CHAPTER 3

VULNERABILITY

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INTRODUCTION

A number of definitions of vulnerability and vulnerable patients pervade the nursing literature. One such definition is the possibility of an adverse or injury (Hardin, 2015). Another definition relevant to this chapter is "the universally present risk for potential or actual harm" (Mesman, 2014, p.27).

The concept of vulnerability has been addressed in the literature from a number of perspectives. One outlook is the evaluation of "vulnerable populations." Some of these are identified based on socioeconomic status, ethnicity, gender, and age. For example, due to physiologic changes associated with aging, older adults are more vulnerable for cardiovascular (Davis, 2014), pulmonary (Frederick, 2014), renal (Boling, 2014), immunologic (Lineberry & Stein, 2014), nutrition and hydration (DiMaria-Ghalili & Nicolo, 2014) issues as well as issues related to alterations in drug metabolism. The latter makes the patient increasingly vulnerable for adverse drug events (Kaplow, 2014).

TYPES OF VULNERABILITY

Three types of vulnerability are described in the literature—physical, psychosocial, and social. Physical vulnerability addresses physiologic issues and can increase the patient's morbidity or mortality. Psychosocial vulnerability is concerned with stressors such as anxiety or other emotional effects of critical illness. Social vulnerability evaluates patients' demographic data and their risk for illness (Scanlon & Lee, 2007).

SOURCES OF VULNERABILITY

Physiologic changes to the cardiovascular system that make patients more vulnerable include decreased heart rate, ejection fraction, and cardiac output. These physiologic changes can impact a patient's reaction to treatment. A loss of physiologic

reserve makes older patients more vulnerable to disease. The estimated 66% of people aged 65 years and older and approximately 80% of those at least 75 years of age with hypertension are vulnerable for progressive renal dysfunction and are more likely to develop left ventricular hypertrophy (Davis, 2014).

The loss of physiologic reserve makes older patients more vulnerable for cardiovascular and renal dysfunction, hypoxemia, and pulmonary edema. Older patients are also more vulnerable for development of dysrhythmias, with atrial dysrhythmias developing more frequently. Sequelae of atrial dysrhythmias include chest pain, heart failure, hypotension, or any combination of these.

It is estimated that approximately 50% of adults with heart failure are 75 years of age or older. These data are significant as an estimated 50% of patients admitted to the intensive care unit (ICU) are at least 65 years old (Davis, 2014).

Pulmonary changes in older adults include a decreased thirst response. This change increases an older patient's vulnerability for respiratory infections due to decreased ability to clear thickened secretions. An increase in shunting is also associated with aging as are musculoskeletal changes, the latter of which can affect movement of the thorax and alter pulmonary function. Further, older patients are at greater risk for pneumonia due to increased number of inflammatory cells in alveolar and bronchiolar spaces (Frederick, 2014).

Similarly, older patients have higher levels of vulnerability for development of renal issues. This increased risk is related to physiologic changes associated with aging as well as age-associated comorbidities. Age-related physiologic changes include a significant decrease in glomeruli and a decrease in functional renal reserve. These changes result in decreases in glomerular filtration rate and renal blood flow. There is an also decreased ability to hold onto sodium and concentrate urine, which increases vulnerability for hypovolemia and decreased renal perfusion. Aging is also associated with a reduction in lean body mass, which can cause cellular dehydration and may result in renal toxicity from administration of nephrotoxic agents (Boling, 2014).

Older adults have notably increased vulnerability for sepsis. This is due to decreased physiologic reserve, alteration in immune function, and technological advances used in care of acute and critically ill patients. Risk factors identified for severe infection in older adults include alteration in B and T cell function, nutritional deficits, alteration in endocrine function, diminished cough and gag reflex, neurologic dysfunction (e.g., delirium, dementia), risk for aspiration, impaired mobility, and alterations in skin integrity. Older adults are at increased vulnerability for sepsis from increased cytokine production, decreased organ function related to physiologic changes associated with aging, decreased cardiopulmonary reserve, and preexisting medical conditions (Lineberry & Stein, 2014).

Older adults have high levels of vulnerability for malnutrition. Physiologic, psychosocial, financial, and dietary factors are implicated in its development. Because of malnutrition, patients are increasingly vulnerable for infection, delayed wound healing, increased time on mechanical ventilation, increased length of stay, and postoperative complications.

When frail older adults develop critical illness, their functional status can decrease. This increases their vulnerability for disability and protracted time to recuperate from critical illness (DiMaria-Ghalili & Nicolo, 2014).

Older adults in the ICU have high levels of vulnerability for development of delirium. Its development may be attributed to age; alcohol intake; smoking; living at home alone; infection; acute illness; fever; presence of lines, catheters or devices; sedation administration; electrolyte imbalances; or drug toxicity. Environmental factors, such as there being no clock in the room, lack of daylight, restraint use, and lack of visitors, have also been implicated in the development of delirium in the ICU. Presence of chronic illness such as cardiac or pulmonary disease has been associated with delirium as well. Alteration in cognition, specifically delirium, may also be attributed to use of restraints, administration of excess sedation, falls, anorexia, and body temperature changes (Amba, 2014; Van Rompaey et al., 2009).

Because of age-related changes in renal and liver function, older adults have high levels of vulnerability for adverse drug events. This is attributed to alterations in pharmacokinetics and pharmacodynamics of agents being administered during critical illness. Specifically, there are alterations in absorption, distribution, metabolism, and excretion of drugs. Each of these can result in drug toxicities or decreases in therapeutic effect. Further, as mentioned, aging is accompanied by comorbidities for which medications are prescribed. Polypharmacy, common in older adults, can result in drug–drug interactions, which can result in increased vulnerability and suboptimal outcomes (Kaplow, 2014).

Infants in the neonatal ICU have high levels of vulnerability as well. They are fragile, frail, and at risk for complications related to therapeutic interventions. Intravenous lines can result in catheter-associated bloodstream infections. Antibiotics used to treat these infections can lead to drug resistance. Anticoagulants used to prevent catheter clotting can result in cerebral hemorrhage. The stress of being intubated and on mechanical ventilation augments the vulnerability of infants, further increasing stress and vulnerability in the neonatal ICU environment. Specifically, the nose and light in the unit can result in sleep disturbances and atypical stress effects (Mesman, 2014).

The routines of the ICU also increase vulnerability levels of patients, for example, during hand-off communication at intershift report or report when a patient is transferred to a different level of care (e.g., emergency department to the ICU, operating room to postanesthesia care unit or ICU). It is essential that these hand-offs occur to nurses with the knowledge and expertise to care for patients with high degrees of vulnerability.

DEFINITION

The Synergy Model definition of vulnerability is the susceptibility to actual or potential stressors that may adversely affect patient outcomes. A Level 1 patient is highly vulnerable, susceptible, unprotected, and fragile. A Level 3 patient is moderately vulnerable, somewhat susceptible, and somewhat protected. A Level 5 patient is minimally vulnerable, is safe, out of the woods, and not fragile (AACN, 2015).

NURSING STRATEGIES

It is essential that nurses caring for acute or critically ill patients consider age-related physiologic changes that increase patients' vulnerability for complications and development of comorbid conditions. A high degree of vigilance is required to assess for specific and nonspecific signs of patient problems.

One of the factors identified in the literature that mitigates vulnerability is termed "personal capacity." It is defined as "the perceived innate ability of all individuals within society to grow, produce, perform, and achieve autonomy and their maximal potential." It is felt to have an inverse relationship with vulnerability. That is, higher levels of personal capacity will decrease one's perception of physical, psychological, and social vulnerability (Scanlon & Lee, 2007). Nurses can increase personal capacity and decrease physical and psychological vulnerability in their roles as a patient advocate, facilitators of learning, and caring practices. These nursing competencies are discussed in detail in chapters 11, 12, and 17. Promoting patient autonomy when hospitalized is critical as patients lose their sense of control and independence when hospitalized.

Physical, psychological, and social vulnerability must also be considered when preparing patients for discharge. Factors that should be considered include whether a patients can participate in self-care, manage their discharge medications, and follow discharge instructions. Assessment of their levels of comprehension of what is required posthospitalization will help decrease vulnerability levels (Scanlon & Lee, 2007).

Assessment for physical vulnerability sources must be made on an ongoing basis. Such sources include comorbid conditions, sensory deficits, and mobility issues. Psychosocial vulnerability can be anticipated in patients who lack social support (Hardin, 2015). Monitoring for these risk factors is imperative.

CASE STUDY

An 85-year-old patient with a history of 78 pack-years tobacco smoking, hypertension, chronic obstructive pulmonary disease (COPD), diabetes, malnutrition, and atrial fibrillation is admitted with chest pain. She has 5 children; 3 of her daughters and a male significant other visited often. Prior to admission, she was a widow and living independently at home.

The patient was diagnosed with a 6 cm abdominal aortic aneurysm. No renal vessel involvement was noted. She was admitted to the ICU following aneurysm repair. She was intubated and on mechanical ventilation and had an intra-arterial line and a central venous catheter.

The patient's postoperative course was complicated by the development of a lower extremity deep vein thrombosis, pneumonia, and sepsis. She was placed on anticoagulation and broad spectrum antibiotic therapy. Glycemic and blood pressure control were challenging during her postoperative course.

After four days in the ICU, she was stabilized and was transferred to a general surgical unit. She was ultimately discharged home.

APPLICATION OF THE CASE STUDY TO THE SYNERGY MODEL

This patient had high levels of vulnerability from a number of sources. From a physiologic perspective, this patient had high levels of vulnerability due to her comorbid conditions. Specifically, hypertension, COPD, and diabetes put her at risk for postoperative complications. Her history of COPD put her at risk for failure to be liberated from mechanical ventilation. Her history of diabetes and malnutrition put her at risk for poor wound healing. Malnutrition also compromised her immune function. Presence of invasive catheters made her vulnerable for development of an infection or sepsis. Her age made her vulnerable for adverse drug events and renal compromise. Meticulous nursing care was critical to her positive outcome.

EXAMPLES OF RESOURCE AVAILABILITY LEVELS

Patients at high risk for vulnerability include those in the ICU with risk factors for delirium; aging patients because of age-related physiologic changes; patients who sustained trauma and are vulnerable to developing multiple organ dysfunction syndrome; and patients with immune deficiency with increased risk of developing infection or cancer (Carlson & Fitzsimmons, 2014). Patients with comorbid conditions (e.g., heart failure, peripheral vascular disease, hepatic dysfunction, renal dysfunction, or cancer) have high levels of vulnerability (Hardin, 2015).

CONCLUSION

Nurses play a pivotal role in identifying patients with high levels of vulnerability. In addition to ongoing assessments for complications of care, collaboration with the multidisciplinary team to mitigate stressors is essential for optimal patient outcomes (Hardin, 2015).

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