Exploring the Enteral Feeding Practices Used By Critical Care Nurses

A Dissertation Presented

by

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Abstract

Mechanically ventilated critically ill patients treated in the intensive care unit (ICU) require enteral feedings to maintain adequate nutrition during critical illness. Delivery of adequate enteral nutrition is also critical to the recovery of critically ill patients. Enteral nutrition has been shown to decrease length of time on the ventilator, decrease length of stay and ICU and decrease mortality. Despite all the evidence regarding the benefits of enteral nutrition, critically ill patients continue to receive less than their prescribed calories and protein. Nurses are in a unique position to influence the delivery of enteral nutrition. Nursing practices that contribute to underfeeding must be identified and corrected to ensure adequate delivery of nutrients is achieved. The purpose of the study was to describe the professional practice of critical care nurses regarding enteral feeding in mechanically ventilated critically ill patients. Several barriers were identified by the participants in the study that contributed to underfeeding including inconsistent practice regarding gastric residual volume, holding feeds when changing patient position and lack of a standardized protocol for enteral feeding. Also identified in the study was the idea that nurses do not see enteral feeding as a life-saving intervention. It is not the "sexy part" of what ICU nurses do. Enteral feeding guidelines need to be developed to include those interventions that are important to nursing practice in order to increase enteral feeding times and improve patient outcomes.

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Chapter 1

State of the Science

Mechanically ventilated patients treated in the intensive care unit (ICU) require enteral feedings to maintain adequate nutrition during critical illness. Those patients who reach prescribed protein and energy targets show a 50% decrease in 28-day mortality (Weijs et al., 2012). A retrospective cohort study, using 2005 hospital discharge records from six states, projected there are 790,257 hospitalizations annually involving mechanically ventilated patients (Wunsch et al., 2010). Wunsch and colleagues (2010) reported that 42.6% of the patients were mechanically ventilated for greater than 96 hours. Total costs of hospital stay were (in thousands) $ 34.2 $\pm$ $ 40.6. Early nutritional support (started within 24 hours of admission) has been shown to decrease the time on the ventilator in critically ill medical ICU patients (Woo et al., 2010) and reduce mortality (Doig, Heighes, Simpson, Sweetman, & Davies, 2009). In the prospective, observational study by Woo and colleagues (2010), the median time on the ventilator was three days for patients who received enteral nutrition within 24 hours versus six days compared to those who had enteral nutrition started greater than 24 hours after admission (3.0 $\pm$ 4.2 versus 6.0 $\pm$ 9.2 days, p =.04). A systematic review by Doig and colleagues (2009) analyzed six randomized controlled trials with 234 participants and found that the provision of enteral nutrition within 24 hours of admission was associated with a significant reduction in mortality [OR = 0.34, 95% confidence interval (CI) 0.14-0.85]. Thus, initiating early enteral nutrition within 24 hours of admission to the ICU will potentially decrease hospital costs.

Nutrition supplies vital cell substrates, antioxidants, vitamins and minerals that help to optimize recovery from illness. During the last ten years, nutritional support has emerged as an important component of care for critically ill patients as multiple studies have shown that enteral

nutrition has improved patient outcomes (Artinian, Krayem, & DiGiovine, 2006; Doig et al., 2009; Khalid, Doshi, & DiGiovine, 2010; Seron-Arbeloa et al., 2011; Woo et al., 2010). Important factors that impact the success of adequate protein delivery include early initiation of enteral feeding and minimizing intervals without nutrition. Interruptions that interfere with adequate delivery of enteral nutrition in critically ill mechanically ventilated patients include problems with the method of delivery, interruptions due to tests and procedures (Elpern, Stutz, Peterson, Gurka, & Skipper, 2004; O'Meara et al., 2008), gastric residual volume (GRV) (McClave et al., 1999), and weaning from mechanical ventilation (Rice, Swope, Bozeman, & Wheeler, 2005).

Mean length of interruptions in enteral feeding can vary. A prospective, descriptive study involving 39 ICU patients and 276 feeding days revealed a mean interruption in enteral feeding of 5.23 hours per patient day (Elpern et al., 2004). Another study of 59 ICU patients found enteral feedings were interrupted a mean of 6 hours (SD, 0.9 hours) per patient each day, resulting in loss of approximately 50% (mean 1106.3; SD, 885.9 Cal) of the prescribed calories (O'Meara et al., 2008). An international prospective observational study of 2946 patients involving 27,944 patient days across 158 adult ICUs from 20 countries found that interruptions in enteral feeding resulted in only 59% of the recommended energy and 60.3% of the recommended protein delivered (Cahill, Dhaliwal, Day, Jiang, & Heyland, 2010). Thus, there is an urgent need to find ways to reduce feeding interruptions in an attempt to improve patient outcomes for mechanically ventilated ICU patients. Massachusetts Nursing Practice guidelines state that one responsibility of the registered nurse (RN) is to " implement nursing intervention which includes all appropriate elements of nursing care, prescribed medical or other therapeutic regimens" (http://www.mass.gov/eohhs/docs/dph/regs/244cmr003.pdf). According to the New

Hampshire Nurse Practice Act, the responsibility of a registered nurse (RN) includes "developing a plan of nursing strategies to be integrated within the client-centered health care plan that establishes nursing diagnoses, setting goals to meet identified health care needs, prescribing nursing interventions, and implementing nursing care through the execution of independent nursing strategies and prescribed medical regimen" (Chapter 326-B:12 Nurse Practice Act, http://www.gencourt.state.nh.us/rsa/html/XXX/326-B/326-B-12.htm). The literature is clear that critically ill mechanically ventilated ICU patients are not receiving the prescribed protein or calories (Cahill, Dhaliwal, Day, Jiang, & Heyland, 2010; Elpern et al., 2004). It also clear that nursing practices are contributing to hypocaloric feeding in critical ill patients (Adam & Batson, 1997; Marshall & West, 2006; McClave et al., 1999). Persenius and colleagues (2006) in their descriptive study of 44 ICU nurses found gaps between recommended nursing care and actual practice surrounding delivery of enteral nutrition. The gaps identified included RNs having responsibility for nutritional assessment, knowledge about enteral nutrition and enteral feeding interventions. The findings in the study by Persenius and colleagues (2006) suggested that a deeper understanding of enteral nursing care in the ICU from the RN's perspective was needed. Gaining evidence-based knowledge of individual and organizational factors would help to identify ways that nurses can intervene to enhance enteral feeding to meet nutritional targets.

The purpose of this study was to describe the professional practice of critical care nurses regarding enteral feeding in mechanically ventilated critically ill patients.

The specific aims of this study were to:

1. Describe the characteristics of nurses, patients, and clinical units and systems that

influence enteral feeding practices of mechanically ventilated critically ill patients.

2. Identify nursing interventions that increase or decrease enteral feeding interruptions and delays.
3. Develop an intervention to improve enteral feeding in mechanically ventilated critically ill patients based on findings from specific aims 1 and 2.

Mechanical Ventilation and the Need for Enteral Nutrition

Mechanical ventilation requires that an endotracheal tube be inserted via the mouth and advanced through the vocal cords into the trachea where a balloon is inflated to maintain the tube in the correct position. Tracheal intubation prevents swallowing and therefore alternate means of nutrition are required. Nutrition therapy conserves and restores body protein mass and adequate energy. Many mechanically ventilated patients often do not receive nutrition in a timely manner. Cahill and colleagues (2010), in an international prospective observational study of 2946 patients, found that the average time to start enteral feeding was 46.5 hours after admission. O'Meara and colleagues (2008) reported that enteral feeding started a mean of 39.7 hours after ICU admission.

Nutrition and the Stress Response to Critical Illness

Malnutrition in the critically ill, mechanically ventilated patient has an adverse effect on all physiological processes. It increases the risks for infection and pulmonary edema (Forchielle & Bines, 2009). If phosphorous levels are not maintained, adenosine triphosphate (ATP) needed for cellular energy is reduced (Higgins, Daly, Lipson, & Guo, 2006). Reduction in ATP and cellular energy causes muscle weakness, which in turn reduces ventilatory drive due to weakened muscles of the diaphragm and skeleton (Higgins et al., 2006). Weakness of the diaphragm and

skeletal muscles in malnourished patients makes it difficult to wean critically ill patients from the ventilator (Forchielle & Bines, 2009).

Protein intake is especially important in critical illness. Decreased protein intake was found to be an independent predictor of mortality and morbidity in a group of adult patients in a respiratory ICU (Singh, Gupta, Agarawal, & Jindal, 2009). Critical illness changes the distribution of protein between the intravascular and extravascular spaces (Nicholson, Wolmarans, & Park, 2000). A decrease in intravascular protein, such as albumin, leads to decreased intravascular and intracapillary oncotic pressures (Nicholson et al., 2000). This decrease in intravascular pressure causes fluid to leak from the intravascular space into the interstitial space, causing edema (Nicholson et al., 2000). Fluid leakage into the interstitial spaces leads to edema of major organs such as the lungs. In mechanically ventilated patients, pulmonary edema further impedes liberation from the ventilator (Boles et al., 2006). Because of the structure of albumin, many other substances, including drugs, easily bind to albumin to be transported. When low levels of serum albumin are present, the distribution, action and metabolism of some drugs can be altered (Nicholson et al., 2000).

Enteral nutrition maintains the functional integrity of the gut (Sigalet, MacKenzie, & Hameed, 2004). Enteral nutrition preserves tight junctions between the intraepithelial cells and blood flow is stimulated to allow endogenous agents such as cholecystokinin, gastrin, bombesin, and bile salts to be released (Sigalet et al., 2004). The adverse change in gut permeability from loss of functional integrity happens within hours of the major insult or injury (Sigalet et al., 2004). Maintaining the functional integrity of the gut with enteral nutrition prevents bacteria from translocation (Sigalet et al., 2004). Preventing translocation of bacteria from the gut may decrease the possibility of sepsis and consequent multiorgan failure (Sigalet et al., 2004).

Delivering early enteral nutrition is a proactive therapeutic strategy that may reduce time on the ventilator, decrease length of stay in the ICU, and decrease hospital mortality (Artinian et al., 2006; Khalid et al., 2010; Woo et al., 2010) .

Despite numerous research reports and resulting guidelines, mechanically ventilated patients continue to receive fewer calories and protein than prescribed (Binnekade, Tepaske, Bruynzeel, Mathus-Vliegen, & deHaan, 2005; Elpern et al., 2004; McClave et al., 2009; O'Meara et al., 2008; Rice et al., 2005; Singh et al., 2009). Important factors that influence the success of adequate protein delivery include early initiation of enteral feeding (Ibrahim et al., 2002) and minimizing interruptions during enteral feeding (Elpern et al., 2004; Rice et al., 2005).

Problems with the Method of Delivery

A review of the literature regarding enteral feeding practices showed that a gastric tube is the most common method used to provide enteral nutrition (Kim, Stotts, Froelicher, Engler, & Porter, 2012). Feeding tubes can also be inserted into the duodenum or jejunum. In a study by Binnekade et al. (2005), the percentage of days with successful feeding intake was smallest with gastric tubes (49%) and greatest for duodenal and jejunal tubes (58%). Hsu and colleagues (2009) reported higher energy (1658 versus 1426 kcal/day) and higher protein intake (67.9 versus 58.8 g/day) as well as a shorter time to goal feeding rate (32.4 versus 54.5 hours) with duodenal feeding compared to gastric feeding. The longest interruption in enteral feeding was due to problems with small bore feeding tubes (534 minutes/day) (O'Meara et al., 2008). A needle catheter jejunostomy tube was a better route of administration of enteral feedings than gastric tube in the descriptive study involving 403 patients by Binnekade and colleagues (2005). Binnekade et al. (2005) reported that the percentage of days with goal energy achievement was

lowest in critically ill patients with gastric tubes (49%) and highest in those with duodenal and jejunal tubes (58%) and needle catheter jejunostomy (76%).

In contrast, White, Sosnowski, Tran, Reeves and Jones (2009), in a randomized controlled study of 104 patients, reported that early post-pyloric feeding offered no advantage over early gastric feeding in overall nutrition received. Patients fed via a gastric tube were found to have a lower average daily energy and protein deficit than the post-pyloric group (White, Sosnowski, Tran, Reeves, & Jones, 2009). These investigators reported that neither the gastric nor the post-pyloric route of enteral feeding achieved the average recommended protein and energy intake, suggesting that tube placement alone is not the reason for inadequate enteral nutrition intake. However, it is an important consideration that must be accounted for in any study on enteral nutrition feeding.

Feeding Interruptions

Interruptions in feeding have occurred because of procedures and tests both in and out of the ICU. O'Leary-Kelly, Puntillo, Barr, Stotts and Douglas (2005), in a prospective descriptive study of 60 patients receiving enteral feedings at goal rate, found that 68.3% of the patients received less than 90% of their required energy intake. Procedures or scheduled surgeries accounted for 45% of the variance. In a prospective descriptive study of 39 patients and 276 feeding days, Elpern et al. (2004), found that 35.7% of the interruptions were due to tests and procedures. Rice and colleagues (2004) prospectively followed 55 mechanically ventilated patients who were enterally fed. They reported that enteral feeding were stopped most frequently due to procedures both at the bedside and in the operating room, representing 41% of events related to cessation of enteral feeding.

Many ICU patients have diagnostic tests that required withholding enteral nutrition for several hours (O'Leary-Kelley et al., 2005). Nurses have often withheld enteral feeding when a patient is required to be in a supine position for fear of aspiration. Changing patients' body position accounted for 15% of all interruptions in enteral feeding in Elpern et al.'s study (2004). Enteral nutrition may not be immediately restarted after a procedure or test is complete. Procedures and tests have often been delayed past the scheduled time, resulting in unnecessary withholding of enteral feeding.

O'Meara and colleagues (2008), in a prospective observational study, found that enteral nutrition was interrupted a mean of six (SD 0.9) hours per day. Interruption time was most likely due to small bore feeding tubes (25.5%). Increased gastric residual volume accounted for 13.3% of total interruption time. There were 60 events of weaning from mechanical ventilation, accounting for 11.7% of total interruption time. Interruption associated with mechanical ventilation increased after admission and after day two.

Interruption of enteral feeding due to GRV has been controversial. Measurement of GRV has not been standardized. The practice of stopping enteral feeding for increased GRV leads to decreased protein and calorie intake (McClave et al., 1999). Measurement of GRV is a common method used by bedside nurses to assess how well a patient is tolerating enteral feeding. GRV is used as a direct measure of volume. High gastric volume is used as an indication that there is impaired gastric emptying and enteral feedings are discontinued to prevent aspiration. Use of GVR appeared in nursing literature in the 1980s and at that time there was no data to support its use (Parrish & McClave, 2008). Checking GRV is done to prevent aspiration pneumonia, yet there is no evidence that high GRV is associated with vomiting, aspiration, or ventilator

associated pneumonia (McClave et al., 2005; Methany, Schallom, Oliver, & Clouse, 2008; Parrish & McClave, 2008).

The amount of GRV that triggered enteral feeding to be held differs between studies, ranging from 150 ml. to 300 ml. (Binnekade et al., 2005; Cahill et al., 2010; Elpern et al., 2004; Singh et al., 2009). Methany et al. (2008), in a study of 206 critically ill patients receiving gastric feeding found no consistent relationship between GRV (150-200 ml.) and aspiration. The study found frequent and infrequent aspirators did not differ significantly at one or more GRVs of at least 150 ml. ($x^2 = 0.3$, $p = .56$) and one or more gastric residual volumes of at least 200 ml. ($x^2 = 2.8$, P -.10).

According to the Society of Critical Care Medicine (SCCM) and the American Society of for Parenteral and Enteral Nutrition (A.S.P.E.N.) guidelines (2009), holding enteral nutrition for GRV of less than 500 ml., in the absence of other signs of intolerance, should be avoided. Using the recommended volume of 500 ml. to stop enteral feedings may lead to less interruptions and longer enteral feeding time, thus, increased delivery of protein and calories in vulnerable patients. A prospective randomized study by Montejo and colleagues (2010) including 329 intubated and mechanically ventilated patients in 28 medical ICUs in Spain found that increasing the limit of GVR to 500 ml. versus 200 ml. before withholding enteral feeding was not associated with adverse effects in gastrointestinal complications or outcome variables. Outcome variables measured included days on mechanical ventilation, ventilator-free days and hospital mortality (Montejo et al., 2010). Days of mechanical ventilation were 14.7 $\pm$ 13.1 in the control group and 15.6 $\pm$ 13.6 in the intervention group (p=0.36). Ventilator-free days were 5.1 $\pm$ 6.4 in the control group versus 5.1 $\pm$ 8.0 (p=0.28) in the intervention group. Hospital mortality was 33.6% in the control group versus 33.9% in the intervention group.

Time to Initiation of Enteral Feeding

Recommendations by the SCCM and A.S.P.E.N. have stated that enteral feedings should be initiated within the first 24 to 48 hours following admission (McClave et al., 2009). Despite this recommendation, enteral feeding has often been significantly delayed for more than a day after hospital ICU admission. Investigators have reported that the average time from admission to start of enteral feedings was from 39.7 hours up to 46.5 hours (O'Meara et al., 2008; Woo et al., 2010). Patients who received early enteral nutrition, defined as beginning within 24 to 48 hours of admission, were shown to have shorter time on the ventilator and a lower incidence of pneumonia, in addition to reduced ICU length of stay and hospital mortality (Artinian et al., 2006; Khalid et al., 2010; Woo et al., 2010) .

Artinian and colleagues (2006) analyzed data collected from Project IMPACT® on mechanically ventilated patients and used mortality and ICU, ICU length of stay and hospital length of stay as outcome measures. This analysis showed a significant decrease in ICU and hospital mortality in the early feeding group, those fed within 48 hours of initiation of mechanical ventilation versus the late feeding group, those fed after 48 hours of mechanical ventilation (18.1% versus 21.4%, p =.01; and 28.7% versus 33.5%, p = .0001). Khalid et al. (2010) used the same database as Artinian et al. and included patients who were mechanically ventilated and on vasopressors (dopamine, epinephrine, norepinephrine and neosynephrine), and found early enteral nutrition versus late nutrition to be associated with reduced ICU and hospital mortality in patients whose hemodynamic condition was unstable (22.5% versus 28.3%; p = .03 and 34% versus 44.0%; p < .001). ICU and hospital mortality were lower in the early enteral nutrition group (fed within 48 hours of initiation of mechanical ventilation) than the late enteral nutrition group (fed after 48 hours of mechanical ventilation) (22.5% versus 28.3%; p =.03 and

34% versus 44%; $p < .001$). The benefits of early feeding were more evident in the sickest patients, those treated with multiple vasopressors (odds ratio 0.36; 95% CI, 0.15-0.85) and those without early improvement (odds ratio, 0.59; 95% CI, 0.39-0.90).

Nursing Practice

In a descriptive survey-based study, Marshall and West (2006) found that several nursing practices may contribute to under feeding in the critically ill patient. These practices included measurement of GRV, changing patient position and checking tube placement.

Measurement of GRV was identified as the most significant potential contributor to under feeding. GRV was used to assess feeding tolerance by 89.9 % of the nurses (n = 338). Feeding was delayed due to GVR by 65.4% (n = 246) of the nurses. Even when prokinetics were used to manage delayed gastric emptying, 65.7% of the nurses reported decreasing the rate of feeding. Changing patient position or checking tube placement were also reported as practices associated with under feeding in critically ill patients (Marshall & West, 2006).

Williams, Leslie, Leen, Mills and Dobb (2013), in a prospective before and after study implemented strategies to reduce the number of enteral feeding interruptions with the aim of developing nursing practice interventions that would reduce avoidable interruptions. The strategies employed included written guidelines, designated champions and formal education programs. The intervention resulted in a reduced number of interruptions (885 interruptions in 271 patients versus 652 interruptions in 234 patients, $p = 0.04$), however patients received similar amount of enteral nutrition before and after the intervention.

Persenius and colleagues (2006), in a descriptive study of 44 nurses in three ICUs in Sweden, found that nurses perceived that they had less responsibility for assessment of nutritional status and more responsibility for planning and implementing interventions and

preventing complications. Their study left open the question of whether more knowledge and awareness of their responsibilities regarding enteral feeding could increase enteral feeding times of the critically ill patient.

Summary

There are few studies that inform us about the best way to enhance nursing practice and to reduce interruptions in enteral feeding despite the knowledge that enteral feeding is a key element to optimal recovery of mechanically ventilated patients in the ICU. Nurses are in a unique position to improve patient outcomes for this patient population. Therefore, the purpose of this study was to describe the professional nursing practices that influence enteral feeding in mechanically ventilated critically ill patients.

Chapter 2

Conceptual Framework

The Synergy Model for Nursing Practice was used to guide the qualitative descriptive study. The Synergy Model was developed in the early 1990s when the American Association of Critical Care Nurses (AACN) Certification Corporation, the certifying body of AACN, formulated a framework to describe nursing practice (Peterson & Bredow, 2008). In 1993, experts in the field of critical care nursing gathered to draft a document based on the underlying assumption that certified critical nurses brought a unique set of skills to the bedside. The experts concluded that certified practice was more than just the carrying out of critical care tasks. The foundation of critical nursing centered on meeting the needs of patients and families while influencing optimal patient outcomes (Peterson & Bredow, 2008).

In 1996, an outcomes think tank was appointed and six quality indicators were identified. These quality indicators included patient and family satisfaction, rate of adverse events, complication rate, adherence to discharge plan, mortality rate, and patient's length of stay (S. Hardin & Hussey, 2003). Patient characteristic outcomes were identified as functional changes, behavioral changes, trust, satisfaction, comfort and quality of life. Nursing competency outcomes were identified as physiological changes, the presence or absence of complications and the extent to which treatment options were obtained.

Further work was done from 1995 through 1997 to revise the conceptual model (Peterson & Bredow, 2008). Originally, 13 patient characteristics/needs were identified. Based on the patient characteristics, nine nursing characteristics were identified. The experts believed that matching the nurse characteristics to the patient characteristics/needs would result in a

synergistic effect which would then result in optimal patient outcomes (Peterson & Bredow, 2008).

The model was expanded to include the patient/clinical units/system characteristics, of which eight characteristics were chosen to describe the patient/clinical unit/system. These characteristics include resiliency, vulnerability, stability, complexity, resource availability, participation in care, participation in decision-making, and predictability. (The AACN Synergy Model for Nursing Practice, http://www.aacn.org/wd/certifications/docs/synergymodelforpatientcare.pdf, pages 1-3). Nurse characteristics of the Synergy Model for Nursing Practice are clinical judgment, advocacy and moral agency, caring practices, collaboration, systems thinking, response to diversity, facilitation of learning, and clinical inquiry (The AACN Synergy Model for Nursing Practice, http://www.aacn.org/wd/certifications/docs/synergymodelforpatientcare.pdf, pages 4-8).

Model Assumptions

The assumptions guiding the Synergy Model for Nursing Practice are:

1. Patients are biological, psychological, social and spiritual entities who present at a particular developmental stage. The whole patient (body, mind and spirit) must be considered.

2. The patient, family and community all contribute to providing a context for the nurse-patient relationship.

3. Patients can be described by a number of characteristics. All characteristics are connected and contribute to each other. Characteristics cannot be looked at in isolation.

4. Similarly, nurses can be described on a number of dimensions. The interrelated dimensions paint a profile of the nurse.

5. A goal of nursing is to restore a patient to an optimal level of wellness as defined by the patient. Death can be an acceptable outcome, in which the goal of nursing care is to move a patient toward a peaceful death. (The AACN Synergy Model for Patient Care, http://www.aacn.org/wd/certifications/docs/synergymodelforpatientcare.pdf, page 9).

Model Concepts

As noted, there are eight patient/clinical unit/systems characteristics with which the nurse is concerned. Each of the eight patient/clinical unit/system characteristics has been defined. With each definition, AACN provides further explanation, reflected by the numbers 1, 3 and 5. In the case of resilience, the first characteristic of the patient/clinical unit/system, 1, represents the minimally resilient patient who does not possess the coping mechanisms to mount a response and has minimal reserves. A score of 5, which represents a highly resilient person, represents the patient with strong reserves who is able to mount and sustain a response to a stressor (http://www.aacn.org/wd/certifications/docs/synergymodelforpatientcare.pdf, 2013).

Nursing characteristics are also defined according to a scale of 1, 3 and 5. With collaboration, which is defined as the nurses' ability to work with others, a score of 1 represents the nurses' willingness to be taught or mentored and openness to team members' contributions. A 5 represents the nurse who teaches, coaches and mentors others and is the example in recruiting resources to optimize patient care.

Details regarding the different characteristics are provided to recognize that the needs of patients vary across a wide range from health to critical illness and nurses need to possess a wide range of experience and expertise to care for the patient. The core concept of the Synergy Model for Nursing Practice is that matching the nurse's competencies to the patient's needs creates synergy and optimal patient outcomes result.

(http://www.aacn.org/wd/certifications/docs/synergymodelforpatientcare.pdf, 2013; Peterson & Bredow, 2008).

Concept Definitions

The conceptual definitions below were taken directly from http://www.aacn.org/wd/certifications/docs/synergymodelforpatientcare.pdf.

- Resiliency is defined as the capacity to return to a baseline level of functioning using compensatory/coping mechanisms; the ability to bounce back after an insult (p. 1).
- Vulnerability refers to how susceptible the patient is to stressors that may adversely affect patient outcomes (p.1).
- Stability is the ability to maintain equilibrium (p. 2).
- Complexity refers to the complexities of the patient and family dynamics (p. 2).
- Resource availability is defined as the resources that the patient /family/community brings to the situation (p. 2).
- Participation in care is the extent to which the patient and family are willing to participate in care (p.3).
- Participation in decision-making is the extent to which patients and families have the ability/willingness to participate in decision-making (p. 3).
- Predictability refers to the certainty surrounding the course of events (p. 3).

The nurse characteristics of clinical judgment, advocacy and moral judgment, caring practices, collaboration, systems thinking, response to diversity, facilitation of learning, and clinical inquiry have also been defined by AACN (Peterson & Bredow, 2008).

- Clinical judgment includes clinical decision-making, critical thinking and a global grasp of the situation, as well as with nursing skills gained through integrating formal and informal experiential knowledge and evidence-based guidelines (p. 4).
- Advocacy and moral agency is what nurses do in working on another's behalf by advocating for the patient and helping to resolve ethical and clinical concerns within and outside the clinical setting (p. 4).
- Caring practices aim to promote comfort and healing and preventing unnecessary suffering. This definition includes the concepts of vigilance, engagement, and responsiveness to caregivers, including family and healthcare personnel (p. 5).
- Collaboration is working with other members of the interdisciplinary team to achieve optimal/realistic patient/family outcomes (p. 6).
- Systems' thinking allows the nurse to manage environmental and system resources that exist for the patient/family and staff, within and across healthcare and non-healthcare systems (p. 6) Response to diversity is the sensitivity to recognize, appreciate, and incorporate differences into the provision of care. These differences include spiritual beliefs, gender, race, ethnicity, lifestyle, socioeconomic status, age and values (p. 7).
- Facilitation of learning involves formal and informal learning for patients/families, nursing staff, other members of the healthcare team and community (p. 7).
- Clinical inquiry is the ongoing process of questioning and evaluating practice and creating practice changes through research utilization (p. 8).

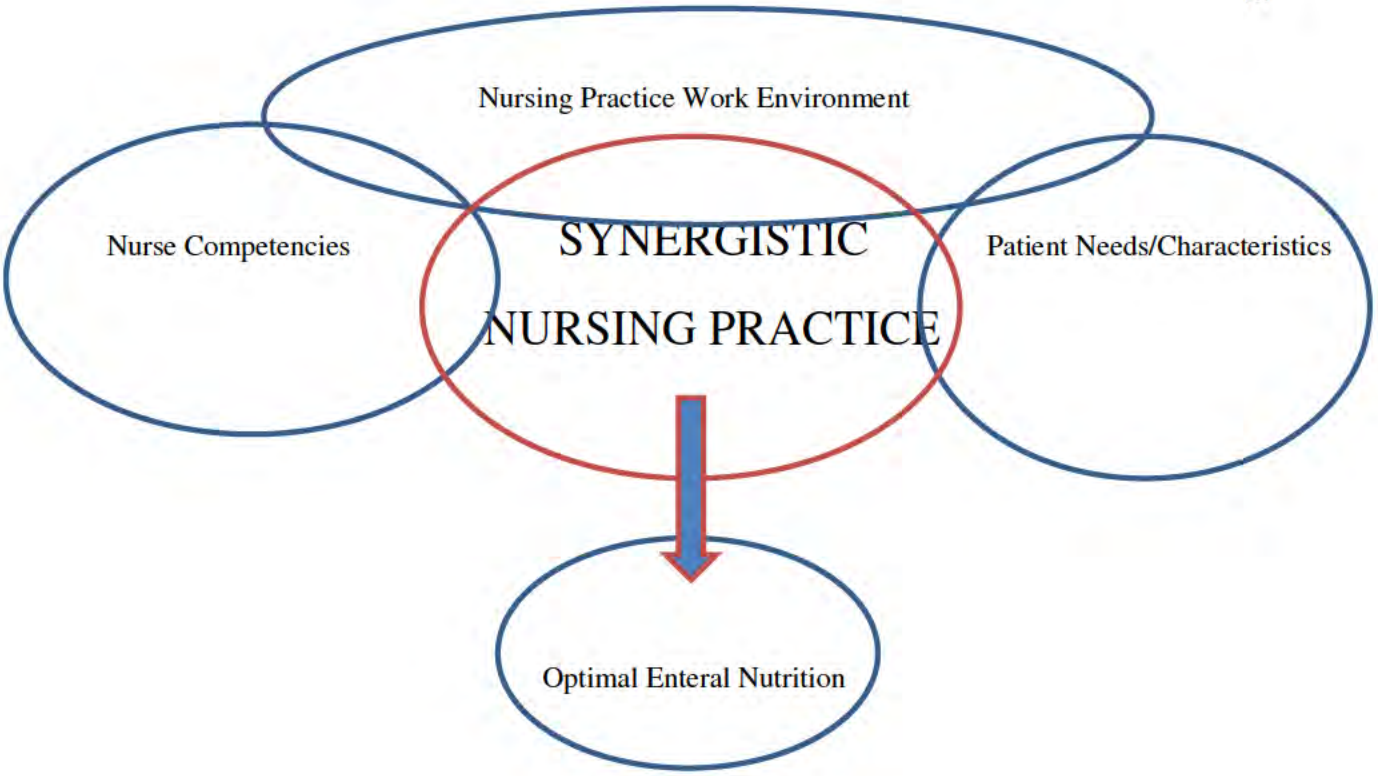

Figure 1.

Adapted Synergy Model

Adapted from AACN Corporation

Utilizing the Synergy Model

The concepts of the Synergy Model have been used in a wide variety of settings to guide nursing practice, including ICUs and clinics. Hardin and Hussey (2003) used the Synergy Model for Patient Care to describe the competencies needed by an Advanced Practice Nurse (APN) in a clinic setting to ensure optimal outcomes for a patient with CHF. The synergy model has been used by APNs to promote optimal patient outcomes and provide a framework to assist APNs to identify levels of patient characteristics and match the needs of the patient and family with the competencies of the nurse providing care (Collopy, 1999; Moloney-Harmon, 1999).

The Synergy Model has been used as a guide to help nurses address the needs of patients. Smith (2006) explains how the Synergy Model for Patient Care addresses the spiritual needs of

critically ill patients. She identified four areas of the model, two patient characteristics and two nurse characteristics that are related to spiritual care. Based on the patient characteristics of resiliency and resource availability, and nursing characteristics of caring practices and response to diversity, nursing interventions to care for the spiritual needs of critically ill patients were outlined. Kuriakose (2008) highlights the role of the critical care nurse while caring for patients who require endotracheal suctioning.

Kohr, Hicks and Curley (2012) and colleagues used the Synergy Model for Patient Care to develop a productivity system. They worked with charge nurses to develop a tool that could accurately predict workload. Their conclusion was that the Synergy Model for Patient Care captured what nurses do sufficiently to quantify nursing resource allocation.

Descriptive reports and case studies reveal how the Synergy Model for Patient Care helped to attain optimal patient outcomes (Annis, 2002; Eckland & Stamps, 2002; Hartigan, 2000; Hayes, 2000; Markey, 2001). In Annis' (2002) case study, the positive outcomes achieved for a dying patient focused on how interdisciplinary planning and the competencies of the team impacted and improved the patient's outcomes across the continuum of care. Eckland and Stamps (2002), using case study format, delineated how using the Synergy Model helped to guide safe and effective care to patients in a progressive care unit. Hartigan (2000) used the Synergy Model to establish criteria for 1:1 care. The model has also served as a framework for conducting nursing rounds (Mullen, 2002).

Nurse leaders have utilized the Synergy Model for Patient Care to help determine adequate staffing ratios (Hartigan, 2000), as a framework for nurse job descriptions (S. R. Hardin & Kaplow, 2005) and developing a clinical advancement program (Czerwinski, Blastic, & Rice, 1999).

Synergy Model and Nursing Practice

The core concept of the Synergy Model for Nursing Practice is that when needs and characteristics of patients are matched with the competencies of the nurses, synergy results and outcomes are improved (AACN). The model is a means of delineating the role of nurses to positively impact the outcomes of patients and improve the success of the healthcare organization (Reed, Cline, & Kerfoot, 2007).

According to Reed and colleagues (2007) the model is a powerful tool that defines the relationship between the nurses' competencies and the characteristics or needs of patients. Data were gathered on the patient/clinical unit/system characteristics as well as nursing characteristics. The Synergy Model for Patient Care, which links patient characteristics with nursing characteristics to provide optimal outcomes, provided the framework from which the study was conducted. The aims of the study were to describe the characteristics of the work environment, the nurses, and the patients. The concepts and assumptions of the Synergy Model for Patient Care were thought to be a good fit to guide the study. It was hoped that by describing the characteristics of the environment, the nurses and the patients, the goal of identifying ways that ICU nurses can intervene to reduce enteral feeding interruptions could be achieved. And ultimately, an intervention could be developed to improve enteral feeding in the mechanically ventilated critically ill patient.

Summary

The Synergy Model for Nursing Practice, with the emphasis of matching the patients' needs with the nurses' competencies was the framework used to guide the study. There has been little research to date that inform the best way to enhance nursing practice to reduce interruptions in enteral feeding despite the knowledge that enteral feeding is a key element to optimal recovery

of mechanically ventilated patients in the ICU. The Synergy Model for Nursing Practice provides a framework to guide the study in order to develop nursing interventions that would improve patient outcomes.

Chapter 3

Methods

A qualitative descriptive design was used in this study to describe the professional practice of critical care nurses regarding enteral feeding in critically ill mechanically ventilated patients. Registered nurses working in an ICU were invited to participate in individual interviews to describe their experiences. The AACN's Synergy Model for Patient Care was used to guide the study. The Synergy Model for Patient Care describes unit, patient, and nurse characteristics that when well matched or are in synergy, promote optimal patient outcomes (http://www.aacn.org/wd/certifications/docs/synergymodelforpatientcare.pdf).

In this chapter, the research methods used in the study will be described. The procedures to ensure trustworthiness and reflexivity will be presented and human subject protections will be addressed.

Qualitative Descriptive Design

A qualitative descriptive design was chosen to explore the nursing practice of critical care nurses regarding enteral nutrition in the critically ill mechanically ventilated ICU patient. Using the qualitative descriptive method of naturalistic inquiry, the data can be presented in every day language and reflect the participants' views (Sandelowski, 2000; Sullivan-Bolyai, Bova, & Harper, 2005). The proposed study sought an accurate account of critical care nurses' practice regarding enteral feeding of the critically ill mechanically ventilated patient. The researcher wanted to understand the complex events and processes involved in the nursing practice of enteral feeding, which is a tenet of qualitative descriptive research (Sandelowski, 2000).

There was little research to describe the nursing practices of enterally fed mechanically ventilated patients. The qualitative descriptive method allowed the researcher to provide a rich

description of the nursing practices that are involved in enteral feeding of the mechanically ventilated patient and from that description, develop interventions that will improve patient care and patient outcomes. According to Sullivan-Bolyai and colleagues (2005), the results of qualitative description can improve care by providing clear information about ways to improve care.

Setting

Nurses were recruited from two large academic medical centers, one in Massachusetts and one in New Hampshire. The institution located in Massachusetts was in an urban setting. Participants were recruited from two medical ICUs that have 32 medical intensive care beds, 16 beds in each unit. There were 120 RNs working in these units. The New Hampshire institution was located in a rural setting. There were two combined medical/surgical/neurology/trauma ICUs with a combined 32 beds (18 and 14). There were 125 RNs working in these two ICUs. These units were chosen to include different practice settings to determine if nurses in different types of units behave or practice differently.

Sample

Qualitative descriptive research methodology uses a purposeful sample to assure that the topic being studied is present in the sample (Creswell, 2007). A purposeful sample of 11 ICU nurses was recruited and data saturation was reached. Demographic maximum variation sampling was sought by including nurses with different educational background and years of experience (Sandelowski, 1995) with inclusion of nurses with greater than one year of experience in the ICU.

Inclusion Criteria

- Registered nurses with greater than one year of experience in the ICU

- Registered nurses who are currently working in the ICU (full and part time)

Exclusion Criteria

- Registered nurses with less than one year of experience in the ICU
- Registered nurses who are contracted to work in the ICU
- Registered nurses who do not work permanently in the ICU
- Registered nurses who have not worked in the ICU within the past three months

Recruitment

The researcher attended ICU staff meetings to discuss the purpose and specific aims of the study and to recruit participants into the study. Nurses were recruited from all shifts. The Study Fact Sheet was posted in the ICUs with information regarding the purpose and specific aims of the study as well as the researcher's contact information. Snowball sampling was also used to recruit ICU nurses. Study participants received a $25 gift card for completing the study interview.

Data Collection

Demographic data were collected on all participants including age, gender, highest degree held, specialty certification, total years of practice as an RN, total years of practice in ICU setting, number of different ICU settings (in different hospitals) and the type of ICU.

The Synergy Model for Patient Care was used to generate interview questions to gain knowledge about the nursing practices of ICU nurses regarding enteral feeding (see Table 1). Individual semi-structured interviews using moderately structured, open-ended questions were conducted (Sullivan-Bolyai et al., 2005).

Interviews were done at a time convenient to the participants (not during work time) and lasted from 25 to 53 minutes. The nurse researcher conducted the interviews with the

participants. The interviews were digitally recorded and were transcribed verbatim by a professional transcriptionist who signed a confidentiality agreement prior to engaging in transcription of the data. Core interview questions and probes were used to gain knowledge of nursing practice.

The researcher kept field notes that were recorded before and after each interview. The interview questions were formulated from the specific aims of the study and guided by the Synergy Model of Patient Care (see Table 1).

Specific aim #1: Describe the characteristics of nurses, patients, and clinical units/systems that affect enteral feeding practices of mechanically ventilated critically ill patient.

Specific aim #2: Identify nursing interventions that increase or decrease enteral feeding interruptions and delays.

Data Management

All interviews were audio taped. Field notes were taken during the original one-on-one interview**.** At the completion of each interview, the investigator listened to the recording and took more field notes. Once the transcription was completed, the investigator again listened to the recording and cross-referenced to the transcription. The nurse researcher then re-read each transcript and summarized the main points. Demographic data were entered into an Excel spreadsheet and analyzed.

Data Security

Data, including tape recordings and field notes, were secured in a locked file cabinet in a secure location in the researcher's home. All data were de-identified as soon as the interview was completed. No names or contact information was associated with the tapes, transcriptions or

final data set. Data were maintained on an encrypted password-protected, laptop computer. Data will be destroyed after publication of the findings or within five years.

Data Analysis

Descriptive statistics were used to analyze the demographic data. Miles and Huberman's strategies for qualitative descriptive data analysis, as outlined by Sullivan-Bolyai, Bova and colleagues (2005), were used. Hand coding of the data from the participant's own words in transcriptions, observations and interviews was done. Insights and reflection of the data were recorded. Patterns, phrases and themes were identified. The codes were labeled with the words of the participants. A data table with similarities and differences using the participant's words was compiled. The data were sorted into categories using the participants' words and themes were derived. True to the goal of qualitative descriptive research, the researcher strived for straight description of the data and used low-inference interpretation (Sandelowski, 2000).

Trustworthiness

The four strategies of trustworthiness of data described by Lincoln and Guba (1985) for naturalistic inquiry were used to ensure that the findings of the study are credible, dependable and confirmable. The strategies that were employed are triangulation, member checking, credibility and confirmability.

Triangulation of the data was done by cross-checking and constantly comparing the data from the interviews and participant profiles to confirm that the information was credible and dependable (Creswell, 2007). The researcher was conscious of the values and biases (demonstrating reflexivity) that may have been brought to the study and made these values and biases known to the readers of the study (Creswell, 2007). Audit checks were completed to help manage bias in the research findings. The researcher kept an account of the process of data

analysis, kept a personal journal and sought guidance from the dissertation Chair. Journaling provided the opportunity to comment on past experiences, biases, and prejudices that may influence the research study (Creswell, 2007). The researcher worked with the dissertation Chair, who is experienced in qualitative descriptive research, who helped guide the research process. Provisions of the research study to ensure credibility included use of an appropriate research method that was congruent with the purpose of the study.

Confirmability was established through triangulation, recording the researcher's assumptions and use of an audit trail. The strategies outlined above helped to enhance the rigor of the study and ensure trustworthiness.

Rigor

Lincoln and Guba (1985) identified credibility as an overriding goal of qualitative research. Credibility refers to the researcher's effort to establish confidence in assuring that the results of the research reflect the experience of participants (Lincoln & Guba, 1985). Authenticity is closely linked to credibility and validity and involves the portrayal of research that reflects the meanings and experiences that are lived and perceived by the participants (Emden & Sandelowski, 1998). Reflexivity, open inquiry, and critical analysis of all aspects of inquiry contribute to validity in qualitative research. Several techniques for increasing the validity of the described research have been described to include employing triangulation, providing verbatim transcripts, demonstrating saturation, member checking and reflexive journaling (Creswell, 2007).

Human Subjects Considerations

Institutional Review Board application process

An Institutional Review Board application was submitted to both institutions where the research was conducted. A waiver of written consent was sought and granted since all data were de-identified and this was a minimal risk study. All participants were given a written study sheet that explained the purpose and procedures associated with this study.

Protection of human subjects

The researcher met with the nurses who volunteered for the study and reviewed the purpose of the study. Risk to the participant was expected to be minimal. Risks associated with this study, which would be rare, included possible loss of confidentiality. This risk was minimized by de-identifying all data, including the demographic sheet, recording and transcript, at the onset. A unique study identification number was used for each participant. There was no way to link the data back to an individual subject. The subjects were informed that they had the right to withdraw from the study at any time. Each participant was assured that employment would not be affected if they chose not to participate in the study.

Reflexivity

According to Creswell (2007), reflexivity means that the writer/researcher is aware of the biases, values and experiences that he or she brings to the study. The researcher has greater than 35 years experience as a critical care nurse and administrator. Enteral feeding became an interest to the researcher because she witnessed many patients over many years that were either not fed or fed less than prescribed. The researcher kept a personal reflective journal that included details regarding the methodology used during data collection and personal thoughts

during data collection. The researcher also discussed the biases and experiences with the Chair of the investigator's dissertation committee.

Study Limitations

The rigor of qualitative research is dependent on the skills of the researcher and more easily influenced by the researcher's personal biases. In this case, the researcher had explored the literature and was influenced by the fact that much of the research has shown that enterally fed mechanically ventilated patients do not receive the protein and calories that are prescribed. The research points to many reasons for underfeeding. The researcher believed that nurses were in a unique position to improve the amount of calories and protein that patients receive and possible improve their treatment outcomes. The researcher was aware of these biases when conducting the research. Being a novice researcher was a limitation of the study which was addressed by consultation with an expert qualitative researcher to prepare appropriately for interviews. In qualitative research, the researcher's presence during data gathering can affect the subjects' responses, which could have been another limitation of the study. The researcher met with the dissertation Chair on a regular basis to review the transcripts, analyze procedures and findings. Further study limitations included a lack of prolonged engagement as the researcher conducted a one hour interview only and there were no observations planned as part of the study.

Conclusion

Use of the qualitative descriptive method to explore nursing practices regarding enteral feeding of the critically ill mechanically ventilated patient was a good fit for the research as the researcher sought a clear description of a specific experience from the nurse's perspective (Sandelowski, 2000). The results of this qualitative descriptive study provide information about how to improve care for patients who are enterally fed.

Chapter 4

Results

Few studies inform us about the best way to enhance nursing practice to reduce interruptions in enteral feeding. Nurses are in a unique position to improve patient outcomes. Critical care nursing practice regarding enteral feeding of mechanically ventilated patients was explored using qualitative descriptive methods. Participants described the characteristics of nurses, patients, and clinical units and systems that influenced enteral feeding practices of mechanically ventilated critically ill patients (Aim 1). Barriers to providing enteral nutrition in the mechanically ventilated patient, as well as nursing interventions that decrease enteral feeding interruptions were described (Aim 2).

Data analysis revealed the characteristics of the nurse, patient, clinical units and systems that influence enteral feeding practices of mechanically ventilated critically ill patients. Data analysis also revealed the barriers to enteral feeding and nurses described interventions that they believe would help lessen the interruptions and improve delivery of enteral feeding. Two themes emerged from the data analysis: “It’s not the sexy part of what we do” and lack of evidence regarding enteral feeding practices.

Participants

A total of 11 ICU nurses participated in the study. Three additional volunteers expressed interest in participating, but did not follow through once contacted. One of these volunteers changed jobs and no longer worked in the ICU setting. A second volunteer did not participate due to scheduling conflicts with the researcher. The third person expressed interest, but never responded to the researcher’s e-mails.

All of the participants enrolled in the study met the inclusion criteria. Demographic data was obtained through self-report. The remainder of the data was obtained through one-on-one interviews with the researcher.

Six participants were employed at an urban academic medical center in Massachusetts, while five participants worked at a rural academic medical center in New Hampshire. Snowball sampling yielded four participants. Demographic data are presented in Table 1. Demographics from both sites are presented together to protect the anonymity of subjects.

The study participants were middle-aged, female, and white; which is consistent with the characteristics of the majority of nurses working in both of these ICU settings. Seventy-two percent (n = 8) of the participants have worked in only one ICU. Twenty-seven percent (n = 3) reported working in at least two different ICU settings during their career and one participant reported working in more than two ICUs in their career. Two participants reported working the night shift; seven participants reported working the day shift. One participant worked both the day and night shift. One participant did not reveal which shift was worked. All worked twelve hour shifts and reported caring for one to two patients per shift.

Table 1

Participant demographics	*Values*
Age (years)	
Mean	47
Median	47
Range	29-58
Total years as RN	
Mean	21
Median	19
Range	2-33
Total years in present ICU	
Mean	15
Median	13
Range	1.5-34
Total years of practice in an ICU	
Mean	17
Median	15
Range	1.5-37
Gender	
Female	11 (100%)
Ethnicity	
White, Non-Hispanic	11 (100%)
Highest Degree	
Diploma	2 (18%)
Associate	2 (18%)
Bachelor	6 (55%)
Master	1 (9%)
Specialty certification	4 (36%)
Type of ICU	
Medical	7 (64%)
Medical/Surgical/combined	4 (36%)
Employment Status	
Full-time	7 (64%)
Part-time	4 (36%)

Comparison of Participants by Hospital Setting

Six participants (55%) from the urban academic medical center and five participants (45%) from the rural academic medical center participated in the study. Participants from the urban setting were older (mean age 48 years) compared to the rural setting (mean age 41.5 years). The urban setting participants had longer total years in practice compared to the rural setting participants (mean 22 years versus mean 15 years). Total years of practice in the current ICU was longer in the urban setting compared to the rural setting (mean 17 years versus 7 years). All participants from the urban setting reported working full time and on the day shift. Three of the participants (60%) from the rural setting worked part-time, and 40% (2/5) worked the night shift. No specialty certifications were identified by participants in the urban setting. Four of the five participants (80%) in the rural setting reported earning a Critical Care Registered Nurse (CCRN) specialty certification.

Table 2.

Comparison of research sites

	NH Research Site	MA Research Site
Feeding tube initial placement	Primarily RN NP/PA/MD under certain circumstances	NP/PA/MD
Type of feeding tube	OG/NG/Duotube	OG/NG/Duotube
Initial check of feeding tube	X-ray	X-ray
Nutrition assessed at daily rounds	Yes (goal sheet)	Yes (rounding checklist)
Guideline for checking gastric residual volume	No	No
Feeding held for repositioning	Yes	Yes
Standardized order set available for enteral feeding	Yes	No
Formal education regarding enteral feeding	No Included in one-on-one orientation	No Included in one-on-one education
Multidisciplinary team members	RN/MD/nutritionist	RN/MD/nutritionist

Description of the Data Set

The data set was made up of verbatim transcripts of 11 one-on-one interviews. The interviews occurred from May 1, 2014 through September 5, 2014. The face-to-face interviews ranged in length from 25 minutes to 53 minutes. The range of pages of each transcribed interview was 6 to 15 pages. Transcribed interviews from the rural medical center were 9 to 15 pages in length, while transcribed interviews from the urban medical center were shorter in length, ranging from 6 to 12 pages. No interview from the rural medical center was less than 8 pages in length.

Along with the transcribed interviews, the researcher documented field notes after each interview. These notes included observations of participants during the interview, as well as notes taken after the audio recording was stopped. The field notes were included as part of the reported data.

Transcripts varied in length and detail. Interviews completed with participants who were not known to the researcher were longer in length and seemed to reveal a more robust response to the questions being asked. Upon reflection of this phenomenon, the researcher surmised that the interviews conducted with participants who were known to the researcher and who had previously worked with the researcher may have assumed the researcher had knowledge about the questions being asked. To try to prevent this from happening, the researcher asked the participants who were known to her to please assume that the researcher knew nothing about the environment that was being discussed.

Characteristics of Clinical Units

Table 2 describes the characteristics of the two study sites. The participants described the clinical units as "organized and supportive." The patients were often described as complex. One participant described the mechanically ventilated patients as:

> ... generally being the type of patients that are very complex. You know, generally it's not just a heart that has something wrong with it, or the lungs, pulmonary, it's not just one system. It generally is multi-system by the time somebody is intubated, vented, apparently they're respiratory system temporarily at least has failed to function properly on its own, and most likely has taken other systems down with it.

The diagnoses that were mentioned in the interviews included respiratory failure, pneumonia, sepsis, multi-system organ failure, renal failure, liver failure, and alcohol or drug withdrawal as well as surgical patients and cardiac patients.

The participants described effective communication between healthcare team members as well as management. Communication occurred face-to-face and electronically through e-mails. The nurse-to-nurse shift report and the daily rounding with the healthcare team were viewed as a way to enhance patient care communication. At both research sites, the clinical nurse educator was viewed as a key person in securing effective communication.

Participants noted that communication about enteral feeding could be improved between the nurses and the physicians with the goal of starting enteral feedings sooner. As one participant expressed, "The physicians are focusing on what they think are more critical issues at the time. They're not thinking about what are considered the smaller issues." Several other participants (n = 7) expressed similar views. However, all participants described the opportunity to discuss enteral feeding at daily rounds. At the rural medical center, feeding was addressed

daily using a daily goal sheet. At the urban medical center, enteral feeding was listed on a poster displayed in the rounds room. On the poster are the specific areas to be addressed daily, including feeding.

The participants described a supportive and collaborative environment, one in which nurses worked well together and helped each other. There was a sense of autonomy in decision-making. Nurses were viewed as important decision makers and were always included in team rounds. One participant stated, "Medicine, they always invite us to rounds. So we do multi-disciplinary rounds. And before they start rounds, they look for the nurse that's taking care of that patient and include that nurse in rounds, which is great."

Positive feedback as well as constructive criticism from management was viewed as important to creating a good environment in which learning occurred. Participants did report that decision-making depended on the daily staffing mix and the attending physician. Participants reported that leadership did a good job with keeping them informed about what's going on, and dealing with difficult situations. Participants noted that leadership was responsive to concerns and sought participation from the staff to solve problems.

Patients

Participants described the patient population as resilient, vulnerable, unstable, and unpredictable. The patients were described as "complex with an up and down course". The participants cited complex medical issues as a reason for the unpredictability. Participants also acknowledged that the enteral feeding course was unpredictable. One participant stated:

> Their course is up and down. Sometimes we don't feed them for days because they're waiting for a procedure so they only get hours of feeding and not a full day of feeding. Sometimes they don't get

fed for the first four or five days.

All participants described an unpredictable feeding course that was determined by the attending physician.

Nurses

Participants reported that nurses had input into decision making regarding the patient. Ten participants reported that the nurse was included in decision making regarding patient care. Three participants mentioned that the physician caring for the patient influenced whether nurses were included in decision making. One participant stated:

> I think overall, yes. You know, sometimes with the newer doctors, you have more obstacles I think because they're less secure in their knowledge, so that makes them less willing to listen to nursing. I think we're considered part of the team and they really do listen to our input and appreciate and act on it, if it's appropriate.

Eight participants reported that there was meaningful recognition from peers. Participants cited different recognition programs, including newsletters and bulletin boards to advertise the accomplishments of nurses. Three participants noted that recent changes in the environment of care to include leadership changes, splitting of the clinical units, and recent layoffs as reasons why meaningful recognition had declined.

Barriers to Enteral Feeding

Barriers to enteral feeding included unstable patients requiring vasopressors, testing and procedures, and the need to keep the patient from receiving anything by mouth. The practice of holding tube feedings when off the floor for testing and forgetting to restart once the testing is complete was a practice that was identified as a barrier to enteral feeding. Holding enteral

feeding when turning a patient was mentioned by several participants as a barrier to providing adequate enteral nutrition. Diarrhea was also noted as a barrier to enteral feeding because it caused the feeding to be held. In addition, physician priorities were mentioned by all eleven participants. One participant stated, "So you'll bring it up on rounds, and they'll say, no he's fine for thirty-six more hours. No, it hasn't been thirty-six hours yet, no, we don't need it."

Nursing Practice Regarding Enteral Feeding

All eleven participants described enteral feeding as being important in the care of mechanically ventilated critically ill patients. Participants were aware that enteral feeding was important to improve patient outcomes. Participants cited the benefits of enteral feeding to include wound healing, maintenance of muscle mass, prevention of translocation of gut flora, and ability to wean from mechanical ventilation. Having acknowledged the importance of enteral feeding, participants reported that most patients are not enterally feed for at least 24 hours and as long as five days after arrival to ICU. Data analysis revealed two themes regarding enteral feeding. The two themes that emerged were, "it's not the sexy part of what we do" and lack of standardization regarding enteral feeding practices.

"It's Not the Sexy Part of What We Do"

Participants described getting the patient settled and carrying out the orders that will save the patient's life as important in the first 24 hours in the ICU. Despite the fact that participants knew that enteral feeding was important to care and recovery of the mechanically ventilated patient and enteral feeding was addressed daily, initiation of enteral feeding was often delayed. One participant summed it up by saying, "So as far as enteral feeds go, sometimes it's just an afterthought. I think frequently it's an afterthought, because it's not the sexy part of Medical ICU work." Another participant noted:

> I think if the patient is sick and busy with other things it kind of gets swept under the rug a little bit. The team tends to focus on what medications to give and family issues and procedures rather than nutrition. Sometimes it does get lost in the shuffle.

Yet another put it this way: "I'm saving the patient, and I've got too many critical things to do. And somewhere in between all of those pressors, CRT, and critical orders is an order for an enteral feeding somewhere stuffed in between".

A fourth participant stated:

> I think everybody's consumed with everything else that's going wrong with the patient. You know, the blood pressure's low, they're unstable, they need their antibiotics. And I don't think that people make that (enteral feeding) their number one priority. Feeding is definitely not the number one priority.

Lack of Standardization Regarding Enteral Feeding Practices

Lack of standardized procedures and knowledge regarding GRV was by far the most discussed issue for participants in regard to enteral feeding. Participants described lack of standardization about how often to check GRV and at what level of GRV to hold tube feeding. Several participants stated that there was no specific guideline for how often to check GRV. All participants reported that their practice was to check GRV at the beginning of the shift, whenever medication was administered and every four hours. All participants were not sure if a policy or guideline existed, but reported that was what they were taught.

There was disagreement among participants on the amount of GRV at which to hold enteral feedings. Participants indicated that enteral feeding should be held for residuals of 100 – 250 ml. How fast to advance enteral feedings varied according to the participants. Every

participant reported that how fast to advance enteral feeding was dependent on the physician writing the order and often times, there was no instruction on how fast to advance the enteral feeding. One participant noted:

> There's no standard order for enteral feeding. Some people say advance by ten every eight hours. I just go on advance by 20mls every twelve hours. And when we first started, you advanced every four hours, by 20, until you got to goal.

Participants all indicated that practices regarding enteral feeding were physician dependent and every physician had a different opinion about how to order enteral feedings, how to advance and at what GRV to hold enteral feedings.

Holding tube feeding for change of position was also noted by all of the participants as a practice that contributed to underfeeding of the critically ill patient. One participant stated, "We've actually been having discussion about this lately, about how putting tube feed on hold within a second or two before the head of the bed goes down to turn the patient or reposition." Several participants acknowledged that the practice of turning off enteral feedings for repositioning and failure to restart the enteral feedings contributed to underfeeding. The further concern that was expressed by several participants was the fear of causing hypoglycemia with the combination of no calories and an insulin drip infusing.

Nursing Interventions to Increase Enteral Feeding

Participants identified several interventions that would increase enteral feeding in the critically ill mechanically ventilated patient. Having a guideline based on scientific evidence and having the research available was an intervention that several participants suggested. One participant suggested having a guideline based in "current scientific evidence references, just

from A to Z, I think it needs all the stuff from placement to advancing the feeding to when you hold it and when you don't, and when to stop it for procedures".

Participants suggested that the guideline should include information regarding placement of the feeding tube, when to advance the feeding, when to hold the feeding, and when not to hold feeding and when to stop feeding for procedures. Participants suggested that the guideline include the use of probiotics. One participant suggested that the guideline include a goal of when the enteral feed would be initiated. The guideline should include patient inclusion and exclusion criteria. The participant stated:

> … have a goal within X, Y, Z hours of admission to the ICU, the patient will be initiated on some form of tube feeding. And then you would have of course your exclusion criteria, those patients that you would not, but so that people would feel more inspired to address it initially.

A specific nursing intervention suggested by one participant to improve the amount of enteral feeding delivered to a patient is to document how many calories that patient has received at the end of every shift. The actual amount of calories received could then be discussed on rounds with a plan to make-up the calorie deficit. One participant suggested that enteral feeding be treated as a vital sign and the amount of volume delivered every two hours be recorded on the nursing flow sheet in order to trend and deliver what is needed to get to goal.

Conclusion

Participants in the study confirmed what other studies have found regarding barriers to enteral feeding. The barriers identified in this study include GRV and change of position. This study also found that there may be another barrier to delivering the prescribed amount of calories and protein that has not been described in the literature. This study found that nurses believe

enteral feeding to not be as important as other life-saving interventions. It is not the "sexy part" of what critical care nurses do. The study also found that nurses believed that an evidence-based guideline to follow would help improve the delivery of enteral nutrition by standardizing practice.

Chapter 5

Discussion

The purpose of this study was to describe the professional practice of critical care nurses regarding enteral feeding in mechanically ventilated critically ill patients. Eleven critical care nurses provided information about nursing practices surrounding enteral feeding in the ICU. Two themes were identified: "it's not the sexy part of what we do" and lack of standardization regarding enteral feeding practices. In this chapter, the usefulness of the theoretical framework used to guide the study will be reviewed. Nursing practice issues relate to holding feedings for GRV, patient positioning and the preference for nurses to focus on more "life-saving" interventions will be discussed. The implications for practice and research are outlined and limitations of the study are presented.

Theoretical Underpinnings

The theoretical framework that guided this study was the AACN Synergy Model of Nursing Practice (Peterson & Bredow, 2008). This theoretical framework served as a guide for the qualitative descriptive study. The framework suggested that gaining a deeper understanding of the characteristics of nurses, patients and organizational factors could help to identify ways that nurses could better intervene to improve enteral feeding in the critically ill patient. The concepts of the framework were used to develop an interview guide. The interview guide was designed to describe the characteristics of the patient, nurses and clinical units or systems that influence enteral feeding in the critically ill mechanically ventilated patient.

Patients were described by participants as unstable and vulnerable, but resilient. Nurses described different levels of clinical judgment based on years of experience. Advocacy for

enteral feeding was also described by all participants with systems in place for nurses to advocate for enteral feeding.

The data collected suggested that the clinical units or systems were collaborative, with meaningful recognition and effective communication. Organizational factors that were seen to effect enteral feeding included the lack of a feeding guideline or protocol. Due to lack of a guideline, when to start feeding, how fast to advance to goal, and when to hold enteral feeding was inconsistent.

The model is a means of delineating the role of nurses to positively impact patient outcomes and improve the success of the healthcare organization (Reed et al., 2007). The model was useful in describing the role of nurses in the provision of enteral nutrition. The model was also helpful in eliciting information from nurses regarding the nursing interventions that could improve the delivery of enteral nutrition to critically ill patients. The framework allowed the researcher a structure from which to gather data about nursing practices that could have an impact on patient outcomes and improve the success of the healthcare organization.

Examining the conceptual area of the work environment was not useful to the purpose of the study. Information regarding the work environment and setting did not add to the results of the study. According to Reed and colleagues (2007) the model is a powerful tool that defines the relationship between the nurses' competencies and the characteristics of patients.
The intent of the research was to describe the characteristics of the nurses and the patients. However, the current study did not seek to determine the relationship between the nurses' competencies and the characteristics of the patients and therefore, were not found to be central to the research aims. This is consistent with the findings of Cahill and colleagues (2010) who found that the culture of the setting was not a barrier to provision of adequate nutrition.

The framework was most useful in examining the nursing practices and organizational factors related to enteral feeding. Examination of these factors provided clear information about ways to change nursing practice to improve enteral feeding. However, the usefulness of the framework for this study was limited to theses two conceptual areas. In future research regarding nursing practices to improve outcomes, another model, more aligned with nursing practice might be considered.

"It's Not the Sexy Part of What We Do"

Despite the fact that participants knew that enteral feeding was important to the care and recovery of the mechanically ventilated patient, initiation of enteral feeding was often delayed because it was not considered life-saving. This finding is consistent with previous literature. DeJonghe and colleagues (2001) in a prospective survey of nutritional support practices in the ICU found three factors; use of extra-renal replacement, use of vasoactive drugs and the presence of a central venous catheter contributed to underfeeding of the critically ill patient. The authors postulate the reason for this is that the effects of nutrition on patient improvement are not quickly seen. DeJonghe and colleagues (2001) suggested regular training of medical staff as an intervention to combat underfeeding. Cahill and colleagues (2012), in a multicenter survey of critical care nurses, found that the first barrier to enteral feeding is "other aspects of patient care taking priority over nutrition" (p. 733). Cahill and colleagues (2010) proposed designing and implementing quality improvement interventions that tailor educational strategies to overcome barriers to enteral feeding.

Persenius and colleagues (2006), in a descriptive study of 44 nurses in three ICUs in Sweden found that nurses perceive that they have less responsibility for assessment of nutritional status and more responsibility for planning and implementing interventions and preventing

complications. Their study left open the question of whether more knowledge and awareness of the nurses' responsibilities regarding enteral feeding would increase enteral feeding times of the critically ill patient? Could more knowledge of the benefits of enteral feeding not only increase enteral feeding times by educating nurses about the benefits of enteral feeding as an intervention that decreases infectious complications, decreases length of time on a ventilator and decreases length of stay in ICU?

Under-Feeding of Critically Ill Patients

Findings from this study suggest that holding feedings for GRV and position changes are two of the major practice issues that result in the under-feeding of critically ill patients. The participants in this study described lack of a guideline regarding how often to measure GRV and at what level of GRV to hold enteral feeding. This was consistent with the Marshall and West (2006) study that found that measurement of GRV may contribute to under-feeding in the critically ill patient. According to Marshall and West (2006), GRV was used to assess feeding tolerance by 89.9 % of the nurses (n = 338) and feeding was delayed due to GVR by 65.4% of the nurses (n = 246).

While there was disagreement among participants of this study as to the amount of GRV at which to hold enteral feedings, participants indicated that enteral feeding was held for residuals of 100 mL – 250 mL. This finding is consistent with a descriptive survey-based study by Marshall and West (2006). Participants in that study reported holding enteral feeding for GRV from 50 mL to 400 mL. According to the Society of Critical Care Medicine and the American Society for Parenteral and Enteral Nutrition guidelines (2009), holding enteral nutrition for GRV of less than 500 ml, in the absence of other signs of intolerance, should be

avoided. The lack of evidence based practice may be contributing to underfeeding critically ill patients in these study units.

Changing patient position was also reported as a nursing practice associated with under feeding in critically ill patients (Marshall & West, 2006). Changing patients' body position accounted for 15% of all interruptions in enteral feeding resulting in a mean length of feeding interruption of 5.23 hours per patient day in a study by Elpern (2004). Several study participants (n = 9) discussed the practice of holding enteral feedings when repositioning and questioned the need for the practice. Based on practice recommendations by the American Society for Parenteral and Enteral Nutrition (2009), it is unnecessary to turn feedings off during the brief time the head of the bed is lowered to turn a patient.

Implications for Practice

Critical care nurses are in a unique position to provide interventions that improve patient outcomes. Participants of the study had several nursing practice suggestions that could increase the enteral feeding time of critically ill mechanically ventilated patients. Table 3 includes nursing practices suggested by participants to improve enteral feeding. Table 4 outlines suggestions nurses would like to see included in a practice guideline. All participants expressed the desire to have a guideline. The participants suggested that an evidence-based guideline be developed that included when to place a feeding tube, documentation of the type of tube and position, and how often to check GRV. The guideline should also include when to initiate enteral feedings, how quickly to advance enteral feedings, what type of enteral feeding formulation to use, when to hold enteral feedings and when to stop feedings for procedures. Marshall and colleagues (2012) identified that many of the enteral nutrition guidelines available

do not provide specific recommendations for nursing practice. Development of a guideline must include those nursing practices that nurses feel will increase delivery of protein and calories.

A specific nursing intervention to improve the amount of enteral feeding delivered to a patient suggested by one participant was to document how many calories a patient had received at the end of every shift. The actual amount of calories received could then be discussed on rounds with a plan to make-up any calorie deficit. Another participant suggested that enteral feeding be treated as a vital sign and the amount of volume delivered every two hours be recorded on the nursing flow sheet in order to trend and deliver what is needed to get to goal.

Table 3

Nursing practice suggested by participants to improve enteral feeding

- Education regarding recognition of aspiration
- Treating feeding as a vital sign and documenting the amount of feeding delivered every two hours
- Document amount of carbohydrate every two hours on the flow sheet with the amount being delivered discussed daily on rounds
- Document intake and output at the end of every shift so nurses are aware of amount of enteral feeding delivered
- Education during orientation regarding the importance of enteral feeding
- Having current evidence-based literature available on the unit
- Standardized times for checking GRV
- Documenting position of feeding tube
- Use of a guideline to improve enteral feeding

Table 4

Suggestions for inclusion in a practice guideline

Early initiation, quick advancement
Address whether to stop feeding when turning
Timing of checking GRV, amount at which to hold feeding versus when it can continue
When to check with MD
When to check placement
Strategies to address gastric intolerance

Implications for Research

Results from this study suggest that nursing interventions are urgently needed to enhance the suboptimal caloric intake of critically ill mechanically ventilated patients. Based on the results of the present study, future research needs to focus on developing and testing an evidence-based guideline that incorporates nursing practice issues. The barriers to implementation of a guideline need to be explored and the usefulness of nutrition champions in the change process should be examined.

Marshall and colleagues (2012) noted that many of the guidelines available for enteral nutrition do not address nursing practice issues such as placement confirmation, monitoring intolerance using GRV, and how quickly to advance enteral feeding. The current study found that uncertainty existed surrounding the nursing practices regarding measurement, interpretation and management of GVR. As a result of this uncertainty surrounding GRV, participants communicated different approaches to the management and delivery of enteral nutrition. An intervention study using a practice guideline that incorporates issues important to nursing

practice is needed. The intervention study should focus on the amount of enteral feeding delivered when a standard approach that incorporates nursing practice issues is used.

Participants in the study indicated that an evidence-based guideline would help to increase the amount of enteral feeding that was delivered to critically ill patients. In order to promote adherence to the guidelines, factors that could influence implementation of guidelines should be explored. Implementation strategies that take into account barriers to changing practice have a higher likelihood of success (Cahill et al., 2010). A qualitative study exploring the factors that influence implementation of guidelines for critical care (Jones, Suurdt, Ouelette-Kuntz, & Heyland, 2007) should be conducted. Specific barriers particular to the setting need to identified and understood to be successful in the implementation of a guideline.

Thompson and colleagues (2001) found that nurses engaged in patient care prefer information obtained through social contact rather than seeking information that is text-based or electronic-based. This approach of integrating complex information with current research, and applying the information to problem-solving within the clinical environment, provides an opportunity to develop a nursing resource person, a nutrition champion, with expertise in nutrition practices. Future research can be conducted to determine if having a nutrition champion improves the knowledge of the staff and decreases interruptions in enteral feeding.

Further interventions to be considered regarding the lack of knowledge specific to nutritional therapy include integration of nutrition-specific education into undergraduate nursing education, and continuing education or yearly competency review for nurses in current critical care practice.

Study Limitations

There were several study limitations. The first limitation was recruitment. Recruitment of the study sample of 11 for this study was a challenge. Despite the fact that there was a potential pool of 225 critical care nurses, recruitment was a slow and tedious process. Once again, the recruitment problem may be due to nurses' lack of interest in this topic. Recruitment into the study took six months and the last four participants were recruited using snowball sampling. One participant helped to recruit four of her colleagues to participate in the study. This recruitment strategy may lead to bias as these individuals may tend to be more interested in enteral feeding and have more knowledge about enteral feeding than those who chose not to participate.

There may have been a historical effect that occurred during the study since both institutions were going through important changes during the enrollment period. In the urban academic medical center, full-time ICU nurses underwent a decrease in hours in order avoid a reduction in workforce. At the rural academic medical center, the two existing ICUs were being split into four ICUs and nurses were forced to choose in which ICU they wanted to work. This meant a change in leadership for some of the nurses. In addition, the long-time director of the ICUs resigned and there was interim leadership in place. All of these factors may have contributed to the difficulty in recruitment for the study and may have influenced some of the subjects' responses to the interview questions.

Another limitation of the study is the lack of diversity as the participants were all white females.

Summary

This is the first qualitative study to describe nursing practices regarding enteral feeding in the mechanically ventilated patient. While the literature describes the barriers to enteral feeding, there are few studies that inform us about the best way to enhance nursing practice to reduce interruptions in enteral feeding. Study findings offer insight into critical care nurses' perspectives on the barriers and nursing practice issues that may improve the delivery of protein and calories to critically ill mechanically ventilated patients in an effort to improve patient outcomes.

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Appendix A

Interview Guide

Conceptual area	Main question	Probes
Characteristics of patients, clinical units and systems of concern to nurses o Resilience o Vulnerability o Stability o Predictability	Can you tell me about the mechanically ventilated enterally fed patients you care for in the unit?	Do patients usually recover and leave the ICU? Tell me about patient outcomes. How labile or stable are the patients in the unit? How predictable is a patient's course in the ICU? How predictable is a patient's enteral feeding course while in the ICU?

Conceptual area	Main question	Probes
Nursing competencies of concern to patients, clinical units and systems o Clinical judgment o Advocacy and moral agency o Caring practices	Can you describe your personal experience with enteral feeding of the mechanically ventilated patient as an ICU nurse? In your opinion what are the	How well do the nurses in your unit demonstrate competency in enteral feeding practices? Give me an example of how nurses in the unit demonstrate

o Collaboration o Systems thinking o Response to diversity o Facilitation of learning o Clinical inquiry	skills needed to be a highly competent ICU nurse?	critical thinking as related to enteral feeding of the mechanically ventilated patient. What do you do when there is conflicting information about enteral feeding practices? Do nurses advocate for the initiation/continuation of enteral feeding? How important a therapy do nurses consider enteral feeding in mechanically ventilated patients? Which multidisciplinary team members are involved in enteral feeding of the patients? Describe the collaborative process surrounding enteral feeding. Is there system support for enteral feeding? Can you describe it to me?

Conceptual area	Main question	Probes
Synergistic nursing practice o Clinical experience o Optimal patient outcomes o Evidenced based practice o Nursing research	This study is focusing on how nurses provide enteral feedings to mechanically ventilated patients. Can you tell me a little bit about your own process when dealing with mechanically ventilated enterally fed in the ICU?	Who places the feeding tubes? What type of feeding tube is used to deliver enteral feeding? How is the position of the tube initially checked? How often, after initial placement, is feeding tube placement checked? How soon do most patients begin being fed? What happens to the enteral feeding when patients are repositioned? Do you measure GRV? At what level do you hold enteral feeding? What are the major barriers that cause delays to the start of enteral feedings? What are some of your

		concerns (if any) about the way enteral feeding is handled on your unit?
	In your opinion – how can we improve nursing practice when it comes to enteral feeding administration for mechanically ventilated patients?	If you could create a practice guideline to improve the amount of enteral feeding a patient gets what would be essential to include? On your unit is there a system in place that can match patient acuity and nursing skill level?

Appendix B

Enteral Feeding Study: Demographic sheet

1. Age: _____ years

2. Sex:

- Male
- Female

3. How do you describe yourself? (Please circle the one option that best describes you)

- American Indian or Alaska Native
- Hawaiian or Other Pacific Islander
- Asian or Asian American
- Black or African American
- Hispanic or Latino
- Non-Hispanic White
- Prefer not to answer

4. Highest degree held:

- Associate degree
- Bachelor's degree
- Master's Degree
- PhD
- DNP
- Other: _____

5. Specialty certification/s: _____

6. Total years of practice as an RN: _____

7. Total years of practice in present ICU: _____

8. Total years of practice in an ICU setting: _____

9. Number of different ICU settings (in different hospitals): _____

10. Type of ICU presently working: _____

11. Total number of patients cared for in a shift:_____

12 Employment status:

- Full time
- Part time

13. Length of shift worked: _____