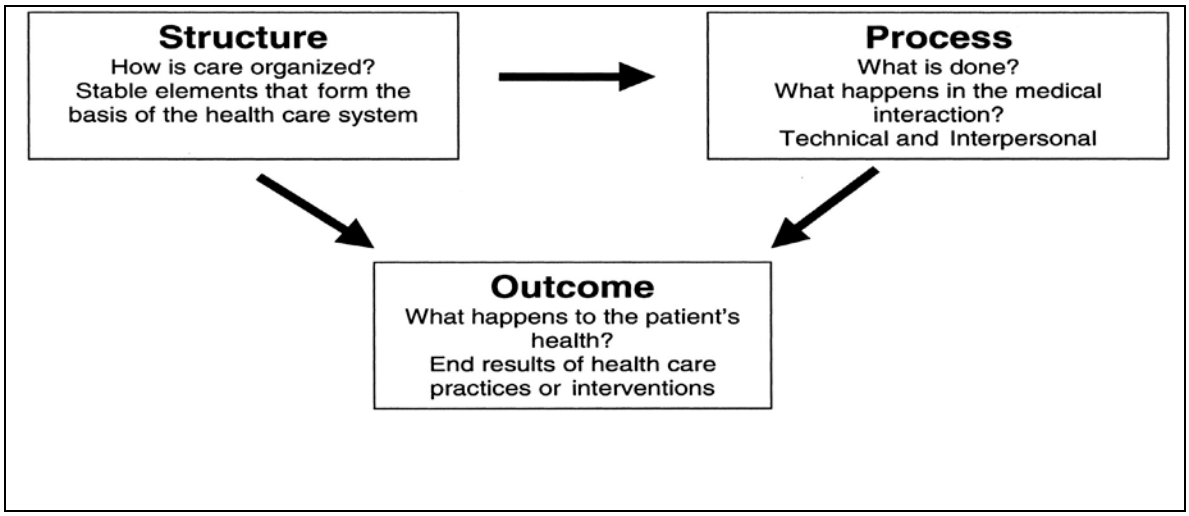

Figure 1. Donabedian model (Himmelfarb, Pereira, Wesson, Smedberg, & Henrich, 2004, p. 3265).

Increased variation in practice leads to wasteful mismanagement of resources, aggravating the cost of healthcare. According to Halpern et al. (2014), the United States spent roughly 18.3% of its Gross Domestic Product on healthcare in 2012, with approximately $100 billion spent on the provision of critical care alone. The level of sedation used on mechanically-ventilated patients in ICU was identified by the Critical Care Societies Collaborative (CCSC) as a contributing factor affecting resource utilization, length of stay, and cost in critical care (CCSC, n.d.).

Another factor which may contribute to the high cost of care in mechanically-ventilated patients may be the decisions clinicians make at bedside. These may be decisions strongly influenced by the educational foundation and structural context of practice. Although nurses' attitudes about sedation management has been identified as a

barrier for adherence to evidence-based practice (Ramoo et al., 2014; Tanios et al., 2009), the structural context of sedation management during the weaning process has not been sufficiently explored.

Significance of the Scholarly Project to Nursing

The essence of this project is the convergence of the Doctor of Nursing Practice (DNP) eight essentials from an acute care nurse practitioner's (ACNP) perspective. According to the American Association of Colleges of Nursing (2012), the ACNP provides care to patients who are characterized as physiologically unstable, technologically dependent, and/or are highly vulnerable to complications. By addressing barriers to the assimilation of best-practice in ICU, the DNP student satisfies core essentials spelled out by the American Association of Colleges of Nursing for both the DNP and ACNP.

Link to DNP Essentials

DNP Essential I: *Nursing Science and Theory: Scientific Underpinning for Practice*. In accordance with this essential, the researcher incorporated the Donabedian Model (Donabedian, 2003) to guide the scholarly project to ameliorate barriers to the integration of sedation and weaning guidelines into practice.

DNP Essential II: *Organizational and Systems Leadership for Quality Improvement and Systems Thinking.* This essential stipulates that improvements in practice are neither sustainable nor measurable without corresponding changes in professional culture (i.e., perceptions and beliefs). Current sedation practices during the weaning process from mechanical ventilation are both a practice problem and an ethical dilemma. Deep levels sedation place the patient at risk for further complications, which

diverts from the bioethical principle of *Primum non nocere* (first, do no harm). This principle is directly related to the nurse's duty to protect the patient's safety (Silva & Ludwick, 1999).

DNP Essential III: *Clinical Scholarship and Analytical Methods for Evidence-Based Practice*. In accordance with this essential, a review of the literature was carried out and a gap in practice was identified. An educational intervention was used to disseminate awareness of the pain, agitation, and delirium (PAD) guidelines published by the SCCM (Barr et al., 2013). Particular emphasis was placed on the following of these guidelines and mandates on intubated patients.

DNP Essential IV: *Information Systems/Technology and Patient Technology for Improvement and Transformation of Health Care*. This essential involves the use of guidelines and following of best practice to reduce variability in care. The essential presents a way of contextualizing Evidence-Based Practice (EBP) from the informatics perspective (Charles, 2008, as cited in Burkart-Jayez, 2011).

DNP Essential V: *Health Care Policy for Advocacy in Health Care*. Standardized care has been shown to improve outcomes. Guidelines and protocols should not be used to replace clinical judgment. Instead, protocols should complement judgment and serve as guides to the clinician. Effective implementation of continuous quality improvement endeavors requires adequate resources (i.e., staffing, working equipment, and tools). According to MacIntyre et al. (2001), staffing below a certain threshold jeopardizes outcomes.

DNP Essential VI: *Interprofessional Collaboration for Improving Patient and Population Health Outcomes*. The SCCM PAD guidelines (Barr et al., 2013) were chosen

because of their strong connotation of close interdisciplinary collaboration and a more lateral organizational structure than is generally practiced.

DNP Essential VII: *Clinical Prevention and Population Health for Improving the Nation's Health*. The best treatment for iatrogenic complications is prevention. Early identification of a patient's readiness to wean is paramount. Guidelines recommend a systematic approach to weaning from mechanical support while taking into consideration the individual's needs. The incorporation of validated tools into clinical practice provides the staff with an objective barometer of the patient's status, in turn, improving interdisciplinary communication and interaction. These are variables that have strong positive implications on patient outcomes.

And finally, DNP Essential VIII: *Advance Nursing Practice.* This essential was realized through the development of an educational intervention using the SCCM guidelines and completion of this scholarly project as a requirement for the degree of Doctor of Nursing Practice.

Practice

Early identification of a patient's readiness to wean is crucial for nurses to optimize outcome. Given the dynamic progression of the weaning process, nurses have a temporal advantage. When compared with other members of the interdisciplinary team, nurses are able to spend a considerable amount of time at bedside, allowing them the opportunity to identify emerging nuances of their patients' conditions. However, several studies have linked nurses' attitudes to the lack of adherence to sedation guidelines and management (Burns, 2012; Ramoo et al., 2014; Tanios et al., 2009). Because knowledge shapes attitudes, efforts to improve nurses' knowledge are essential.

Healthcare Outcomes

The Institute of Medicine (IOM) defines quality of care as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Lohr, 1990, p. 375). Guidelines addressing ventilator-related infections include general recommendations about educating and training the healthcare personnel, who are charged with the responsibility of inserting and maintaining such devices, as well as clinical recommendations (Flodgren et al., 2013). Weaning protocols, along with nurse-driven sedation protocols, have been shown to improve outcomes and are supported by the emerging evidence. In a randomized controlled study by Brook et al. (1999), the use of a nurse-directed sedation protocol resulted in a reduced duration of mechanical ventilation (55.9 hrs vs. 117.0 hrs, protocol vs. nonprotocol, respectively) and ICU length of stay (5.7 ± 5.9 days vs. 7.5 ± 6.5 days; $p = .013$). These results ameliorated the need for expensive radiologic evaluations and the potential for iatrogenic events.

Healthcare Delivery

According to evidence, most hospital-acquired traumatic events could be easily prevented if better policies and procedures were in place and followed *(*Andel, Davidow, Hollander, & Moreno, 2012; Bauman & Hyzy, 2014). International guidelines recommend goal-directed sedation administration to meet patient needs within the critical care environment (Ramoo et al., 2014). Although successful implementation of a standardized sedation management requires a multidisciplinary approach, in the setting of critical care nurses are primarily responsible for the management and assessment of sedation and early identification of readiness to wean (Ramoo et al., 2014).

Healthcare Policy

In response to the Patient Protection and Affordable Care Act (PPACA), the Centers for Medicare and Medicaid Services (CMS), with some private insurance companies, started implementing financial incentives that reward good quality practices and penalize bad practices (Kavanagh, Cimiotti, Abusalem, & Coty, 2012). In today's economic uncertainty, organizational systems are held accountable for cost containment in an environment focused on outcomes. With this very purpose in mind, the American Board of Internal Medicine Foundation developed the Choosing Wisely Campaign (Halpern et al., 2014), tasking professional societies to develop a list of the top five medical services that patients should question. This task was undertaken by the Critical Care Societies Collaborative (CCSC), spearheaded by the American Association of Critical-Care Nurses (AACN), the American Thoracic Society (ATS), the American College of Chest Physicians (CHEST) and Society of Critical Care Medicine (SCCM), to optimize the care through communication, education, research, and advocacy of patients critically ill and injured (CCSC, n.d.).

The five procedures are as follows: (a) Do not order diagnostic tests at regular intervals (such as every day), but rather in response to specific clinical questions. (b) Do not transfuse red blood cells in hemodynamically stable, nonbleeding ICU patients with a hemoglobin concentration greater than 7 g/dL. (c) Do not use parenteral nutrition in adequately nourished critically ill patients within the first 7 days of an ICU stay.(d) Do not deeply sedate mechanically-ventilated patients without a specific indication and without daily attempts to lighten sedation. (e) Do not continue life support for patients at

high risk for death or severely impaired functional recovery without offering patients and their families the alternative of care focused entirely on comfort (Halpern et al., 2014).

All five procedures on the list of the Choosing Wisely Campaign seem to be intrinsically related. However, for the current project, two of the five issues were addressed: (a) do not deeply sedate mechanically-ventilated patients without a specific indication and without daily attempts to lighten sedation, and (b) do not use diagnostic tests at regular intervals but rather in response to specific clinical questions (Halpern et al., 2014). According to evidence, a standardized sedation approach reduces the need for mechanical support and length of stay, in turn decreasing the risk of iatrogenic complications and optimizing outcomes.

Summary

This chapter presented the nature of the project and identified the problem statement, and purpose for the project. A brief synopsis of a literature review was presented, substantiating the problem statement and purpose. Definitions of key terms were introduced. Project objectives were delineated, with project questions and the guiding theoretical framework. A succinct presentation of the significance of this problem and potential impact on practice, healthcare outcomes, delivery, and policy was also provided.

SECTION TWO

LITERATURE REVIEW

The purpose of this study was to decrease practice variation in sedation management during the weaning process from mechanical ventilation through an educational intervention based on current guidelines for sedation practices in the ICU. A search of relevant literature across disciplines was conducted. The following computerized databases were used to conduct the search for relevant literature: the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline Complete, Education Resource Information Center (ERIC), Cochrane Library, Google Scholar, The National Guidelines Clearinghouse, and the Journal of the American Medical Association network. The following key words were used: *analog-sedation, daily sedation interruption, protocol implementation, sedation protocol*, and *spontaneous breathing trials*. Citations were limited to the English language and by concepts of exploration. A limitation was imposed to locate literature published since 2010, with seminal works sought by manual review of citations in published works. Synthesis of the literature revealed what was found to address the phenomenon of best practices guiding sedation management of critically ill adults undergoing weaning from ventilator support in critical care.

Sedation Practices in Critical Care

More than 80% of mechanically-ventilated patients in the ICU are managed with the use of continuous sedative-hypnotics and/or analgesics (Devabhakthuni, Armahizer, Dasta, & Kane-Gill, 2012). However, evidence suggests that these agents are often overused in critical care (Augustes & Ho, 2010). Unequivocally, there is a strong

association between the depth of sedation and weaning outcomes (Anifantaki et al., 2009; Girard et al., 2008; McLean et al., 2006; Rumpke & Zimmerman, 2010). Deep levels of sedation are associated with prolonged mechanical ventilation (Anifantaki et al., 2009; Girard et al., 2008; Rumpke & Zimmerman, 2010). Given the pharmacokinetic variability of sedatives and analgesics, in the setting of organ dysfunction and critical illness the most appropriate pattern and dose of administration are often difficult to determine (Augustes &. Ho 2010; Girard et al., 2008). As a result, many intensive-care practitioners are under the perception that their patients are not oversedated. However, observational studies in the United States and Europe have found that nearly half of all mechanically ventilated patients in the ICU are deeply sedated and unarousable (Girard et al., 2008).

The problem of oversedation may be ameliorated with daily sedation interruption (Girard et al., 2008). It is postulated that the lower plasma levels of the drug allow patients to regain earlier neurological recovery, setting the stage for earlier extubation (Girard et al., 2008). A fundamental component in the management of sedation is the systematic evaluation of the depth of sedation and analgesia, including daily assessment for the presence of delirium with validated and reliable tools (Barr et al., 2013; Luetz et al., 2012).

Standardization of care through the use of protocols has been advocated as an important tool to improve and disseminate evidence-based practice (Miller et al., 2012). However, there is evidence to suggest that adherence to protocols and guidelines is low (Miller et al., 2012). For example, Erasmus et al. (2010, as cited in Miller et al., 2012) reported that “only about 40% of health care workers comply with hand hygiene practices” (p. 218e2). According to Bauman and Hyzy (2014), patients receive only 50%

of the recommended evidence-based therapies in the United States. This lack of guideline adherence is also reflected with beta-blocker prescription after a myocardial infarction. According to Miller et al. (2012), the rates of beta-blocker prescription after myocardial infarction has remained low despite the surmountable evidence of the prescription's benefits over the last decades.

Similar findings apply to adherence with sedation guidelines in mechanically-ventilated patients in the ICU. According to Miller et al. (2012), a survey of ICU professionals revealed that less than half of respondents practiced daily sedation interruption (DIS) on most ICU days. International studies also reflect a practice discrepancy addressing sedation management in the ICU. Less than 78% of physicians reported using DIS for their mechanically-ventilated patients (Miller et al., 2012). Failure to translate evidence into widespread practice is evident even after two highly publicized randomized controlled trials by Kress, Pohlman, Connor, and Hall (2000) and Girard et al. (2008) demonstrating the benefits of daily interruption of sedation.

Efficacy of Sedation Vacation in Mechanically-Ventilated Patients

In a randomized controlled trial by Girard et al. (2008), "Efficacy and Safety of a Paired Sedation and Ventilator Weaning Protocol for Mechanically Ventilated Patients in Intensive Care (Awakening and Breathing Controlled Trial)," also known as the ABC study, the researchers concluded that the practice of paired spontaneous awakening trial (SAT) with spontaneous breathing trials (SBT) was associated with better outcomes. Of the 336 patients who met inclusion criteria, 168 patients were randomized into the intervention group. This study differs from others in that the intervention cohort underwent daily wakeup trials. Both cohorts, intervention and control, were treated with

benzodiazepines and opioids. However the authors mentioned that the intervention group received more Propofol, a shorter acting gamma-aminobutyric acid (GABA) agonist, than the control. It is worth mentioning that the fact that the intervention group received a shorter-acting GABA agonist did affect the internal validity of this study.

In the ABC study (Girard et al., 2008), prior to being subjected to SATs, patients had sedation interrupted. It was understood that the practice of complete interruption of analgesia was not necessarily required, or perhaps indicated, for every patient undergoing weaning. According to Girard et al. (2008), analgesia was continued for pain during 132 of the 895 SATs in the intervention group without mention of any adverse events. There was no mention as to what opioid drug was used; therefore, one cannot make generalized extrapolations. The authors mentioned that, regardless of the GABA agonist used, both groups received similar overall sedative dosages (Girard et al., 2008). Perhaps a decline in plasma drug concentration through the practice of daily drug interruption reduced the likelihood of systemic drug accumulation, a factor leading to improved outcomes.

Critical Care Guidelines

The drug of choice, as well as the methods used to administer and titrate medications for pain, agitation, and delirium in the ICU, can affect the overall outcome of mechanically-ventilated patients (Barr et al., 2013). These pharmacological interventions are associated with short- and long-term sequelae (Patel & Kress, 2012). In 2013, the Society of Critical Care published the latest revision to the PAD guidelines for adult patients in the ICU. The quality or strength of evidence was evaluated with the Delphi method, weighted according to a rating scheme (A, B, or C; Barr et al., 2013).

Level A entailed high quality randomized controlled trial (RCT); level B RCT with significant limitations (downgraded) or high-quality observational study (OS) (upgraded), and level C entailed recommendations based only on observational studies (Barr et al., 2013). Actionable recommendations were further given a nominal rating of plus (+) or minus (-) symbols (Barr et al., 2013). A *strong for* was denoted as +1, a *strong against* was denoted as -1 (Barr et al., 2013). Weak rating for the level of evidence was denoted with a 2 with either +/- for a *strong for* or *strong against* (Barr et al., 2013). The scope of the guidelines encompassed both intubated and nonintubated adults in the ICU. However, for the purpose of the present project, consideration was given to recommendations addressing mechanically-ventilated patients in critical care. The guidelines placed major emphasis on the psychometric aspects of PAD monitoring tools, with specific focus on the prevention, diagnosis, and treatment of delirium.

Although direct recommendations for patients undergoing weaning from mechanical ventilation were not given in Barr et al. (2013), generalizations for this population could be made. Pain, agitation, and delirium could preclude patients from participating or tolerating the weaning process from mechanical ventilation (Barr et al., 2013). It is postulated that frequent assessment of PAD in mechanically-ventilated patients could prevent the negative sequalae due to excessive accumulation of sedatives (Barr et al., 2013). The guidelines recommended goal-directed sedation with the practice of daily sedation interruption (+1B; Barr et al., 2013).

When addressing the concept of sedation on mechanically-ventilated patients, one must always be cognizant to first acknowledge the need for adequate pain control. Pain is a symptom frequently experienced by critically ill patients and could result as a

consequence of intubation and mechanical ventilation itself (Patel & Kress, 2012). Some studies suggest that adequate pain management results in less need for sedative use (Patel & Kress, 2012). Although there is no objective tool for the assessment of pain in nonverbal patients, the Behavioral Pain Scale (BPS) and the Critical-Care Pain Observation Tool (CPOT) have been both validated for use in mechanically-ventilated patients. Barr et al. (20013) pointed out that vital signs alone should not be used for the assessment of pain; rather, vital signs should serve as a cue for further investigation in mechanically-ventilated patients (+2C; Barr et al., 2013). Both the BPS and CPOT tools could help guide administration of analgesics.

Prompt identification and treatment of possible underlying causes of agitation, such as hypoxia, hypoglycemia, hypotension, and withdrawal from alcohol and other drugs, as well as pain and delirium are important (Barr et al., 2013). Oversedation may result in a failure to routinely screen patients' readiness to wean (Perrem & Brochard, 2013). In two studies, approximately 60% to 70% of mechanically-ventilated patients in the ICU meet simple weaning criteria, meaning successful extubation after the first SBT (Conti, Mantz, Longrois, & Tonner, 2014; Perrem & Brochard, 2013). Daily screening for readiness to wean is a major diagnostic tool in determining successful extubation (Perrem & Brochard, 2013). Delayed awakening due to accumulation of sedative drug and lack of screening have been associated with failure of simple weaning, leading to prolonged mechanical support (Perrem & Brochard, 2013).

The depth and quality of sedation should be routinely assessed in patients receiving mechanical support in order to optimize the weaning process. According to Barr et al. (2013), the PAD guidelines recommend the use of goal-directed sedation and

daily sedation interruption unless clinically contraindicated. The Richmond Agitation-Sedation Scale has been validated for interrater reliability in the ICU and for titration of sedative over time (Barr et al., 2013; Patel & Kress, 2012). Sedation during the weaning process should be described and configured as analog-sedation, which highlights the primacy of pain relief for the delivery of patient comfort before, during, and after weaning (Conti et al., 2014). Most sedatives used for mechanically-ventilated patients generally depress the respiratory drive and should be avoided, especially during weaning (Conti et al., 2014; Patel & Kress, 2012).

Dexmedetomidine, an alpha-2 agonist, has both sedative and analgesic effects (Patel & Kress, 2012). In a meta-analysis on the long-term use of alpha-2 agonist for sedation of mechanically-ventilated patients, Chen et al. (2015) concluded that those patients receiving Dexmedetomidine were less likely to develop delirium when compared to those receiving usual care (i.e., Propofol or Benzodiazepines). Dexmedetomidine does not depress the respiratory drive like the other sedative drugs, allowing for a more awake and interactive patient (Chen et al., 2015; Patel & Kress, 2012).

Protocol Implementation Requirements

An interdisciplinary approach to guideline implementation is the best approach for evidence-based evidence assimilation. Barr et al. (2013) pointed out that continuous quality improvement measures such as provider education, preprinted and/or computerized protocols, order forms, and quality ICU rounds checklists, could facilitate guideline assimilation in critical care (+1B). However, in current literature insightful information is lacking as to what kinds of structural requirements for protocol implementation are needed. In the ABC study (Girard et al., 2008), there was no mention

of the process or structural resources required to implement such an intervention. Girard et al. (2008) did not track the time spent executing the protocol or document the resources used to implement the intervention. This lack of information posits a limitation in reproducing the findings of this study, given the structural heterogeneity of healthcare institutions. However, Girard et al. (2008) mention that the protocol "was designed to be done by bedside nurses and respiratory therapists during the course of routine care, and it was largely implemented by clinical staff during the trial" (p. 133).

A study by Goodman (2006) presented a step-by-step approach to protocol implementation but did not provide much information about the kind of education presented to the staff about the weaning process. Neither did Rumpke and Zimmerman (2010) provide the process undertaken; however, this study was useful because the authors shared their weaning and sedation tools. Rumpke and Zimmerman (2010) mentioned "mandatory education" for the interdisciplinary staff, which ultimately allowed them to "proceed with protocol implementation with a sense of confidence" (p. 47). However, limited follow-up information was provided about adherence to the implemented protocol.

A Canadian study by Beck and Johnson (2008) on the implementation of a nurse-driven sedation protocol relates the steps taken but not how many educational sessions were presented to the staff, only that education was presented over a 3-month period. Like the other two studies by Goodman (2006) and Rumpke and Zimmerman (2010), Beck and Johnson (2008) took an interdisciplinary approach for protocol development and implementation. One could therefore extrapolate that leadership support, and

interdisciplinary congruence, must be primary for successful implementation of any protocol.

Barriers to Guideline Adherence

Barriers to guideline implementation are numerous and may vary from clinician to clinician (Tanios et al., 2009). Survey data assessing compliance with the 2002 SCCM guidelines addressing pain, agitation, and delirium suggested that many challenges are associated with implementation. For example, surveys assessing compliance with daily sedation interruption (DIS) found that only 29% of Canadian intensivists used sedation protocols; 40% of them performed sedation interruption and only 63% did so for all their patients. In an international study from France, Tanios et al. (2009) found that only 36% of ICUs had sedation protocol in place, and none of the ICUs were conducting daily sedation interruption. A survey by Tanios et al. (2009) on the use of sedation protocol identified several barriers. Of those clinicians who had sedation protocol in place, the 3 most common barriers preventing sedation protocol use were (a) lack of physician order for the protocol, (b) nursing preference not to use the protocol, and (c) in certain situations requests by the caregiver of more control of sedation than the protocol would allow (Tanios et al., 2009).

In the Tanios et al. (2009) study, a drug preference was not associated with better compliance with guidelines. According to the study, of those who responded, 92% chose a sedation regimen with GABA agonists. And perhaps due to the lower associated cost with benzodiazepines, 66% of clinicians in this study chose a benzodiazepine regimen (Tanios et al., 2009). The three most common barriers to the use of daily sedation

interruption included (a) concerns about respiratory compromise, (b) lack of nursing acceptance, and (c) concerns about patient-initiated device removal.

Guidelines and protocols are based on the best available evidence, usually developed through multidisciplinary consensus. Success of a new protocol requires multidisciplinary collaboration. After implementation, factors that affect adherence must be addressed. These factors may include the clinicians' underlying knowledge and attitudes, the incentives in place for them to change practice, and the organizational culture in which they practice.

Interventions Targeting Adherence

A systematic review titled "Interventions to Improve Professional Adherence to Guidelines for Prevention of Device-Related Infections" by Flodgren et al. (2013) assessed the effectiveness of different interventions, alone or in combination, targeting healthcare professionals or healthcare organizations in terms of improved adherence to infection control guidelines on device-related infection rates and measures of adherence. The authors included 13 studies, 12 of which followed an interrupted time series design (ITS), and only one randomized controlled trial. The studies involved 40 hospitals, 51 ICUs, 27 wards, and more than 3,504 patients and 1,406 professionals.

Of the 13 studies included, six targeted improved adherence to guidelines preventing ventilator-associated pneumonia (VAP), six central-line associated blood stream infections (CLABSI), and one addressed urinary catheter practices. Given the nature of the study designs and heterogeneity of the methodologies involved, all included studies were judged to have a moderate to high risk of bias and very low quality of evidence by the authors (Flodgren et al., 2013). Although this study provides some

evidence on how to prevent device-related infections, a significant evidence-to-practice gap still remains.

According to Flodgren et al. (2013), implantation strategies targeting guideline adherence could be either passive or active, with active appearing to have the greatest impact. Passive implementation strategies entail the distribution of educational materials, posters, and visual aids. Active strategies, those that require some form of interaction with the healthcare professional, entail a more dynamic approach of integration of reminders, audit and feedback, interactive workshops, and one-to-one academic detailing (Flodgren et al., 2013; Garg et al., 2005).

According to Grimshaw (2004, as cited in Flodgren et al., 2013), the design and implementation of interventions to improve adherence with guidelines depends on successful behavior change interventions which require an appropriate method for characterizing intervention and linking the intervention to an analysis of the target behavior. All of the studies reviewed incorporated some form of core educational intervention targeted at the healthcare professional to support guidelines adoption. The interventions were comprised of one active intervention with or without passive reinforcements. The results for both the VAP and CLABSI studies were mixed, with half showing beneficial effect and the other half showing no effect or an increased infection rate. It is worth noting that six of the studies which showed a significant decrease of infection rates incorporated more than one active intervention, which was repeatedly administered over time (Flodgren et al., 2013).

Summary

In this section was discussed a gap in the translation of evidence-based interventions into practice. A general overview of sedation practices in critical care was presented. In this section was also discussed the efficacy of sedation vacation in mechanically-ventilated patients, with a brief presentation of the guidelines. Requirements for protocol implementation, barriers to guideline adherence, and interventions targeting adherence of best-evidence into practice were also addressed.

SECTION THREE

METHODS

The purpose of this scholarly project was to decrease practice variation in sedation management during the weaning process from mechanical ventilation through an educational intervention based on current guidelines for sedation practices in the intensive care unit. In this section, several components associated with the methodology used for this project are introduced, including project design, setting, project participants, ethical considerations, resources, and phases with their outcome measures.

Project Design

This scholarly project followed a pretest and posttest design with a planned educational intervention, encompassing two phases. The preintervention entailed a self-administered survey evaluating the most salient factors associated with nurses' sedation and weaning practice in the ICU. The intervention encompassed an active component with passive reinforcements. The educational component consisted of a core educational presentation in didactic format supplemented with PowerPoint slides. The presentation highlighted indications and contraindications for daily sedation interruption and criteria for readiness to wean, as well as validated tools recommended by guidelines for the systematic assessment of mechanically-ventilated patients. At the end of the didactic presentation, the participants were provided with a hard copy of the PowerPoint slides as passive reinforcement. Finally, the postintervention included vignettes with commonly encounter scenarios in the ICU assessing knowledge acquisition postpresentation.

Setting

The setting for this study was Barry University College of Nursing and Health Sciences, Miami, Florida.

Project Participants

Project participants were graduate nursing students attending the Barry University College of Nursing and Health Sciences and who work as critical care nurses.

Inclusion and Exclusion Criteria

Every critical care nurse who provides direct care to critically ill adults undergoing weaning from mechanical support was considered eligible to participate. Critical care nurses working with a pediatric population were excluded, given that different assessment tools are used in the pediatric population.

Ethical Considerations

Before implementation of the project, approval from Barry University's Institutional Review Board (IRB) was requested and procured (Appendix A). Permission was granted from the Barry University Director of Nurse Practitioners and DNP Specializations for the researcher to present the intervention (Appendix B). A cover letter (Appendix C) was provided to participants explaining the nature of the project and asking for their participation. Completion of the pretest and posttest tools was anonymous. Anonymity was ensured by the researcher enclosing the pre/posttest tools in manila envelopes. Upon completion of the tools in classrooms, the participants were asked to place the completed surveys back in their designated envelopes and deposit these in a temporarily sealed container outside of the classrooms. The researcher then picked up the box later that day. Voluntary attendance and participation implied consent. No direct

risks were anticipated in this scholarly project. Participants' choosing not to complete the instruments or remain for the full study did not affect their overall academic evaluations as students. The researcher did not collect any identifiable data from the participants, and no harm from participation was anticipated or noted.

Resources

An adaptation of the survey instrument "Evaluating Sedation Practices in the Intensive Care Unit" (ESPICU) by Tanios et al. (2009) was used for the pretest phase of this project (Appendix D). Permission to use and amend the tool was procured from the author (Appendix E). The original instrument (Appendix F) was developed through a deliberate stepwise process that included item generation and construction (Tanios et al., 2009). The survey tool was pilot tested and clarified. Focus groups consisting of intensivists, critical care pharmacists, and nurses at Tufts-New England Medical Center (Boston, Massachusetts) were used to refine the survey items. The instrument is a 17-item survey divided into 4 sections: (a) demographics, (b) sedation choice, (c) frequency of use of sedation protocols and perceived barriers to their use, and (d) use of sedation interruptions and perceived barriers to their use (Tanios et al., 2009). For the present study, six additional questions were added to the survey addressing weaning practices in the ICU. The adapted version is a 24-item survey.

The researcher developed a PowerPoint presentation based on the PAD guidelines. Knowledge acquisition was then evaluated by participants' answering questions of commonly encountered scenarios in the ICU in the form of vignettes. At the end of the educational presentation, participants were provided with the hard copy of the PowerPoint slides as passive reinforcement.

Phase I

Permission from Barry University's Director of Nurse Practitioners and DNP Specializations was procured (Appendix B). This phase entailed access to participants via flyers (Appendix G) and email, as well as access to a classroom to host the educational intervention. Recruitment took place over a 2-week period. Permission was procured to send a blast email, including the flyer and cover letter (Appendix C), to students attending Adult Gerontology/Acute Care II during the summer semester.

The plan was to recruit a maximum of 30 participants for the study. This phase also entailed the researcher's development of an educational presentation in the form of a PowerPoint (Appendix H). The PowerPoint highlighted indications and contraindications for daily sedation interruption and criteria for readiness to wean, as well as validated tools recommended by guidelines for the systematic assessment of mechanically-ventilated patients. Permission from the program director and approval from this project's chair giving permission to use the PowerPoint constituted completion of Phase I.

Phase II

The educational intervention, with the pre/posttest, took effect in the third week. The itinerary is duplicated in Appendix I. As a token of appreciation, the participants were provided with a light lunch. Completion of the adapted version of the ESPICUS survey met Objective 2 of this project. At the completion of the intervention, participants were given a hard copy of the PowerPoint as passive reinforcement. Completion of the vignettes (Appendix J), developed by the researcher, helped answer the questions posed in this project, as well as meeting Objectives 1, 3, and 4.

Summary

This section presented the components associated with methodology. Project design, setting, project participants, ethical considerations, resources, and phases with their outcome measures were delineated. The appendices contain the associated paper trail supplementing this project.

SECTION FOUR

RESULTS AND DISCUSSION

The problem was that there is poor adherence to sedation protocols in the ICU when clinicians wean patients off mechanical ventilation. In this section the results of the study are presented and the findings, strengths and limitations are discussed, along with the implications for practice, healthcare outcomes, healthcare delivery, and healthcare policy.

Phase I

Permission to access graduate nursing students attending Barry University College of Nursing and Health Sciences to participate in the study was granted by the Director of Nurse Practitioners and DNP Specializations (Appendix B). After gaining access to the participants, a cover letter was provided to them explaining the nature of the project asking for their participation, and detailing the inclusion and exclusion of participation. The objective was to recruit 30 participants for the study and for the researcher to conduct all components of the project (pretest, intervention, and posttest) on the same day. However, due to access of availability to students attending Adult Gerontology/Acute Care II, the pretest was conducted first. Two weeks later, the educational intervention and posttest were implemented. Twenty-eight students participated in the project. A total of 17 completed the pretest survey and 28 completed the posttest, the vignettes. The educational intervention and posttest were carried out on the same day.

The first objective, to use the guidelines published by the Society of Critical Care Medicine in 2013 on pain, agitation, and delirium to guide an educational intervention,

was met through the development of an hour-long curriculum. The development of the educational intervention required advanced knowledge in the pathophysiology, assessment, and intervention associated with sedation management of mechanically-ventilated patients. The guidelines on pain, agitation, and delirium by the SCCM (Barr et al., 2013) were used as the foundation for the education presentation. The researcher's clinical experiences in the area of critical care and ongoing preceptorship with critical care experts facilitated the molding of the educational tool. The content of the educational material was evaluated by an expert with extensive clinical experience in the area of pulmonology, who was also lead educator for the Barry University Acute Care Nurse Practitioner program.

Phase II

The second objective, to identify barriers to guideline adherence on sedation management for mechanically-ventilated patients in the ICU, was met through the completion of the modified EPICUS survey on sedation practices by Tanios et al. (2009). The instrument published by Tanios et al. (2009) is a 17-item survey divided into four sections: (a) demographics, (b) sedation choice, (c) frequency of use of sedation protocols and perceived barriers to their use, and (d) use of sedation interruptions and perceived barriers to their use. For the current project, six additional questions were added to the survey addressing clinicians' weaning practices in the ICU. The adapted version was a 24-item survey. Descriptive statistics included percentages for categorical variables. All statistical analysis was performed with the IBM Statistical Package for the Social Sciences (SPSS,), version 21software (IBM SPSS, 2013).

Of the 17 participants who completed the pretest, 77% had 10-12 years or less of clinical critical care experience, with the majority (41%) having 4-6 years. The primary ICU setting was reported as mixed medical-surgical within community hospitals by 88% of the participants. Eighty-two percent reported having a 1:2 nurse-patient ratio. Of particular interest, it was noted that although there was awareness of having ICU protocols for the management of weaning from mechanical ventilation and for sedation (88% and 82 %, respectively), only one participant reported ever being involved in protocol development in the unit. Fewer than 65% reported that nursing contributions influence decisions made regarding mechanical ventilation. Only 41% reported ongoing professional development for the management of mechanical ventilation within their institutions.

The concept of daily sedation interruption was familiar to 94% of the participants, but only77% reported an association between sedation and patient outcome for mechanically-ventilated patients in the ICU. Fewer than 53% performed daily sedation interruption 100% of the time. Only 41% used a sedation protocol within their ICU. This lack of adherence seemed to exist despite the availability of a sedation protocol in the unit.

Figure 2 shows the responses to the first question posed in the study: What are some of the reasons given by critical care nurses as to why once daily sedation interruption is not utilized for all mechanically-ventilated patients in the ICU? Three of the most frequently reported reasons were the possibility of respiratory compromise (34%), patient-initiated device removal (29%), and compromising patient comfort (11%), respectively. The findings of this study were similar to the findings by Tanios et al.

(2009). Unlike Tanios et al. (2009), in the present study nursing acceptance was not one of the main reasons given for not conducting daily sedation interruption.

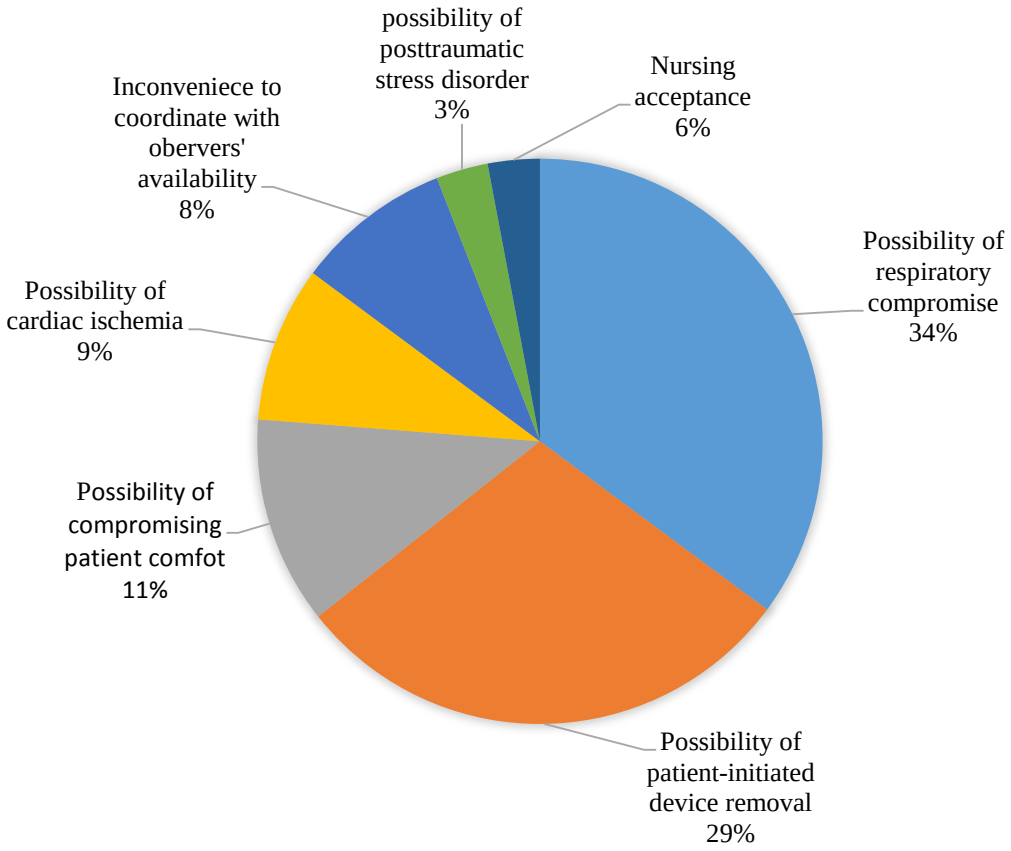

Figure 2. Reasons that once daily interruption of sedation is not utilized by critical care nurses for all mechanically-ventilated patients in the ICU**.**

The results of the survey offered important insights into practices for sedation and analgesia in the ICU. Figure 3 reflects the most frequently used sedation regimens for mechanically-ventilated patients, as reported by the participants of this project. The sedation regimen most frequently used were Propofol (94%), followed by Precedex (88%). These findings differ from the DOLOREA study by Payen et al. (2007). According to Payen et al. (2007), Propofol was used 20% of the time. The reported use of Dexmedetomidine in this study was significantly higher when compared to other studies (Ely et al., 2004; Girard et al., 2008; Payen et al., 2007; Tanios et al., 2009). Although a GABA-agonist was indicated as the main source of sedation, the choice of Propofol instead of Midazolam or Ativan was indicated as the main choice.

According to Goodwin et al. (2012), Dexmedetomidine, in contrast to low-dose Propofol, has been known to reduce the negative sequelae of neurocognitive dysfunction associated with critical illness. Patients on Dexmedetomidine are more awake, allowing for cooperation as active participants in their care (Goodwin et al., 2012). The mandate of the PAD guidelines to treat pain first and then use sedation if needed was not adequately reflected in the responses. This finding concurs with the findings from other studies on the inadequacy of pain management in mechanically-ventilated patients (Patel & Kress 2012; Payen et al., 2007). The consensus was that sedation does not equate analgesia (Payen et al., 2007).

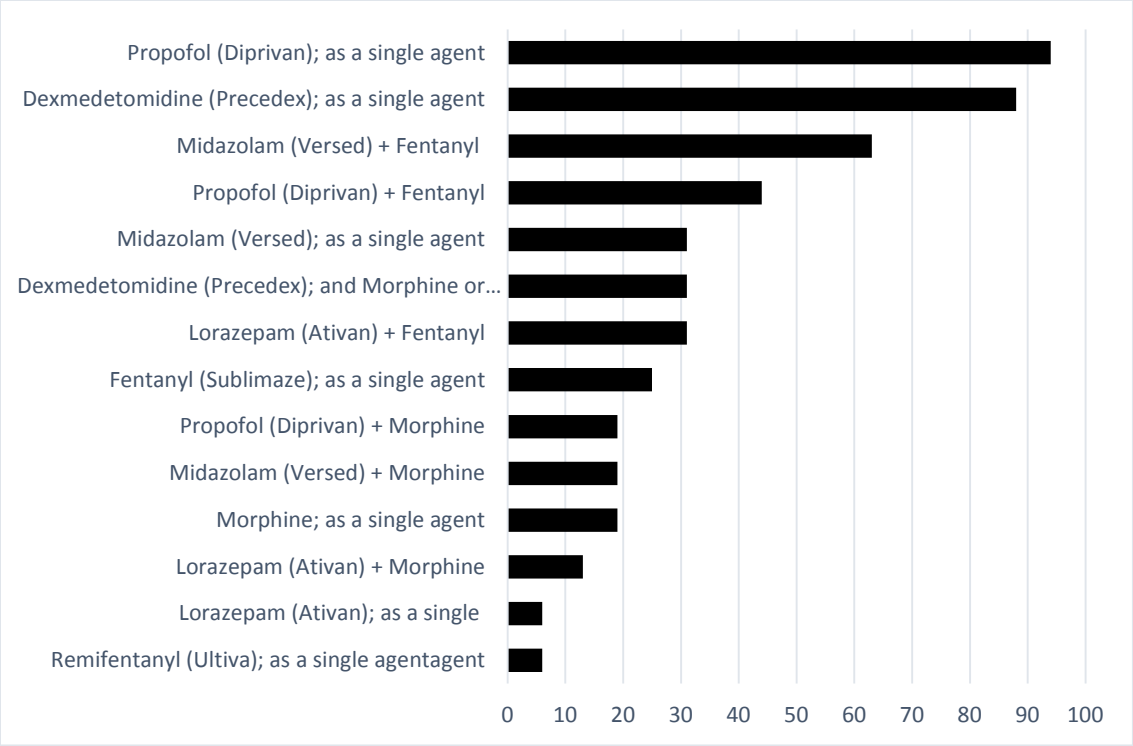

Figure 3. Most frequently used sedation regimen for mechanically-ventilated patients in the ICU.

Objectives 3 and 4, to present parameters for weaning readiness on mechanically-ventilated patients and validated assessment scale recommended by the SCCM guidelines for sedated patients on mechanical ventilation were met through an educational presentation. The vignettes helped address the second question posed in this study: How would an educational intervention affect nurses' knowledge on sedation guidelines during the weaning process? After a single session, 100%-75% of the participants were able to properly identify indications and contraindications for daily sedation interruption. A total of 79% properly identified the need to assess and treat pain before sedation, and 86% properly identified the need to seek for underlying causes of agitation. Figure 4 shows the percentage of correctly answered vignettes.

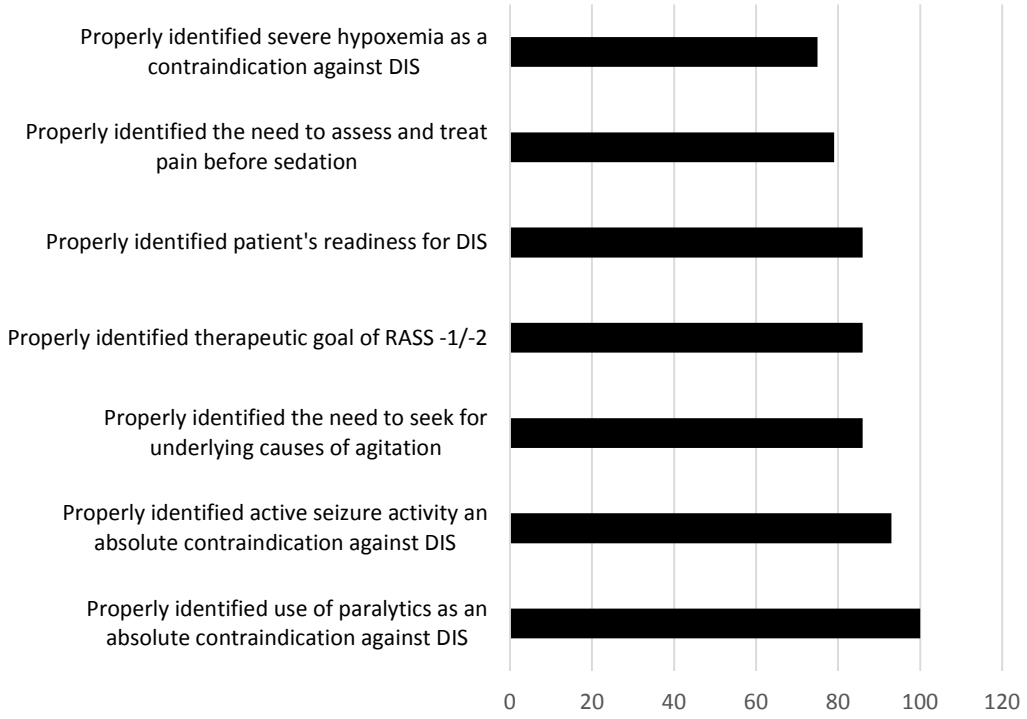

Figure 4. Percentage of correctly answered vignettes.

According to Richman and Mercer (2002), the vignette method, primarily qualitative in nature, provides nurse educators an innovative way to bridge the alleged "theory-practice gap" (p. 70). Vignettes are used to extrapolate data by requests of study participants how they would act under certain circumstances (Tulaimat & Mokhlesi, 2011). This method posits a flexible alternative beyond the direct control and surveillance of the researcher (Richman & Mercer, 2002). The use of vignettes could provide a feasible alternative to direct observation during nursing care and the educational preparation of nursing staff (Richman & Mercer, 2002; Tulaimat & Mokhlesi, 2011). The vignette strategy was used in this study to extrapolate the extent of participants' knowledge application after an educational intervention disseminating the PAD guidelines.

Strengths and Limitations of the Project

A strength of this study was the development of the educational tool and vignettes by the researcher. The development process involved a holistic integration of the researcher's academic training as an adult gerontology acute care nurse practitioner and her clinical critical care experience. The educational tool was based on the latest recommendations in evidence-based practice on sedation (Ramoo et al., 2014; Tanios et al., 2009).

The educational intervention was fiscally feasible. The cost of used resources was less than $300.00, with the bulk of the expenses primarily incurred on snacks provided to participants during the presentation and the researcher's daily expenses in food and gasoline. The researcher was well prepared for the expense, and the project did not posit any financial strain.

A broader perception of local practice was assumed by conducting of the study at the university. The responses received came from critical care nurses working in different institutions within the local community. Because the study was conducted at a neutral environment, it is believed that the responses were closer to actual practice than if the study had been conducted in the nurses' healthcare institutions. It is believed that participants did not feel the organizational constraint posited in some cases by direct observational studies. The responses to the survey were similar to what is known in literature about sedation practice in the ICU.

A limitation of the study was the sample size and variance from the pretest to posttest. The intent was to recruit 30 participants. However, due to access availability to the students, this recruitment goal was not met. Although the intent was to administer

pretest, intervention, and posttest on the same day, some participants' schedules precluded full participation. Thus, the pretest was administered one day, and the intervention and posttest another. A total of 17 participants completed the pretest and 28 completed the posttest. However, the researcher wanted to retain the opportunity to collect data and to implement the educational intervention. Therefore, to gain as many participants as possible, the researcher administered the pretest and intervention and posttest on two separate occasions.

Implications for Practice

Nurses are primarily responsible for the management of sedation in ventilated patients. The depth of sedation has direct association with patient outcome (Ely et al., 2004; Girard et al.; 2008; Payen et al., 2007; Rumpke & Zimmerman, 2010; Skrobik et al., 2010). Readiness to wean from mechanical ventilation is a dynamic process (Girard et al., 2008; Rumpke & Zimmerman, 2010). Given their temporal advantage, nurses are able appreciate subtle nuances. The use of guidelines for the development of an educational tool met the requirements for DNP Essentials I and III. These are Nursing Science and Theory: Scientific Underpinning for Practice; and Clinical Scholarship and Analytical Methods for Evidence-Based Practice, respectively. With regard to DNP Essentials III and VI, the pain, agitation, and delirium guidelines published by the SCCM (Barr et al., 2013) were chosen because of their strong connotation advocating close interdisciplinary collaboration and a more lateral organizational structure than is generally practiced.

Healthcare Outcomes

This project could potentially be used to improve outcomes of mechanically-ventilated patients in the ICU. By clinicians' establishment of consensus and decreasing practice variation in clinical practice, patients would more likely be kept at a therapeutic goal of sedation. A state of cooperative sedation would allow for better neurocognitive function, in turn decreasing morbidity and mortality.

Healthcare Delivery

According to Berwick (2003, as cited in Burkart-Jayez, 2011), "failing to use science is costly and harmful: it leads to overuse of unhelpful care, underuse of effective care and errors in execution" (p. 162). A crucial step in decreasing variance in sedation practice is the improvement of nurses' competency level. This project was meant to disseminate the latest recommendations found to decrease morbidity and mortality on critically ill patients receiving mechanical ventilation.

Healthcare Policy

The rate of pain assessment of patients in the ICU is largely disregarded. This concept was reflected in the participants' responses to the vignettes. A total of 79% properly identified the need to assess and treat pain before sedation. A possible explanation for this gap in practice by Payen et al. (2007) is that clinicians might have low motivation to perform routine pain and sedation assessment because there is no visible impact on patient outcome. In the DOLOREA study, Payen et al. (2007) found that implementation of ICU protocols with increased education about pain and sedation increased adherence to national guidelines. In the present study, although most nurses reported the existence of a protocol in their unit, only 41% were provided with ongoing

professional development. Sustainability of any concept could be further established in nurses' clinical practice through education.

Recommendations for Future Projects

Future considerations should be placed on the involvement of nurses in guideline development and implementation. An area that was not addressed in this study was the area of nursing documentation as it supports guidelines adherence. Nurses were not asked if their documentation matched the essential elements required by the PAD guidelines. For example, Does the organization's EMR provide the assessment tools recommended by the guidelines? Are these properly translated to optimize protocol adherence? More emphasis should be placed on facilitators of practice and how to break down barriers.

Summary

In this section the results of the study, findings, and strengths and limitations were discussed, with implications for practice, healthcare outcomes, healthcare delivery, and healthcare policy. An active educational intervention with the use of vignettes proved useful in improving guideline knowledge application for critical care nurses. More emphasis should be placed on nurses' continuous professional development in the area of mechanical ventilation and sedation. Future projects should involve of nurses in guideline development.

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APPENDIX A

IRB LETTER OF APPROVAL

Barry University
Division of Academic Affairs

Institutional Review Board
[redacted]

Research with Human Subjects
Protocol Review

Date:	April 20, 2015
Protocol Number:	150408
Title	Improving Sedation Practice in Adult Intensive Care Units
Meeting Date:	April 15, 2015
Researcher Name: Address:	Ms. Maritza Scarlet Baez [redacted]
Faculty Sponsor:	Dr. Delia Leal Nursing & Health Science

Dear Ms. Baez:

On behalf of the Barry University Institutional Review Board (IRB), I have verified that the specific changes requested by the IRB have been made. Therefore, I have granted final approval for this study as exempt from further review.

As principal investigator of this protocol, it is your responsibility to make sure that this study is conducted as approved by the IRB. Any modifications to the protocol or consent form, initiated by you or by the sponsor, will require prior approval, which you may request by completing a protocol modification form.

It is a condition of this approval that you report promptly to the IRB any serious, unanticipated adverse events experienced by participants in the course of this research, whether or not they are directly related to the study protocol. These adverse events include, but may not be limited to, any experience that is fatal or immediately life-threatening, is permanently disabling, requires (or prolongs) inpatient hospitalization, or is a congenital anomaly cancer or overdose.

The approval granted expires on May 13, 2016. Should you wish to maintain this protocol in an active status beyond that date, you will need to provide the IRB with and IRB Application for Continuing Review (Progress Report) summarizing study results to date.

APPENDIX B

PERMISSION FROM THE DIRECTOR TO PRESENT INTERVENTION

April 2, 2015

To whom it may concern;

Maritza Baez has permission to present a one hour educational intervention to graduate nursing students during the summer semester of 2015 commencing on May 11, 2015 and ending July 31, 2015. Upon IRB approval she may recruit graduate students attending Barry University College of Nursing and Health Sciences graduate nursing program who work in critical care. I approve access to a classroom for the entire hour, preferably prior to the students' regularly scheduled class. She is allowed to post a flyer in the Wiegand building for a period of two weeks, as well as send it through blast-email to students enrolled in NUR 670 and NUR 668. She may recruit up to 30 participants and provide her planned token of appreciation, a light lunch to the volunteers. I support her endeavor to provide the educational program to the graduate nurses. This will not detract from the current course objectives for students enrolled in NUR 670 and NUR 668.

Sincerely

Terri Rocafort
Director of NP and DNP Specializations
Barry University

APPENDIX C

COVER LETTER

Barry University
Cover Letter

Dear Research Participant:

Your participation in a scholarly project is requested. The title of the project is *Improving Sedation Practice in Adult Intensive Care Unit*. The project is being conducted by Maritza S. Báez, a student in the College of Nursing and Health Sciences at Barry University. She is seeking information that will be useful in the field of critical care. The aim of the research is to decrease practice variation in sedation management during the weaning process from mechanical ventilation.

In accordance with these aims, the following procedures will be used: complete survey on sedation and practices, participate in an educational intervention, and complete a post education vignette and survey. We anticipate the number of participants to be 30 critical care nurses.

If you decide to participate in this project, you will be asked to: complete survey on sedation and practices, participate in an educational intervention, and complete a post education vignette and survey.

Your consent to be a project participant is strictly voluntary, and should you decline to participate or should you choose to drop out at any time during the study, there will be no adverse effects on your academic progress.

There are no known risks to you if you chose to participate. Although there are no direct benefits to you, your participation in this study may help our understanding of sedation practices during the weaning process in adult ICUs.

As a project participant, information you provide will be kept anonymous, that is, no names or other identifiers will be collected on any of the instruments used. Data will be kept in a locked file in the researcher's office. By completing and returning this survey you have shown your agreement to participate in the study.

If you have any questions or concerns regarding the study or your participation in the study, you may contact me, Maritza S. Báez, at [redacted], my supervisor, Dr. Delia Leal, PhD, ACNP-BC, CCRN, [redacted], or the Institutional Review Board point of contact, Barbara Cook, at [redacted].

Thank you for your participation.

Sincerely,

Maritza S. Báez

APPENDIX D

ADAPTED SURVEY:

EVALUATING SEDATION AND WEANING PRACTICES IN THE INTENSIVE CARE UNIT

Evaluating Sedation and Weaning Practices in the Intensive Care unit

1. What is your primary clinical care role?
   a. Physician
   b. Nurse
   c. Pharmacist
   d. Physician Assistant
   e. Clinical nurse specialist

2. How many years in clinical critical care practice? (post training)
   a. I am still training
   b. 1-3 years
   c. 4-6 years
   d. 7-9 years
   e. 10-12 years
   f. 13-15 years
   g. 16-19 years
   h. 20+ years

3. What is the setting of your primary intensive care unit
   a. Medical intensive care unit
   b. Coronary intensive care unit
   c. Surgical intensive care unit
   d. Mixed medical-surgical intensive care unit
   e. Trauma intensive care unit
   f. Cardiothoracic intensive care unit
   g. Burn intensive care unit
   h. Stepdown/intermediate/telemetry ICU
   i. Long-term acute care unit

4. How would you characterize the primary hospital where you practice
   a. University hospital
   b. Non-University teaching hospital
   c. Community hospital
   d. Veterans Affairs hospital

5. How many total critical care beds do you estimate are in your primary hospital?
   a. 100+
   b. 100-70
   c. 69-50
   d. 49-30
   e. 29-10
   f. less than 20

6. How many beds are in the main (or primary) ICU in which you practice?
   a. 21+
   b. 16-20
   c. 11-15
   d. 6-10

7. What is the nurse-to patient ratio for patients receiving mechanical ventilation in your ICU?
   a. 1:1 ratio
   b. 1:2 ratio
   c. 1:3 ratio
   d. Other, please specify _____

8. What percentage of patients in your primary ICU do you estimate are mechanically ventilated?
   a. 100-76%
   b. 75-51%
   c. 26-50%
   d. 0-25%

9. How often do nursing contributions influence decisions made regarding mechanical ventilation?
   (never) 0 1 2 3 4 5 6 7 8 9 10 (always)

10. In your ICU, do you have guideline/policy/protocol for management of mechanical ventilation?
    a. Yes
    b. No
    c. Uncertain

11. In your ICU, do you have a guideline/policy/protocol for weaning from mechanical ventilation? *(answer required)
    a. Yes
    b. No
    c. Uncertain

12. If yes, where you involved in the development of this protocol?
    a. Yes
    b. No
    c. Not applicable

13. Does your ICU have a sedation protocol? *(answer required)
    a. Yes
    b. No

14. If yes, where you involved in the development of this protocol?
    a. Yes
    b. No
    c. Not applicable

15. Do nurses receive education on ventilation during ICU orientation?
    a. Yes
    b. No
    c. Uncertain

Evaluating Sedation and Weaning Practices in the Intensive Care unit

16. Do nurses receive education on sedation management during ICU orientation?
    a. Yes
    b. No
    c. Uncertain

17. Are opportunities available in your ICU for ongoing professional development related to mechanical ventilation?
    a. Yes
    b. No
    c. Uncertain

18. From the list of sedation regimens, please choose the five regiments that are the most frequently used for your intubated and mechanically ventilated patients (with no. 1 being the most frequently used and no. 5 the fifth most frequently used regimen)

	1	2	3	4	5
Morphine; as a single agent					
Fentanyl (Sublimaze); as a single agent					
Lorazepam (Ativan); as a single agent					
Lorazepam (Ativan) + Morphine					
Lorazepam (Ativan) + Fentanyl					
Midazolam (Versed); as a single agent					
Midazolam (Versed) + Morphine					
Midazolam (Versed) + Fentanyl					
Propofol (Diprivan); as a single agent					
Propofol (Diprivan) + Morphine					
Propofol (Diprivan) + Fentanyl					
Dexmedetomidine (Precedex); as a single agent					
Dexmedetomidine (Precedex); and Morphine or Fentanyl					
Remifentanil (Ultiva); as a single agent					
Other agent(s)— Please indicate which					

19. In your opinion, is there an association between sedation administered and patient outcome for mechanically ventilated patients in the intensive care unit?
    a. Yes
    b. No

20. How often is once a daily interruption of sedation therapy employed for mechanically ventilated patients under your care in the ICU?
    a. 100-76%
    b. 75-51%
    c. 50-26%
    d. 25-1%
    e. Never
    f. I am not familiar with this strategy

21. List the three (3) most important reasons that a once daily interruption of sedation therapy is not utilized for all mechanically ventilated patients under your care in the ICU?
    a. Inconvenient to coordinate with observers' ability
    b. No proven benefit
    c. Possibility of patient-initiated device removal
    d. Possibility of cardiac ischemia
    e. Possibility of posttraumatic stress disorder
    f. Possibility of respiratory compromise
    g. Possibility of compromising patient comfort
    h. Nursing acceptance
    i. Other (please specify)

22. The sedation protocol is used for what percentage of mechanically ventilated patients under your care?
    a. ALL
    b. 99-76%
    c. 75-51%
    d. 50-26%
    e. 25-0%

23. In your opinion, which of the following population of mechanically ventilated ICU patients would NOT be managed with a sedation protocol?
    a. Cardiothoracic ICU patients
    b. Medical ICU patients
    c. Neurosurgical ICU patients
    d. Neonatal ICU patients
    e. Pediatric ICU patients
    f. Trauma ICU patients
    g. All ICU populations should be managed with a sedation protocol
    h. Other (please specify)

Adapted from Tanios et al. (2009), pp. 71-72.

APPENDIX E

PERMISSION TO USE THE SURVEY

From: John Devlin Hide

To: Maritza Baez

Cc: Delia M Leal

RE: Seeking permission to use survey tool

February 22, 2015 at 15:04

Hi Maritza:
Please do use our survey instrument as you would like. I do not have additional psychometric properties for the instrument other than what I have included in the paper.
Good luck with your research!
Thanks- John

From: Baez, Maritza (Barry Student) [redacted]
Sent: Sunday, February 22, 2015 1:59 PM
To: Devlin, John
Cc: Leal, Delia M
Subject: Seeking permission to use survey tool

Good afternoon, my name is Maritza Baez, Doctor of Nursing Practice student from Barry University. I am currently in the process of developing the proposal for my scholarly project and would like to request permission to use the survey instrument published in article doi: 10.1016/j.jcrc.2008.03.037, titled: Evaluating practices in the intensive care unit. I have been looking for a survey tool that would be relevant to my project and finally, I definitely believe that this instruments is the most relevant to what i want to concentrate on -
- sedation protocol/guideline use through the weaning process from Mechanical Ventilation.
If permission is granted, an adaptation of the survey will be administered to 50 participants, and only to be used for academic purposes. I would also like to request the psychometric properties of the instrument, if possible.

Best regards,

Maritza Baez, DNP student
[redacted]

APPENDIX F

ORIGINAL SURVEY

protocols and daily sedation interruption are numerous. These barriers should be addressed on an institutional basis to boost the use of these evidence-based strategies in daily practice.

Appendix A. Survey Instrument

Evaluating sedation practices in the intensive care unit

1. What is you primary critical care clinical role?

Physician
Nurse
Pharmacist
Physician Assistant
Clinical Nurse Specialist

2. If you practice in the United States, in what region of the country do you practice?

Northeast
Midwest
Southeast
South
Northwest and Alaska
Southwest and Hawaii
Do not practice in the United States

3. Years in clinical critical care practice? (post training)

I am still training
1-3 years
4-6 years
7-9 years
10-12 years
13-15 years
16-19 years
20 + years

4. What is the setting of your primary intensive care unit?

Medical intensive care unit
Coronary intensive care unit
Surgical intensive care unit
Mixed medical-surgical intensive care unit
Trauma intensive care unit
Cardiothoracic intensive care unit
Neuroscience intensive care unit
Burn intensive care unit
Stepdown/intermediate/telemetry ICU
Long-term acute-care unit

5. How would you characterize the primary hospital where you practice?

University hospital
Non-university teaching hospital
Community hospital
Veteran Affair hospital

6. What percentage of patients in your primary ICU do you estimate are mechanically ventilated?

100-76%
75-51%
26-50%
0-25%

7. How many beds are in the main (or primary) ICU in which you practice?

21+
16-20
11-15
6-10
Less than 5

8. How many total critical care beds do you estimate are in your primary hospital?

100+
100-70
69-50
49-30
29-10
Less than 20

9. From the following list of sedation regimens, please choose the five regimens that are most frequently used for your intubated and mechanically ventilated patients (with no. 1 being the most frequently used and no. 5 the fifth most frequently used regimen)

	1	2	3	4	5
Morphine; as a single agent					
Fentanyl (Sublimaze); as a single agent					
Lorazepam (Ativan); as a single agent					
Lorazepam (Ativan) + morphine					
Lorazepam (Ativan) + fentanyl					
Midazolam (Versed); as a single agent					
Midazolam (Versed) + morphine					
Midazolam (Versed) + fentanyl					
Propofol (Diprivan); as a single agent					
Propofol (Diprivan); and morphine					
Propofol (Diprivan); and fentanyl					
Dexmedetomidine (Precedex); as a single agent					
Dexmedetomidine (Precedex); and morphine or fentanyl					
Remifentanil (Ultiva); as a single agent					
Other agent(s)—please indicate in box below					

10. In your opinion, is there an association between sedation administered and patient outcome for mechanically ventilated patients in the intensive care unit?

Yes
No

11. How often is a once daily interruption of sedation therapy employed for mechanically ventilated patients under your care in the ICU?

100-76%
75-51%
50-26%
25-1%
Never
I am not familiar with this strategy

12. List the three (3) most important reasons that a once daily interruption of sedation therapy is not utilized for all mechanically ventilated patients under your care in the ICU?

Inconvenient to coordinate with observers' availability
No proven benefit
Possibility of patient-initiated device removal
Possibility of cardiac ischemia
Possibility of posttraumatic stress disorder
Possibility of respiratory compromise
Possibility of compromising patient comfort
Nursing acceptance
Other (please specify)

13. Does your ICU have a sedation protocol? (*answer required)

Yes
No

14. The sedation protocol is used for what percentage of mechanically ventilated patients under your care?

ALL
99-76%
75-51%
50-26%
25-0%

15. Were you involved in the development of this protocol?

Yes
No

16. In your opinion, which of the following populations of mechanically ventilated ICU patients should NOT be managed with a sedation protocol?

Cardiothoracic ICU patients
Medical ICU patients
Neurological ICU patients
Neurosurgical ICU patients
Neonatal ICU patients
Pediatric ICU patients
Trauma ICU patients
All ICU populations should be managed with a sedation protocol
Other (please specify)

17. What is the main reason that a sedation protocol is not utilized for all the mechanically ventilated patients under your care?

Inconvenient
No proven benefit
I like more control of sedation use
Patients get oversedated
Patients get undersedated
Not readily ordered by the physician
Often difficult to use when ordered
Nursing staff preferences
Other (please specify)

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From Tanios et al. (2009), pp. 71-72.

APPENDIX G

RECRUITMENT FLYER

You are Invited to Participate in a Doctor of Nursing Practice Project

"Improving Sedation Practice in Adult Intensive Care Unit"

Location:

Wiegand building, Room# 254

Date & Time:

June 10th, 2015 at 4:30

Inclusion

Registered nurses who work in adult ICUs are eligible to participate.

Exclusion Criteria

Critical care nurses working with a pediatric population will be excluded given that different assessment tools are used in this population. The participants will be requested to confirm their eligibility on the survey.

***If you are willing to participate and have any questions about this project please contact*:**

Maritza Baez, RN-BSN, CCRN

[redacted]

Doctoral Student in the College of Nursing and Health Sciences at Barry University

If you have any questions, please contact:

Maritza Baez, RN-BSN, CCRN

305-799-7688

Or

Delia [redacted]-BC

[redacted]

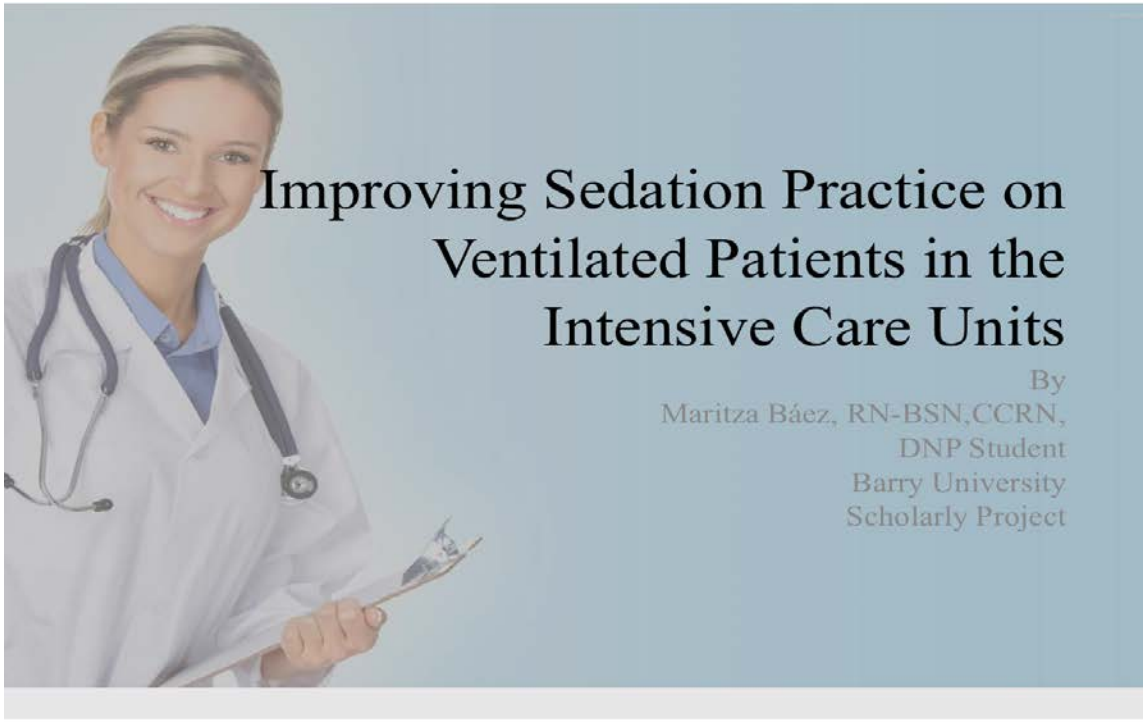
Or

Barbara Cook, Institutional Review Board point of contact

[redacted]

APPENDIX H

EDUCATIONAL PRESENTATION: POWERPOINT

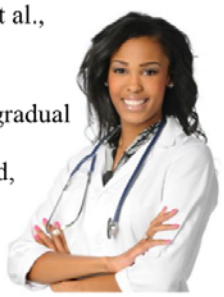


Project Objectives

1. Present validated tools recommended by the SCCM guidelines for the systematic assessment of sedated patients on mechanical ventilation
2. Discuss indications and contraindications for daily sedation interruption
3. Discuss parameter for weaning readiness on mechanically ventilated patients

INTRODUCTION

- Mechanical ventilation is required in more than 90% of critically ill adults in ICU (McLean et al., 2006).
- It has been estimated that as much as 42% of the time that a medical patient spends on a mechanical ventilator is during the weaning process (MacIntyre et al., 2001)
- Prolonged mechanical ventilation, defined as mechanical ventilation for more than 3 days, can increase healthcare costs as a result of longer hospitalization and unnecessary medical complications (McLean et al., 2006).
- The process of weaning from mechanical ventilation refers to the gradual discontinuation of ventilatory support, with the ultimate goal of mechanical liberation (Brochard & Tille, 2009; Perrem & Brochard, 2013).

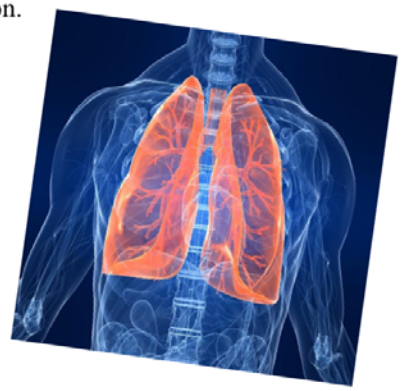


INTRODUCTION cont.

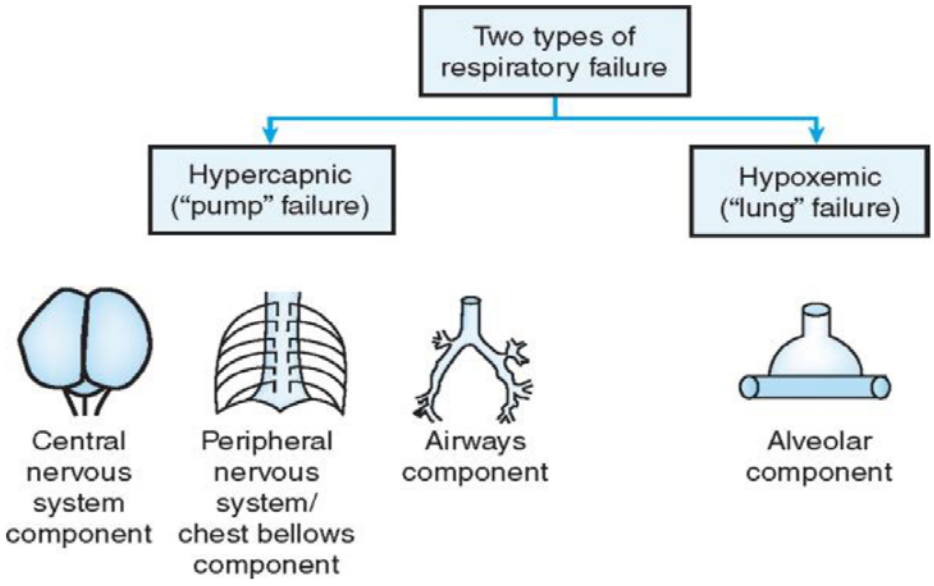
- Although a variety of approaches are available to wean patients from mechanical ventilation, evidence from clinical trials suggests that protocol-directed weaning is safe when compared to usual care, and consistently have shown to reduce the time on mechanical ventilation without overt complications (White, Currey, & Botti, 2011; Rumpke & Zimmerman, 2010).
- Early identification of a patient's readiness to wean is crucial in order to optimize outcome.
- An essential element of the weaning process is the judicious management of sedation.

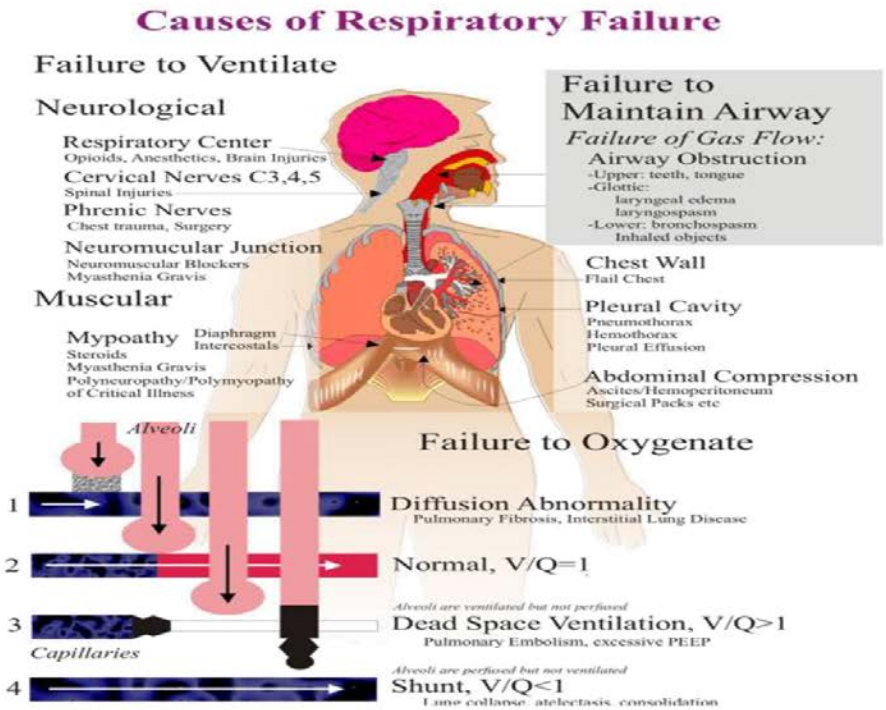
PATHOPHYSIOLOGY OF RESPIRATORY FAILURE

- Respiratory failure is the loss of the ability to ventilate adequately or to provide sufficient oxygen to the blood and systemic organs. Meaning that, the pulmonary system is no longer able to meet the metabolic demands of the body with respect to oxygenation of the blood and/or CO_2 elimination.
- In practice, respiratory failure is defined as a:
  - PaO2 < 60 mmHg on room air
  - PaCO2 > 50 mmHg



PATHOPHYSIOLOGY OF RESPIRATORY FAILURE





PATHOPHYSIOLOGY OF MECHANICAL VENTILATION

- Patients require MV support when their ventilatory and/or gas exchange capabilities of their respiratory system fail.
- Positive pressure ventilation inflate the lungs by exerting positive pressure on the airways; in turn, forcing the aveoli to expand during inspiration.
- There are multiple modes, methods, and theories of positive pressure ventilation
- Mechanical ventilation is a supportive measure.
- It does not cure the underlying cause for respiratory failure.
- In patients receiving MV > 24 hrs, a search for all the possible causes contributing to ventilator dependence should be undertaken.

GOAL/INDICATION OF SEDATION IN THE ICU

- Facilitate mechanical Ventilation
- Prevent pain and anxiety
- Decrease oxygen consumption
- Decrease the stress response
- Prevent patient self injury
- Facilitate nursing care

Weinert, et al. AJCC. 2001; 10:156
Kress, et al. Am J Resp Crit Care Med. 1996; 153:1012-1018

Figure 1: The ICU PAD Care Bundle

	PAIN	AGITATION	DELIRIUM
ASSESS	Assess pain ≥4x/shift & prn Preferred pain assessment tools: • Patient able to self-report → NRS (0-10) • Unable to self-report → BPS (3-12) or CPOT (0-8) Patient is in significant pain if NRS ≥ 4, BPS ≥ 6, or CPOT ≥ 2	Assess agitation, sedation ≥4x/shift & prn Preferred sedation assessment tools: • RASS (-5 to +4) or SAS (1 to 7) • NMB → suggest using brain function monitoring Depth of agitation, sedation defined as: • *agitated* if RASS = +1 to +4, or SAS = 5 to 7 • *awake and calm* if RASS = 0, or SAS = 4 • *lightly sedated* if RASS = -1 to -2, or SAS = 3 • *deeply sedated* if RASS = -3 to -5, or SAS = 1 to 2	Assess delirium Q shift & prn Preferred delirium assessment tools: • CAM-ICU (+ or -) • ICDSC (0 to 8) Delirium present if: • CAM-ICU is positive • ICDSC ≥ 4
TREAT	Treat pain within 30" then reassess: • Non-pharmacologic treatment–relaxation therapy • Pharmacologic treatment: – Non-neuropathic pain → IV opioids +/- non-opioid analgesics – Neuropathic pain → gabapentin or carbamazepine, + IV opioids – S/p AAA repair, rib fractures → thoracic epidural	Targeted sedation or DSI (*Goal: patient purposely follows commands without agitation*): RASS = -2 – 0, SAS = 3 - 4 • If *under sedated* (RASS >0, SAS >4) assess/treat pain → treat w/sedatives prn (non-benzodiazepines preferred, unless ETOH or benzodiazepine withdrawal is suspected) • If *over sedated* (RASS <-2, SAS <3) hold sedatives until at target, then restart at 50% of previous dose	• Treat pain as needed • Reorient patients; familiarize surroundings; use patient's eyeglasses, hearing aids if needed • Pharmacologic treatment of delirium: – Avoid benzodiazepines unless ETOH or benzodiazepine withdrawal is suspected – Avoid rivastigmine – Avoid antipsychotics if ↑ risk of Torsades de pointes
PREVENT	• Administer pre-procedural analgesia and/or non-pharmacologic interventions (e.g., relaxation therapy) • Treat pain first, then sedate	• Consider daily SBT, early mobility and exercise when patients are at goal sedation level, unless contraindicated • EEG monitoring if: – at risk for seizures – burst suppression therapy is indicated for ↑ ICP	• Identify delirium risk factors: dementia, HTN, ETOH abuse, high severity of illness, coma, benzodiazepine administration • Avoid benzodiazepine use in those at ↑ risk for delirium • Mobilize and exercise patients early • Promote sleep (control light, noise; cluster patient care activities; decrease nocturnal stimuli) • Restart baseline psychiatric meds, if indicated

Adapted with permission. © 2013. Wolters Kluwer Health. Barr J, Fraser GL, Puntillo K, et al. Clinical Practice Guidelines for the Management of Pain, Agitation and Delirium in Adult Patients in the Intensive Care Unit. *Crit Care Med*. 2013; 1:263-306.

ANALGO-SEDATION

the practice of addressing

pain and discomfort,

and *then* adding

sedation if necessary

SEDATION IN THE ICU

SEDATION DURING THE WEANING PROCESS

- Analgo-sedation with Primacy to Pain Relief
- Cooperative Sedation
- Maximize Neurological Function
- Facilitate transition from passive recipient of care, to active participant

Table 1. Sedatives and Analgesics in Common Use in the ICU.*

Drug (Brand Name)	Mechanism of Action	Typical Adult Dose	Pharmacokinetic Properties	Adverse Effects
Midazolam (Versed)	$GABA_A$ agonist	Bolus, 1 to 5 mg; infusion, 1 to 5 mg/hr	Half-life, 3 to 11 hr; active metabolite accumulates with prolonged infusion; metabolized by hepatic oxidation, with renal excretion of active metabolite	Possibly a higher risk of delirium and tolerance than with certain other sedatives
Lorazepam (Ativan)	$GABA_A$ agonist	Bolus, 1 to 4 mg; infusion, 1 to 5 mg/hr	Slower onset (5 to 20 min) than that of midazolam or diazepam (2 to 5 min); half-life, 8 to 15 hr; metabolized by hepatic glucuronidation, with no active metabolites, so offset may be more predictable than that of midazolam in critical illness	Possibly a higher risk of delirium and tolerance than with certain other sedatives
Diazepam (Valium; Diazemuls)	$GABA_A$ agonist	Bolus, 1 to 5 mg	Half-life, 20 to 120 hr; metabolized by hepatic desmethylation and hydroxylation; active metabolite accumulates in renal failure	Poorly soluble in water, so prolonged peripheral intravenous infusion may cause phlebitis; possibly a higher risk of delirium and tolerance than certain other sedatives
Propofol (Diprivan)	$GABA_A$ agonist, with other effects, including on glutamate and cannabinoid receptors	50 to 200 mg/hr or 1 to 3 mg/kg/hr	Half-life, 30 to 60 min after infusion; longer after prolonged infusion because of redistribution from fat stores; metabolized by hepatic glucuronidation and hydroxylation	Vasodilatation or negative inotropy causing hypotension or bradycardia; propofol infusion syndrome (lactic acidosis, arrhythmia, and cardiac arrest), mostly associated with prolonged infusion rates of >4 to 5 mg/kg/hr; hypertriglyceridemia; pancreatitis
Dexmedetomidine (Precedex)	α_2-Agonist	0.2 to 1.5 μg/kg/hr	Half-life, 2 hr; does not accumulate with prolonged infusion; metabolized by hepatic glucuronidation and oxidation, with no active metabolites	Transient hypertension, then hypotension; bradycardia, dry mouth, nausea
Remifentanil (Ultiva)	μ-Opioid agonist (also with κ-opioid agonist effects)	0.5 to 2 μg/kg/min; loading dose of 0.4 to 0.8 μg/kg may be considered	Half-life, 3 to 4 min; does not accumulate with prolonged infusion; metabolized by plasma esterases and so is unaffected by organ function	Nausea, constipation, respiratory depression, bradycardia
Fentanyl (Sublimaze)	μ-Opioid agonist (also with κ-opioid agonist effects)	20 to 100 μg/hr; loading dose of 50 to 100 μg may be considered	Half-life, 1.5 to 6 hr; highly fat soluble, so rapid onset but accumulates with prolonged infusion; metabolized by hepatic oxidation; no active metabolites	Nausea, constipation, respiratory depression, skeletal-muscle rigidity with high bolus doses
Morphine (Roxanol; Duramorph)	μ-Opioid agonist (also with κ-opioid and δ-opioid agonist effects)	1 to 5 mg/hr; loading dose of 2 to 5 mg may be considered	Half-life, 3 to 7 hr; more water soluble, so slower onset than fentanyl with less accumulation; metabolized by hepatic glucuronidation to morphine-6-glucuronide (10%) (20 times as active as parent drug) and morphine-3-glucuronide (90%) (inactive as an analgesic but causes neuroexcitation, at least in animal models), both with renal excretion	Nausea, constipation, respiratory depression, histamine release and consequent vasodilatation and hypotension, itch
Hydromorphone (Dilaudid)	μ-Opioid agonist (also with κ-opioid and δ-opioid agonist effects)	0.5 to 2 mg/hr; loading dose of 0.4 to 1.5 mg may be considered	Half-life, 1.5 to 3.5 hr; 7 to 11 times as potent as morphine; metabolized by hepatic glucuronidation to hydromorphone-3-glucuronide, with effects similar to those of morphine-3-glucuronide	Nausea, constipation, respiratory depression

* $GABA_A$ denotes γ-aminobutyric acid type A.

ANALGO-SEDATION

We recommend that IV opioids be considered as the first-line drug class of choice to treat non-neuropatic pain in critically ill patients (+1C).

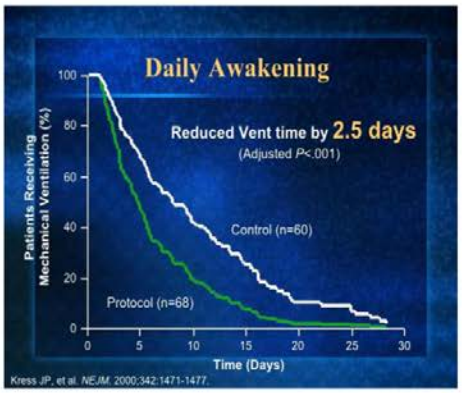
DAILY SCREENING

- Daily screening for readiness to wean is a major diagnostic tool in determining successful extubation (Perrem & Brochard, 2013).
- Delayed awakening due to accumulation of sedative drug and lack of screening have been associated with failure of simple weaning leading to prolonged mechanical support (Perrem & Brochard, 2013).

DAILY INTERRUPTION OF SEDATION (DIS)

- Hold sedation infusion until patient awake then restart at 50% of the prior dose if agitated

- "Awake" define as 3 of the following 4:
  1. Opening eyes in response to voice
  2. Use eyes to follow investigator on request
  3. Squeeze hand on request
  4. Stick out tongue on request

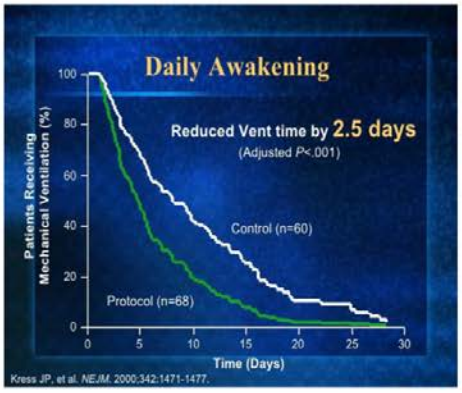


Kress, et al. NEJM. 2000; 342:1471-1477

DAILY INTERRUPTION OF SEDATION (DIS)

DIS was ASSOCIATED WITH:

- Fewer diagnostic tests to assess changes in mental status
- No increase in rate of agitated-related complications or episodes of patient-initiated device removal
- No increase in PTSD or cardiac ischemia



Kress, et al. NEJM. 2000; 342:1471-1477

DAILY SEDATION INTERRUPTION (DIS)
CONTRAINDICATIONS

- MISSION ABORTED Active Seizures
- MISSION ABORTED Alcohol Withdrawal
- MISSION ABORTED Agitation
- MISSION ABORTED Paralytics Use
- MISSION ABORTED Myocardial Ischemia
- MISSION ABORTED Elevated ICP

TO DIS or *NOT* to DIS…? 😳

DIS - daily interruption of sedation
aka WAKE UP TRIAL

The nurse is caring for a 30 year old female receiving mechanical ventilation after hypoxemic respiratory failure following cosmetic surgery. She developed ARDS, and is now on rotoprone treatment receiving intravenous infusion of Nimbex, Propofol, and Fentanyl drip. The mechanical ventilator settings are AC 20, Vt 350, FiO2 90%, PEEP 15. ABG: pH 7.31, CO2 61.4, PO2 118, HCO3 30.4, SaO2 97%.

ASSESSMENT OF PAIN
ON MECHANICALLY VENTILATED PATIENTS

- Routinely pain monitoring (+1 B)
- The Behavioral Pain Scale (BPS) and
- the most valid and reliable tools
  - The Critical -Care Pain Observation Tool (CPOT)
  - behavioral pain scales for monitoring pain (except for brain injury)
- Vital sign should not be used for the assessment of pain (+2C)

ICU LIBERATION

ASSESSMENT OF DEPTH OF SEDATION
ON MECHANICALLY VENTILATED PATIENTS

Table 1. The Richmond Agitation-Sedation Scale (RASS)

Score	Term	Description	
+4	Combative	Overtly combative, violent, immediate danger to staff	
+3	Very agitated	Pulls or removes tube(s) or catheter(s); aggressive	
+2	Agitated	Frequent nonpurposeful movement, fights ventilator	
+1	Restless	Anxious but movements not aggressive or vigorous	
0	Alert and calm		
−1	Drowsy	Not fully alert, but has sustained awakening (eye opening/eye contact) to voice (>10 seconds)	Verbal stimulation
−2	Light sedation	Briefly awakens with eye contact to voice (<10 seconds)	
−3	Moderate sedation	Movement or eye opening to voice (but no eye contact)	
−4	Deep sedation	No response to voice, but movement or eye opening to physical stimulation	Physical stimulation
−5	Unarousable	No response to voice or physical stimulation	

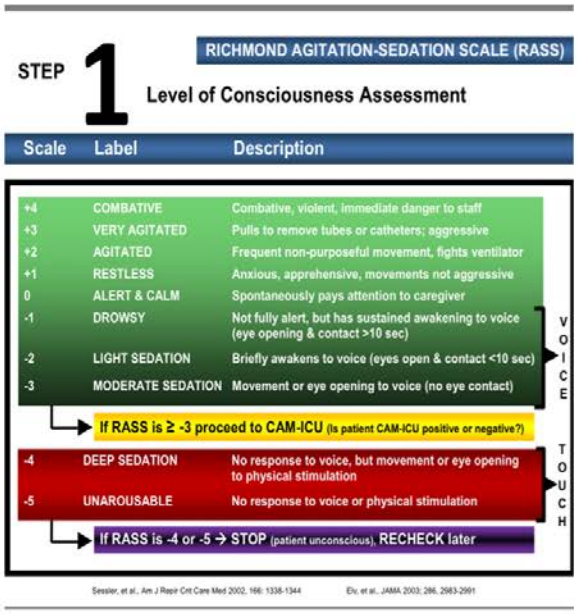
Procedure for RASS Assessment

1. Observe patient
   - Patient is alert, restless, or agitated. — Score 0 to +4
2. If not alert, state patient's name and say to open eyes and look at speaker.
   - Patient awakens with sustained eye opening and eye contact. — Score −1
   - Patient awakens with eye opening and eye contact, but not sustained. — Score −2
   - Patient has any movement in response to voice but no eye contact. — Score −3
3. When no response to verbal stimulation, physically stimulate patient by shaking shoulder and/or rubbing sternum.
   - Patient has any movement to physical stimulation. — Score −4
   - Patient has no response to any stimulation. — Score −5

Ely et al. JAMA. 2003; 289:2983-2991

WHAT IS THE RASS SCORE?

A 70 year old female patient, who is receiving mechanical ventilation, has been placed on a daily interruption of sedation therapy. During the sedative interruption, the nurse finds that the patient is responsive only to noxious stimuli.



WHAT IS DELIRIUM?

Delirium is a *disturbance of consciousness*

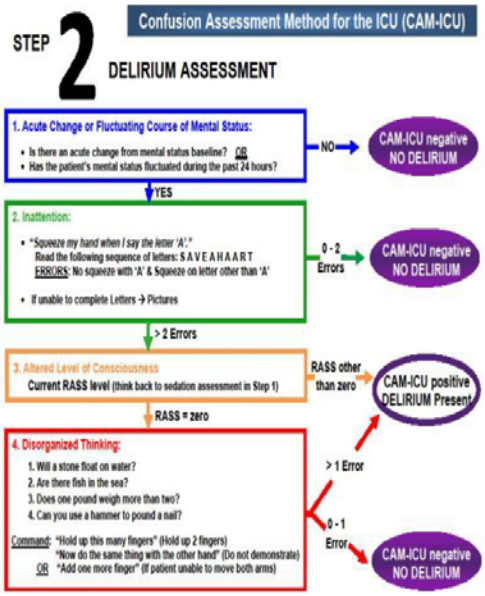
characterized by *acute onset* and fluctuating course of inattention accompanied by either a change in cognition or a perceptual disturbance, so that a patient's ability to receive, process, store, and recall information is impaired.

DELIRIUM & MECHANICAL VENTILATION

- SCCM 2013 PAD guidelines recommend routine monitoring of delirium in adult ICU patients (+1B).
- Delirium affects 60-80% of patients on MV
- Age and *COMA* have been identified as potential risk factors for delirium.
- Delirium is an independent risk factor for mortality at 3and 6months with 10% excess mortality per each day of delirium
- Results in longer hospital LOS, MV, and
- long-term cognitive impairment resembling a dementia-like state

DELIRIUM & MECHANICAL VENTILATION

USING reliable tools such as the CAM-ICU may MITIGATE the incidence of DELIRIUM and possibly IMPROVE OUTCOMES



Delirium Subtypes

- Hyperactive Delirium
  - Acute, combative agitation often requiring sedation
  - Easier to diagnose
  - "ICU psychosis"
- Hypoactive Delirium
  - Quiet and peaceful behavior, despite cognitive impairment; more difficult to assess
  - Associated with worse prognosis
- Mixed Delirium
  - Features a mix of elements from both hyperactive and hypoactive delirium
  - Fluctuating course

STOP, T-H-I-N-K, if needed MEDICATE

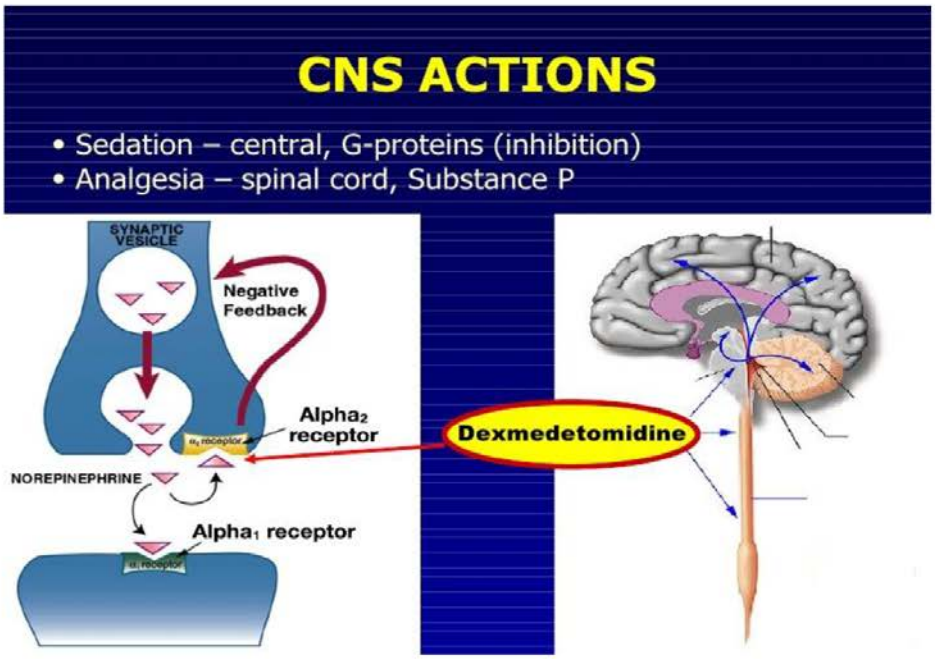
Stop

- Do any medications (especially benzo-diazepines) need to be stopped or lowered?
- Is the patient on the minimal amount of sedation necessary? Do any titration strategies need to be used, such as a targeted sedation plan or daily sedation cessation?
- Do the sedative drugs need to be changed?

T-H-I-N-K

- **T**oxic situations
  - CHF, shock, dehydration
  - Deliriogenic medications
  - New organ failure
- **H**ypoxemia
- **I**nfection or sepsis
- **I**mmobilization
- **N**on-pharmacologic interventions employed?
  - Glasses, hearing aids, reorientation, sleep protocols, noise control
- **K+** or electrolyte problems

ALPHA-2 AGONISTS



WEANING – the process of decreasing ventilator support and allowing the patient to take over the work of breathing.

CLASSIFICATION:

1. Simple weaning

   Extubated on 1st attempt (± 70%)

2. Difficult weaning

   Require > 3 SBT

3. Prolonged weaning

   At least 3 SBT, or > 7 days of weaning after the 1st SBT

CRITERIA FOR WEANING

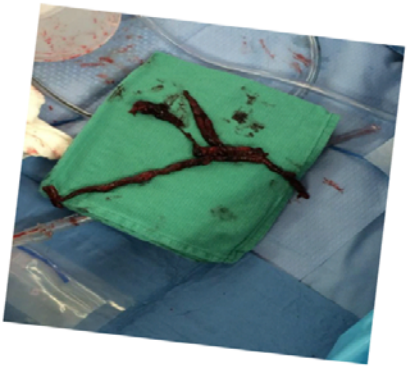
Patients receiving mechanical ventilation for respiratory failure should undergo a formal assessment of discontinuation potentials if the following criteria are satisfied:

- ,Evidence for some reversal of the underlying cause for respiratory failure
- Adequate oxygenation
  - PaO2/FiO2 ratio > 150 to 200;
  - positive end-expiratory pressure [PEEP] <7.5 cmH2O,
  - FiO2 ≤ 0.5 ; and
  - pH > 7.25
- Hemodynamic stability,
  - NO acute arrhythmia
  - SPB > 90 mmHg
- The capability to initiate inspiratory effort
- No vasopressor use

Grade of evidence: B

TO WEAN or NOT to WEAN…? 😳

29 y/o male s/p thrombectomy post ORIF of left hip after MVA interfacility transfer for hip procedure. PMHX significant for asthma as a child. Denied DM, HTN, or cardiac disease. After ORIF of the hip the day before, and after being transferred to the floor, the patient started complaining of shortness of breath with evidence of severe hypoxia. CTA showed massive PE and was emergently taken to the OR for thrombectomy. Post procedure the patient was admitted to the ICU vented and sedated with Propofol for critical care management. The 2D ECHO post procedure reflected right ventricular strain with global hypokeneisis. He is also receiving infusion of Milrinone (Primacor) drip infusing at 0.5 mcg/Kg/min, Levophed drip at 5mcg/min, and Insulin at 3 units/hr.



WEANING MODES

- T-piece Trials
- Synchronized Intermittent Mandatory Ventilation (SIMV)
- Pressure Support Ventilation (PSV)
- Continuous Positive Airway Pressure (CPAP)

SPONTANEOUS BREATHING TRIALS

- An initial brief of spontaneous breathing can be used assess the capability of continuing onto a formal SBT.
- The criteria with which to assess patient tolerance during SBTs are the respiratory pattern, the adequacy of gas exchange, hemodynamic stability, and subjective comfort. „
- The tolerance of SBTs lasting 30 to 120 min should prompt consideration for permanent ventilator discontinuation.

Grade of evidence: A

Critical Care 2000, **4**:72-80

CONCLUSION

- Critical care is expensive
- We can *deliver better care* by using guideline recommendations
- *Use* of sedation and weaning *protocols* is safe
- Delirium is costly
- Be an *ADVOCATE* for better outcomes


DANKSCHEEN
BÍYAN
SHUKRIA
TINGKI
YAQHANYELAY
TASHAKKUR ATU
THANK
GRACIAS
SUKSAMA
EKHMET
ARIGATO
MAAKE
GRAZIE
MEHRBANI
SHUKURIA
YOU
PALDIES
GOZAIMASHITA
EFCHARISTO
KOMAPSUMNIDA
JUSPAXAR
BOLZÏN
MERCI

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APPENDIX I

EDUCATIONAL INTERVENTION ITINERARY

DATE AND TIME	ACTIVITY
Wednesday, June 10th	**Planned Educational Intervention**
4:00.- 4:20 pm	**Introduction of Speaker** – Beverage and snacks
4:20 - 4:40 p.m.	**Educational intervention** **Objectives:** • Present validated tools recommended by the SCCM guidelines for the systematic assessment of sedated patients on mechanical ventilation • Discuss indications and contraindications for daily sedation interruption • Discuss parameter for weaning readiness on mechanically ventilated patients
4:40 – 5:00 pm	**Post-Intervention Evaluation** – Vignettes

APPENDIX J

VIGNETTES OF PATIENTS RECEIVING SEDATION ON MECHANICAL VENTILATION

1. The nurse is caring for a 30-year-old female receiving mechanical ventilation after hypoxemic respiratory failure following cosmetic surgery. She developed ARDS and is now on pronator treatment receiving intravenous infusion of Nimbex, Propofol, and Fentanyl drip. She weights 58 kg, the mechanical ventilator settings are AC 20, Vt 350, FiO2 90%, PEEP 15. ABG: pH 7.31, CO2 61.4, PO2 118, HCO3 30.4, SaO2 97%. Should the nurse perform a daily interruption of sedation therapy? (Circle one)
    a) Yes
    b) No
2. A 50-year-old male presents to the emergency room with a 3-day history of worsening shortness of breath which progressively got worse after a cold. Due to his severe respiratory distress and hypoxemia, he was intubated in the emergency room and sedated with Propofol for comfort and ventilator synchrony. His past medical history is significant for chronic alcohol abuse, COPD, and hypertension. Last drink, as per wife, was 1 week ago. It is now 4 days later, patient is still sedated with Propofol at 20 mcg/kg/min. During the nurse's assessment, the patient briefly opened and closed his eyes upon verbal command, squeezed the nurse's hand, and stuck out his tongue.
    - What is the RASS score? _____

- Should the nurse perform a daily interruption of sedation therapy? (Circle one)

  a) Yes

  b) No

3. Mrs. H is a 60-year-old female with past medical history significant for diabetes, hyperlipidemia, chronic kidney disease, coronary artery disease, status post coronary artery bypass surgery (CABG). 10 years ago, underwent elective abdominal hernia repair. After surgery, she failed extubation attempt and had to be transferred to ICU for further ventilator and medical management. On post op day # 2, the ventilator settings are AC 12, Vt 400, FiO2 40%, PEEP 5. She is receiving intravenous Propofol at 30 mcg/Kg/min. VS: BP 135/75, HR 98, RR 20, O2 sat 96%, Temperature 37.3, BG of 175. Should the nurse perform a daily interruption of sedation therapy? (Circle one)

   a) Yes

   b) No

4. In reference to the case above, during the sedation interruption, Mrs. H becomes restless, agitated, and asynchronous with the ventilator, attempting to pull on her ETT and lines. Her vital signs are as follows: BP 180/70, HR 120, RR 35, O2 sat 93%.

   - What is the patient's RASS score? _____
   - What should be the initial nursing action for this patient?

a) Notify the respiratory therapist that the patient can be placed on spontaneous breathing trial to evaluate for extubation.

b) Hold the sedative infusion until the patient is calm and cooperative, and then resume ½ of the prior infusion dose.

c) Assess and treat for pain, and if needed resume the infusion of Propofol at ½ the previous dose and titrate as needed.

d) Resume the infusion of sedation medication at the previous dose.

5. A 50-year-old female w/ hx of suicide attempts, brought in by EMS, intentionally overdosed on unknown amount of Zyprexa at 12:30PM. As per EMS pt was found unconscious. Patient was stuporous upon arrival. She was intubated to protect the airway. The day after admission, patient is able to follow simple commands but she becomes easily agitated. Propofol infusion was started for ventilator synchrony and patient's comfort.

BLOOD GAS	
ABG pH	7.500 H
ABG pCO2	27.8 L
ABG pO2	381.2 H
ABG HCO3	21.2 L
O2 Saturation	99.7
Base Excess	-0.8

Respiration Rate	14.0
Vent Mode	AC
FiO2 (21.0 - 100.0 %)	100.0
Tidal Volume	500
PEEP (cmH2O)	5.0

What should be the next course of action?

a) Seek and manage underlying causes of agitation, consider changing sedation medication, and consult with the team to wean down FiO2.
b) Titrate Propofol to RASS of -4.
c) Call respiratory to place patient on pressure support.

6. 2. A 46-year-old male with history of sickle cell anemia reports chest pain associated with worsening of shortness of breath the past 5 days. Chest CT revealed nodule density related to vaso-occlusive crisis, no evidence of pulmonary emboli, but the presence of left lower lobe pneumonia. Patient denies hemoptysis, paroxysmal nocturnal dyspnea, or peripheral edema. Microbiology revealed positive culture bacteremia with staphylococci. ABG of 7.53, PCO2 22, PO2 is 47, bicarbonate is 18, base excess is -3. Patient was in hypoxemic respiratory failure, intubated and sedated with Propofol, Fentanyl, and Versed.

   Should the nurse perform a daily interruption of sedation therapy? (Circle one)

   a) Yes

b) No

7. 3. 89-year-old woman presented with altered mental status. She was intubated for airway protection. The CT scan of the brain reveals a very large hemorrhage involving the right-sided posterior temporal lobe and the parietal lobe. There is vasogenic edema and midline shift. Not a candidate for surgical evacuation. Cardene for BP management, Mannitol, and 3% saline was started. After 2 days of admission, the patient experienced tonic clonic seizures not improved with antiseizure medications, Dilantin, Ativan, and Keppra reason for which Propofol was started. EEG revealed rapid spiking waves of generalized seizures despite treatment.

   Should the nurse perform a daily interruption of sedation therapy? (Circle one)

   a) Yes

   b) No

APPENDIX K

LETTER FROM THE EDITOR

NOELLE STERNE, Ph.D.
Academic Editor

P.O. Box 800616
Aventura, FL 33280
305 935-9307 Phone
305 935-9666 Fax
graduatestudiescoach@yahoo.com Email

August 20, 2013

To the Dean, College of Nursing and Health Sciences
To the Director NP and DNP Specializations
To the DNP Project Chairperson

This letter certifies that I have reviewed, edited, and provided corrections on grammar, format, and writing consistent with the *Publication Manual of the American Psychological Association* (6th edition) for the DNP Capstone Project which Maritza Scarlet Báez has submitted to her committee at the Barry University College of Nursing and Health Sciences.

Other than my editorial assistance to Ms. Báez as described above, I did not participate in the rewriting of her original work. Nor did I make any substantive changes to her significant and important contribution to academic scholarship in the professional nursing community.

A pleasure to serve.

Sincerely,

Noelle Sterne

/s/ Noelle Sterne, Ph.D.

VITA

MARITZA SCARLET BÁEZ, RN-BSN, CCRN

SUMMARY OF QUALIFICATIONS

- Florida Nursing License since 2003
- Post-Bac DNP Adult-Gerontology Acute Care Nurse Practitioner
- Ability to combine pieces of information to form general rules or conclusions (includes finding relationships among seemingly unrelated events)
- Operate diagnostic or therapeutic medical instruments and equipment
- Understands the implications of new information for both current and future problem-solving and decision-making

EDUCATION

Barry University, Miami Shores, FL 2015
Doctor of Nursing Practice
Scholarly Project: *Improving Sedation Practice in Adult Intensive Care Units*

Florida Atlantic University, Davie, FL 2010
Bachelor of Science in Nursing
Magna Cum Laude

Broward Community College, Davie, FL 2002
Associate in Science in Nursing

CERTIFICATIONS

Certified Critical Registered Nurse (CCRN)
Ultrasound Guided Central Venous Catheter (CVC) Insertion
Advance Cardiac Life Support (ACLS)
Basic Life Support (BLS)

RELEVANT CLINICAL EXPERIENCE: CRITICAL CARE

CLINICAL ROTATION

Aventura Hospital: MICU/SICU--125 hours 2015
Jackson University of Miami: SICU-125 hours 2015
Aventura Hospital: MICU/SICU--125 hours 2014

PROFESSIONAL EXPERIENCE

Aventura Hospital, Aventura, FL 2012- Present
Registered Nurse
Medical-Surgical Intensive Care Unit
Level II Trauma Center

Baptist Hospital, Kendall, FL 2009-2012
Registered Nurse
Emergency Room

Memorial Regional Hospital, Hollywood, FL 2004-2009
Registered Nurse
Surgical Intensive Care Unit
Level I Trauma Center

Star One Staffing, Miami, FL 2007-2011
Registered Nurse
Medical-Surgical Intensive Care Unit
Emergency Room

PUBLICATION AND PRESENTATION

A Microsystems Approach to Improving Quality in an Adult Intensive Care Unit 2014
Abstract: *Lambda Chi Chapter, Sigma Theta Tau International Annual Research Conference, Davie, FL*

LANGUAGES

English: Speak fluently and read/write with high proficiency
Spanish: Speak fluently and read/write with high proficiency

PROFESSIONAL AFFILIATIONS

Sigma Theta Tau International: Honor Society of Nursing
American Association of Critical Care Nurses
American Nurses Association
American Geriatrics Society

CONFERENCES AND SYMPOSIUMS

Broward County Chapter of the American Association of Critical Care Nurses 2015
40th Annual Spring Seminar

Barry University College of Nursing and Health Sciences 2015
Doctoral Colloquium: *Social Justice Has No Borders*

Baptist Health South Florida 2014
Fifth Annual State of the Science Symposium: Critical Care Best Practices

Barry University College of Nursing and Health Sciences 2014
Scholarship Revisited: Transforming Nursing Education, Practice, and Research

Lambda Chi Chapter: Sigma Theta Tau International 2014
Doctoral Colloquium: *Transforming Qualitative Research: Understanding Grounded Theory Method*

Baptist Health South Florida 2013
Fourth Annual State of the Science Symposium: Critical Care Best Practices

Lambda Chi Chapter: Sigma Theta Tau International 2013
Spring Research Day

Lambda Chi Chapter: Sigma Theta Tau International 2012
Nurses' Role in Healthcare Futures

VOLUNTEER EXPERIENCE

Thanksgiving Community Event, Washington Park, FL
Emergency Homeless Shelter, Ft. Lauderdale, FL