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N501: Theoretical Foundations of Advanced Nursing
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Description of the Critical Issue

Critical illness can generate overwhelming levels of physical and psychological stress for patients. ICU delirium is an independent variable of mortality and morbidity in the intensive care unit (ICU) as it impairs patients’ ability to “receive, process, store, and recall information,” resulting in confusion (Kotfis, Marra, & Ely, 2018). Often this newfound state of sudden confusion can induce hallucinations, delusions, and paranoia, extending patients’ lengths of hospitalization and negatively impacting their quality of life. Unfortunately, ICU delirium continues to be frequently underestimated and overlooked by many health care professionals.

It was not until the era of the coronavirus (COVID-19) pandemic that I began noticing the substantial effect delirium has on many ICU patients. Delirium can occur in anxious patients with increased oxygen demands and prolonged hospital stays. Confined to their isolation room with limited human interaction, these COVID-19 patients are placed either in an uncomfortable mask with very high bilevel positive airway pressure (BIPAP) settings or on a high flow nasal cannula. As a nurse for these patients, clustering care every two hours is crucial to limit virus exposure time and to decrease use of limited personal protective equipment by entering the patient’s room more often than necessary. The ongoing noisy alarms, sleep interruptions, and prodding with needle sticks for lab collections are only a few of the likely contributions to delirium in the ICU setting. Clinicians’ strong encouragement for patient self-pronning, also referred to as “tummy time,” which is meant to improve oxygenation, can lead to unintended long naps during the day with reduced stimuli. These frequent periods of low environmental stimuli (i.e., lights off, dark rooms, little to no exercise, isolation) sometimes make patients, especially the elderly, confused about the time of day and cause disruptions in circadian rhythms,
which rapidly worsen sleep deprivation. This results in periods of agitation and anxiety in this patient population that only exacerbates their high oxygen demand.

Non-invasive oxygen devices can be tolerated anywhere from days to weeks depending on the patient's condition. When the patient's lungs cannot sustain this, due to increased oxygen demand and hypercapnic respiratory failure, immediate intubation is required for most. The vicious cycle of delirium circles once again when these patients become dependent on a mechanical ventilator and are placed on continuous intravenous sedatives and/or paralytic drips. While sedatives are used to improve patients’ synchrony with the ventilator, prolonged and deep sedation is a causative factor for the development of delirium and can have neurotoxic effects (Kotfis et al., 2018). These neurotoxic effects include acute brain dysfunction, long-term cognitive impairments, and increase risk of death (Pandharipande, Patel, & Barr, 2014). The highest incidence rate of delirium is found in ICU patients undergoing mechanical ventilation and reaches over 80% (Kotfis, et al., 2018).

Because the incidence of ICU delirium in mechanically ventilated patients can range from 32% to 87%, there should be a greater emphasis placed on the issue of ICU delirium (Kotfis et al., 2018). Implementation of more diagnostic tools, routine monitoring, prevention interventions, and clinician education on ICU delirium can decrease its high occurrence and significantly improve patients’ environment and health outcomes, in addition to reducing costs and lengths of hospital stays.

Selected Theory
Many ‘human needs’ nursing theories have advantageously served as key components in early identification of patients’ needs in order to reach fulfillment. The Neuman Systems Model, in particular, utilizes a systems approach to focus on the “human needs of protection and relief from stress” (Neuman & Fawcett, 2011). Regardless of one’s type of environment, it will likely contain both positive and negative stressors that can alter an individual’s system of balance and well-being. In the clinical setting, interventions should be sought and applied early on to prevent disruption that can cause the patient harm.

Born and raised on a rural Ohio farm in 1924, Betty Neuman went on to earn her bachelor’s and master’s from UCLA, and eventually a doctorate in clinical psychology in 1985 from Pacific Western University. Throughout her early nursing career, she not only worked as a hospital nurse but also an industrial nurse before becoming a clinical instructor, where she taught at various universities throughout the United States. It was not until 1972 that Neuman officially published her theory, then known as, “A Model for Teaching the Total Person Approach to Patient Problems.” Her inspiration for the theory development derived from non-nursing disciplines, such as psychology, which included the works of “Lazarus on stress and coping, Chardin and Cornu on wholeness in systems, von Bertalanffy and Lazlo on general systems theory, and Selyle on stress theory” (Neuman & Fawcett, 2011). Neuman highlights the four main components of the nursing metaparadigm: person, environment, health, and nursing, in addition to fifteen various concepts that play a major role in her theory. According to Neuman, human beings are viewed as “unique open systems” that are ever-changing with their environment, and require protection (Neuman & Fawcett, 2011). Neuman’s model is especially relevant to patients who are placed in an unfamiliar environment, such as an intensive care unit setting.
This theory can help illuminate the problem of ICU delirium because of its ability to anticipate the potential effects of interventions that may “strengthen the lines of defense against stress” (McEwen & Wills, 2019, p. 160). For example, critical illness can induce high stress levels in patients, presenting as agitation and/or delirium. The stressors involved may take the form of “sedation, mechanical ventilation, and the patients’ attempts to make sense of what is heard and seen in an unfamiliar environment” (Black, 2011). The Neuman Systems Model’s components and concepts strongly resonate with the interventions I hope to utilize towards addressing and resolving ICU delirium. This model encourages nurses to view their patients holistically and anticipate their response to stress. Neuman emphasizes that the “nurse can provide [balance] through the identification of problems…and [by] using the concept of prevention as intervention” (McEwen & Wills, 2019, p. 156). There are three levels of prevention identified by Neuman: primary, secondary, and tertiary. The primary prevention is activated upon stressor suspicion to refrain from its reception. If signs of stress have affected the open system, then secondary prevention interventions are activated to strengthen the lines of defense and resistance and minimize the negative reactions. Ultimately, the tertiary prevention aims to avert recurrence of these same stressors and guide the open system towards regaining stability. With the implementation of management strategies, education, and preventative methods, clinicians can eliminate negative stressors that induce a patient’s system instability, in this case ICU delirium. Within the circles of the model illustrated in Appendix A are five variables including physiologic, psychological, sociocultural, developmental, and spiritual, that work in concert to manage the open system’s stability, serving as the basic structure (McEwen & Wills, 2019, p. 157). When stressors arise, a patient utilizes various versions of protection before adapting to these internal or external stressors. Surrounding the basic structure are the lines of
resistance further enclosed by the normal line of defense (NLD), and lastly the outermost barrier known as the flexible line of defense. The normal line of defense is considered the patient’s baseline health. If the NLD is incapable of providing sufficient protection to the open system, then the lines of resistance become activated. These barriers of protection are constantly responding to stressors that manifest from internal, external, and created environments. By incorporating preventative measures, lines of defense can potentially be strengthened, eliminating negative reactions such as delirium. Neuman “believed that the causes of stress can be identified and remedied through nursing interventions” (McEwen & Wills, p. 156). Potential nursing interventions include delirium diagnostic tools, daily sedation weaning trials, and improved environmental stimuli (e.g., exposure to daylight, reorientation to unfamiliar sounds and sights). By utilizing these interventions, the lines of defense are reinforced, allowing the patient to regain balance with their dynamic environment.

**Theory Application**

The key concepts of Neuman’s System model serve as the foundation for remediating the issue of ICU delirium. Nurse-facilitated interventions can help strengthen the lines of defense and resistance against stressors endured by patients experiencing critical illness. During direct patient-care contact, nurses can engage in frequent reorientation with their patient to provide not only the time of day, place, and activity, but orient them to uncommon hospital sounds and sights, such as loud monitor alarms or frequent beeping. Sensory disturbances may induce unnecessary stress, eventually resulting in ICU delirium; with strategic promotion of adequate rest and sleep periods, patients will likely be in sync with their external environment instead of out of touch with it. This eliminates the need for the activation of the first protective mechanism, known as the flexible line of defense. Further nursing strategies to achieve sufficient sleep
hygiene include clustering patient care, regulating light and noise control, and limiting excess physical stimuli at night (Pandharipande et al., 2014). The purpose of these interventions is to ensure system stability.

There are benefits of taking non-pharmacological approaches, instead of pharmacological ones, to manage delirium in ICU patients; however, the ideal strategy would be to prevent the delirium from occurring in the first place. Neuman encourages early intervention, prior to the penetration of the protective lines of defense and resistance (Alligood, 2013, p. 285). This method is known as “primary prevention as intervention” and can be used to reduce the incidence of delirium among the critically ill population. Because ICU delirium is associated with longer hospital stays, which are often secondary to increased lengths of time on the mechanical ventilator, the implementation of corresponding protocols to prevent over-sedation and reduce ventilation time may significantly improve patient outcomes. The protocols would be early initiation and safe repetition of the Spontaneous Awakening Trial (SAT) and Spontaneous Breathing Trial (SBT). These are part of the Awakening and Breathing Coordination, Delirium monitoring/management and Early exercise/mobility (ABCDE) bundle (Pandharipande et al., 2014). The ABCDE bundle is an “evidence-based, interprofessional, multicomponent strategy for minimizing sedative exposure, reducing duration on the mechanical ventilation and managing ICU acquired delirium and weakness” (Balas, Burke, Gannon, Cohen, Colburn, Bevil, Franz, Olsen, Ely, & Vasilevskis, 2013). For example, SATs are crucial in order for ICU nurses to properly assess their patients’ neurological status without the sedative depressing their central nervous system. The inclusion of sedation scales, such as the Richmond Agitation and Sedation Scale (RASS) is equally important to prevent the occurrence of under- or over-sedation in patients at risk for delirium. According to Pandharipande et al. (2014), RASS is one of the “most
valid and reliable methods for measuring the quality and depth of sedation” in adult critical care patients. Additionally, the sedative drug of choice plays a major factor in length of ICU hospitalization. A recent meta-analysis included in the *Pain, Agitation, and Delirium (PAD)* Guidelines, demonstrated that using non-benzodiazepines for sedation (i.e., propofol, dexmedetomidine) corresponded to a shorter ICU and mechanical ventilation duration as opposed to using benzodiazepines (i.e., midazolam, lorazepam) (Pandharipande et al., 2014). We can have reasonable confidence in this result, as $p = 0.0007$. Upon completion of a successful SAT, a formal SBT can occur. SBTs are actually recommended daily to move towards safe and successful extubations (Pandharipande et al., 2014). With these preventative measures implemented by nurses more often, there will likely be a reduction in the time spent on the mechanical ventilator, in addition to less time spent in the ICU, decreasing the risk of developing ICU delirium. According to the Neuman’s Systems model, eliminating these types of stressors from occurring can promote a healing environment for the patient (Bardwell, Brimmer, & Davis, 2020).

There are various limitations and strengths associated with the application of Neuman’s Systems Model. This model provides a reliable framework in the intensive care unit by guiding nursing practice, patient advocacy, and education. Because the patient is in a constant “reciprocal relationship with [their] environment,” there will likely always be a natural defense mechanism reaction to stressors in order to maintain a state of wellness (Alligood, 2013, p. 287). While the patient’s reaction may occur on multiple levels, including the patient’s flexible line of defense, normal line of defense, or line of resistance, those efforts alone might still be inadequate to regain stability. Thus, these undefeated stressors can lead to reactions symptomatic of delirium in patients within the dynamic ICU environment. However, nurses have the capacity to implement
certain interventions to prevent these stressors from reaching the patient as promoted in Neuman’s Systems Model. According to Alligood (2013), many of these interventions contribute to “a possible degree of reaction, resources, goals, and anticipated outcomes.” For example, by demonstrating appropriate environmental stimuli, standardizing sedation management, and working towards reducing ventilation time, the nurse plays a vital role in securing optimal wellness and stability for the patient, improving their overall health outcomes. Another benefit of this model is its design of commonality and consistency in the delivery of care. The model outlines a “client system and classification of stressors that can be understood and used by all members of the health care team” rather than excluding important disciplines in the multidisciplinary team (Alligood, 2013, p. 287). For instance, these patients thrive from receiving formal physical, occupational, and speech therapy during the recovery journey in the ICU in order to improve functional mobility, health and safety screenings, and reduce hospital readmission. A final strength in applying this model in the ICU is its emphasis on wholistic systems approaches for the patient. Let it be known that Neuman purposefully altered the spelling of the term holistic to wholistic in her second edition (1989) to “enhance understanding of the term as referring to the whole person” (Alligood, 2013, p. 283). She strongly believed that “nursing is concerned with the whole person” (Alligood, 2013, p. 285). The model focuses on patients as wholes whose components (i.e., physiological, psychological, sociocultural, developmental, and spiritual) are constantly interacting with their changing environment to best accommodate their wellbeing (Alligood, 2013, p. 283). The efforts made by nurses to strengthen the patient’s lines of defense and resistance and intervene with preventative measures to ensure stability serves to improve overall quality of care. Additionally, these wholistic principles
encourage nurses to incorporate more evidence-based practices in their nursing care plans to reach this desirable state of health and stability.

While this model is nurse-driven, it is primarily patient-focused. A limitation of using Neuman’s Systems Model for this patient population is the likelihood of these critically ill adults being unable to participate in their care plans and heavily relying on the nurse to carry out all the interventions. Nevertheless, this model is still beneficial in targeting the issue of ICU delirium. I believe involving patient family members in implementing the psychosocial interventions decreases some of burden on the nurse and improves the patients’ wellbeing.

Conclusion

There is great relevancy in applying the Neuman’s Systems Model in the adult acute care setting to target the issue of ICU delirium. Because its systems method “accommodates varied approaches to patient assessment and care,” this model has the potential to be well-received by ICU nurses and this specific patient population. However, this model should not be limited to the adult population, as it has potential to serve as a strong foundation in the pediatric critical care population as well. Within the critical care setting, there are numerous complex stressors patients of all ages may experience in such an unfamiliar environment; therefore, utilizing Neuman’s Systems Model as a guide to understand and care for these patients can restore stability and provide high-quality patient-centered care.

Neuman’s Systems Model is a reliable framework to follow because it assists nurses and patients in proactively identifying internal and external stressors and accommodating patients to their environment if their defense mechanisms fail. Furthermore, it promotes prevention-as-intervention techniques that the nurse can incorporate into their practice before the patient’s
natural defense system activates and equilibrium disruption occurs. Notably, this implementation process guided by Neuman’s model has the potential to significantly reduce the development of delirium among the critical care population. The components of Neuman’s Systems Model strategically focus on the patient, their issues, and approaches to accommodate their needs. Whether those approaches are completed by the patient or by the nurse depends on multiple factors. Future work that can take place to target ICU delirium would be the inclusion of family participation using this conceptual model. Involving the patient in goals of care is imperative for interdisciplinary care management and health outcomes. Unfortunately, many patients in a critically ill state have limited capacity to actively participate in their care plans. Luckily, the advocacy of a patient-delegated family member involved in the plan of care, in addition to nurse-facilitated family participation during psychological care, can reduce the risk of ICU delirium development. The approaches taken using Neuman’s Systems Model would be prevention as intervention by integrating families in psychological care. For instance, arranging regular bedside visitations with a family member who can help patients reorient to an unfamiliar environment by serving as a familiar presence acts as primary prevention. Ideally, the goal would be to prevent reactions of distress and confusion from occurring, which have the potential to transform into ICU delirium. Psychological interventions are essential in resolving the issue of ICU delirium and the involvement of family to implement these interventions can strengthen the framework of this model and ensure patient wellness and stability.

ICU delirium continues to be prevalent throughout the United States and should not be overlooked any further. The Neuman Systems Model brings awareness to negative stressors and guides one to develop prevention strategies that have a positive effect on a patient’s health. As highly trusted health care professionals in society, I believe nurses have the responsibility to
reflect health care values in their work by incorporating quality interventions and producing positive patient outcomes, under the guidance of the Neuman’s Systems Model.

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[https://doi.org/10.1097/CCM.0b013e3182a17064](https://doi.org/10.1097/CCM.0b013e3182a17064)


Appendix A


Figure 7-2  The Neuman Systems Model.


Diagram of the Neuman Systems Model