

Assessment and Management of Older Adults with Complex
Illness in the Critical Care Unit

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Background

With increased frequency, the consumers of critical care services are older adults. More than one-half (55.8 percent) of all intensive care unit (ICU) days are incurred by patients over the age of sixty-five (Angus et al., 2000 [Level IV]). This number is expected to increase to unprecedented levels over the next ten years as the population ages (Angus et al., 2000 [Level IV]). While older adults are an extremely heterogeneous group, they do share some age-related characteristics and are susceptible to a variety of geriatric syndromes and diseases that may influence both their ICU utilization rates and outcomes.

Americans over the age of sixty-five are living longer; are more racially and ethnically diverse; frequently suffer from chronic conditions such as hypertension, heart disease, diabetes and cancer; and over one-quarter report difficulty performing one or more activities of daily living (ADL) (Administration on Aging, 2005 [Level IV]). They are also more likely to be diagnosed as having two of the most common and costly ICU diagnoses, acute respiratory failure and sepsis. Reports of the incidence of these conditions increase exponentially with age (Carson, 2003 [Level VI]; Martin, Mannino, & Moss, 2006 [Level IV]). Ideally, the goals of providing nursing care to the critically ill older adult include restoring physiologic stability, preventing complications, maintaining comfort and safety, and preserving or preventing decline in pre-illness functional ability and quality of life (QOL).

Risk Factors for Critical Care

There is evidence, however, suggesting many critically-ill older adults are at risk for poor outcomes. A critical review of the literature found that once hospitalized for a life-threatening illness, older adults suffer from high ICU, hospital and long-term crude mortality rates and are at risk for deterioration in functional ability and post-discharge institutional care (Chelluri, Grenvik, & Silverman, 1995 [Level V]; Williams et al, 2008 [Level IV]). Older age is also one of the factors that may lead to physician bias in refusing ICU admission (Joynt et al., 2001 [Level IV]; Mick & Ackerman, 2004 [Level VI]), the decision to withhold mechanical ventilation, surgery, or dialysis (Hamel et al., 1999 [Level III]), a provision of lower intensity of care (Thompson et al., 2008 [Level IV]), and an increased likelihood of an established resuscitation directive (Hakim et al., 1996 [Level III]).

Despite these findings, most critically-ill older adults demonstrate resiliency, report being satisfied with their QOL post discharge and, if needed, would reaccept ICU care and mechanical ventilation (Chelluri, Grenvik, & Silverman, 1995 [Level V]; Guentner et al., 2006 [Level IV]; Kaarola, Tallgren, & Pettila, 2006 [Level III]; Kleinpell & Ferrans, 2002 [Level IV]). Although research identifying specific factors responsible for undesirable outcomes is conflicting, it has become increasingly clear that chronologic age *alone* is not an acceptable predictor of poor outcomes after critical illness (Chelluri, Grenvik, & Silverman, 1995 [Level V]; Esteban et al., 2004 [Level IV]; Kleinpell, 2003 [Level IV]; Marik, 2006 [Level VI]). In other words, older patients demonstrate considerable variability in outcomes following an ICU stay.

There are many factors, supported by research, that influence an older adult's ability to survive a catastrophic illness. These factors include severity of illness, nature and extent of comorbidities, diagnosis, reason for/duration of mechanical ventilation, impaired level of consciousness, complications, length of ICU/hospital stay, preadmission nursing home residence, pulmonary artery catheterization, pre-hospitalization functional ability, gender and ethnicity (Adnet et al., 2001 [Level IV]; Chelluri, Grenvik, & Silverman, 1995 [Level VI]; Chelluri, Pinsky, Donahoe, & Grenvik, 1993 [Level IV]; Djaiani & Ridley, 1997 [Level IV]; Esteban et al., 2004 [Level IV]; Hamel et al., 1999 [Level III]; Kass, Castriotta, & Malakoff, 1992 [Level IV]; Knaus et al., 1991: Level of Evidence: Level IV: Validation Study ; Mayer-Oakes, Oye, & Leake, 1991 [Level IV]; Nicolas, Le Gall, Alperovitch, Loirat, & Villers, 1987 [Level IV];

Nierman, Schechter, Cannon, & Meier, 2001 [Level IV]; Richmond, Kauder, Strumpf, & Meredith, 2002 [Level IV]; Soares et al., 2006 [Level IV]; Shapira et al., 1997 [Level IV]; Vosylius, Sipylaite, & Ivaskevicius, 2005 [Level IV]; Wu, Rubin, & Rosen, 1990 [Level IV]). Equally important are variables frequently discussed in the literature that have yet to be fully investigated. These variables include senescence, cognitive impairment, ageism, decreased social support and the critical care environment (Tullmann & Dracup, 2000 [Level VI]; Mick & Ackerman, 2004 [Level VI]). Most importantly, while some of these variables are “fixed,” others appear to be amenable to nursing intervention. Geriatric syndromes, such as urinary incontinence, delirium and falls, can often be prevented with appropriate and timely nursing interventions (for more information on geriatric syndromes refer to Module 3 and visit www.ConsultGerRN.org and select Geriatric Topics: “Falls” and “Urinary Incontinence.”

The purpose of this chapter is to prepare baccalaureate nursing students for some of the challenges experienced when caring for critically ill older adults.

Preadmission Risk Factors for Critical Care

Older adults who experience an illness or accident that brings them to an ICU can have a number of preexisting conditions or may be relatively healthy. In addition to the acute event that precedes the person’s admission, it is essential that nurses recognize the complex interaction of physiological, cognitive, psychological, developmental and social influences that are a part of every older adult’s life. Within a critical care context, some of these factors can increase the risk of poor outcomes for the older adult with a complex illness. Therefore, the completion of a comprehensive assessment of a critically ill older adult’s preadmission health status and functional ability helps the nurse identify risk factors for cascade iatrogenesis, the development of life-threatening conditions and frequently encountered geriatric syndromes. The cascade of interactions between the effects of usual aging and the older adults’ critical care stay can compound their efforts to recover from critical illness and lead to additional post-hospitalization disability, particularly for those older adults who enter into a critical illness with some functional impairment (Creditor, 1993 [Level VI]).

Preexisting Cognitive Impairment

There are many anatomic and physiologic changes that occur in the aged central nervous system (CNS; see Table 1). It is important the critical care nurse recognize that these age-related neurological changes are not necessarily synonymous with cognitive impairment (Urden, Lough, & Stacy, 2005 [Level VI]). Of the 13% (4.5 million) of American older adults with Alzheimer’s disease in 2000, 7% were between the ages of 65 to 74 years, 53% were between the ages of 75 to 84 years, and 40% were age 85 and older. Of course, with the dramatic population increases projected in these age groups, this prevalence is expected to double for the 65 to 74-year-old cohort and quadruple for those adults age 85 and older by 2050 (Hebert, Scherr, Bienias, Bennett, & Evans, 2003 [Level IV]). However, when chronic illness (such as diabetes, hypertension, or coronary artery disease [CAD]) is coupled with normal aging changes and acute pathology, the risk for cognitive impairment is heightened (for more information, see Modules 4 and 6). This additive effect partially explains the high rates of preexisting cognitive impairment (31 to 42 percent) found in older adults admitted to medical ICUs because of their multiple comorbidities upon admission (Pisani, Inouye, McNicoll, & Redlich, 2003 [Level IV]). For more information, visit www.hartfordign.org/resources/education/tryThis.html and select Try This: “Brief Evaluation of Executive Dysfunction: An Essential Refinement in the Assessment of Cognitive Impairment”). Still, the presumption that outcomes from critical care are less favorable in patients with dementia, is not supported in the literature, and should not solely drive treatment decisions in the ICU (Pisani et al., 2005 [Level IV]).

Research suggests that many healthcare providers are unaware of the frequency of preexisting cognitive impairment in the critically ill older adult population (Pisani, Redlich, McNicoll, Ely, & Inouye, 2003 [Level IV]). Unfortunately, this knowledge is essential for providers with regard to decision-making capacity, informed consent issues and evaluation of mental status changes throughout hospitalization (Pisani, Redlich, McNicoll, Ely, & Inouye, 2003 [Level IV]); for more information, visit www.hartfordign.org/resources/education/tryThis.html and select Try This: " Decision Making and Dementia"). Knowledge of preexisting cognitive impairment can also further aid practitioners in making anesthetic and analgesic choices, considering one-to-one care options, weaning from mechanical ventilation and helping in the discharge planning process. It is, therefore, vitally important that the nurse assess for the presence of prior cognitive impairment and acknowledge its potential influence on critically ill older adults' outcomes and risks for adverse events (for more information, visit www.hartfordign.org/resources/education/tryThis.html and select Try This: "Recognition of Dementia in the Hospitalized Older Adult" or visit www.ConsultGerRN.org and select the STAT topic "Abrupt Change in Mental Status").

Relatives or other caregivers should be asked for baseline information about memory, executive function and overall functional ability in daily living prior to critical care admission. The nurse should ask the patient or family to describe the patient's behavior on a typical day, how the patient interacts with others, their responsiveness to stimuli, how able they are to communicate and their memory, orientation and perceptual patterns prior to their illness (Milisen, DeGeest, Abraham, & Delooz, 2001a [Level VI]). Finally, the nurse should obtain a list of all prescription and non-prescription medications taken prior to hospitalization and review it for potential withdrawal syndromes (Broyles, Colbert, Tate, Swigart & Happ 2008 [Level IV]).

Developmental and Psychosocial Factors

In light of older adults' heterogeneity and longevity, a variety of living and family arrangements are evidenced in this age group. According to the Administration on Aging (2005 [Level IV]), 55 percent of older noninstitutionalized persons reported living with a spouse, while 31 percent lived alone. While many older adults have adult children or other relatives who care for them, it is important to note that many of these elders are also caregivers themselves—caring for their aging spouses, relatives, grandchildren, and friends. (Administration on Aging, 2005 [Level IV]). Finally, it is important for the nurse to consider that varied and multiple definitions of family and family arrangements exist in light of the growing number of ethnic and minority elders (Kelley, Tripp-Reimer, Choi, & Enslein, 2001 [Level VI]).

Older adults maintain a variety of living and family arrangements prior to a critical care admission. Living alone or having few significant others nearby is likely to increase an older, critically ill adult's risk for additional issues related to their overall assessment and management. The lack of presence of family or a significant other threatens the nurse's ability to obtain accurate data about the person, which is often needed urgently to make important management decisions. Flexible, longer, and more open visitation in ICUs has become accepted practice in the ICU and is particularly important in the care of older critically ill patients (Henneman & Cardin, 2002 [Level VI]; Nelson et al., 2001 [Level IV]).

In addition, the very nature of critical illness often renders older adults unable to effectively communicate with the healthcare team for hours, days, or even weeks at a time. The ICU nurse must remain creative in seeking important information about older patients by contacting their primary care provider or a residential facility (e.g., nursing home, assisted living) when appropriate, particularly if families are absent or are poor informants. Unfortunately, a recent study found most older patients had little, if any, visitors during their

ICU stay, suggesting nurses in this setting may have to be especially vigilant in developing caring relationships, actively pursuing accurate information about the older adult, and commencing care planning early (Eriksson & Bergbom, 2007 [Level IV]).

This inability to communicate may stem from multiple factors including physiologic instability, technology that leaves them voiceless such as endotracheal tubes (ETTs), and the frequent cognitive impairment that often accompanies sedative and narcotic use (Happ, 2000 [Level IV]; 2001 [Level VI]). In recent studies, between 75% and 90% of patients, many of whom were older, reported distress due to difficulty communicating (Nelson et al., 2001 [Level IV]; Nelson et al., 2004 [Level IV]). Family members are, therefore, often a crucial source for obtaining important preadmission information such as past medical and surgical history, drug and alcohol use, nutritional status, sensory impairments, home environment and medication use (Broyles, Colbert, Tate, Swigart & Happ, 2008 [Level IV]). The spouse or significant other of a critically ill older adult is also often the person responsible for communicating with the healthcare team what the patient wants in terms of aggressiveness and goals of care, quality of life values, Do Not Resuscitate (DNR) status and advanced directives. Consequently, when a spouse or significant other is absent from the bedside and additional information sources are unavailable, additional risks to the overall plan of care can ensue from inadequate communication.

Functional Ability

Although the majority of older adults report having at least one chronic condition and many report having multiple conditions, they remain relatively independent (Administration on Aging, 2005 [Level IV]). Disability data from 2000 shows that only 10 percent of persons sixty-five and older reported a disability that restricted their ability to dress, bathe or get around inside their home, while 29 percent reported a disability restricting a physical activity, such as ambulating (Waldrop & Stern, 2003 [Level IV]). Level of activity restriction appears to increase with age; for example, self-care activity restrictions increase from 10 percent in the sixty-five and older cohort to 13 percent in the seventy-five to eighty-four cohort and to 27 percent in the eighty-five and older cohort (Waldrop & Stern, 2003 [Level IV]).

The importance of evaluating preadmission functional status cannot be overemphasized. Some studies have shown functional status to be a major determinant in the recovery of critically ill older adults (Mick & Ackerman, 2004 [Level VI]; Roche, Kramer, Hester, & Welsh, 1999 [Level IV]; Tullmann & Dracup, 2000 [Level VI]). Numerous clinical and research tools have been used to measure functional status with little consensus on a commonly accepted definition of functional status. Both the Katz (1963 [Level IV]) Index of Activities of Daily Living and the Functional Independence Measure (FIM) (Kidd et al., 1995 [Level III]) have been recommended as appropriate measures within an older population (Krešević & Mezey, 2003 [Level VI]); for more information visit www.hartfordign.org/resources/education/tryThis.html and select Try This: "Katz Index of Independence in ADL"). The Katz ADL index is one of the most widely used functional assessments across many settings, evaluating older adults' independence level for six activities. The FIM was originally developed for use in the rehabilitation of patients recovering from stroke; it measures disability and rehabilitation outcomes and is reported to be less burdensome than other functional assessment instruments to complete (Pollak, Rheault, & Stoecker, 1996 [Level III]).

Assessment and Management of the Older Adult in the Critical Care Unit

Respiratory System

An older ICU patient's respiratory status can become the most tenuous component of their recovery even if their primary admission involves another body system. Age-related pulmonary changes include progressive decreases in the strength of respiratory muscles, lung

elasticity, chest wall compliance, PaO₂ level, ventilatory responses to hypoxia and hypercapnia, and number and efficiency of cilia in airways (see Table 1). Most of these changes will not be apparent on routine physical assessment. The nurse, however, may observe some of the skeletal changes associated with aging, including possible kyphosis and an increasing anteroposterior diameter of the chest (Bates, 1995 [Level VI]) and, on initial auscultation, hear a few bibasilar crackles that clear with deep breathing and coughing (Urden, Lough, & Stacy, 2005 [Level VI]).

The age-related pulmonary changes elevate an older adult's risk for aspiration, atelectasis and pneumonia (Nagappan & Parkin, 2003 [Level VI]; Rosenthal & Kavic, 2004 [Level VI]; Urden, Lough, & Stacy, 2005 [Level VI]). These risks are further heightened in those elders who undergo thoracic or abdominal surgery, sustain rib fractures or chest injury, receive narcotics or sedatives, have tubes that bypass the oropharyngeal airway (i.e. nasogastric tube (NGT), orogastric tube (OGT), or ETT), or who are weak, deconditioned, dehydrated and have poor oral hygiene (Nagappan & Parkin, 2003 [Level VI]; Rosenthal & Kavic, 2004 [Level VI]; Urden, Lough, & Stacy, 2005 [Level VI]).

There are several interventions the nurse may use to help prevent, or minimize the consequences of, pulmonary complications in the critically ill older adult. These interventions include encouraging and assisting in coughing, deep breathing, incentive spirometer use and early and frequent mobilization (Thomsen, Snow, & Rodriguez, 2008 [Level III]; Bailey, Thomsen, Spuhler, Blair, & Jewkes, 2007 [Level IV]); consulting physical therapy for assistance with ambulation; providing proper oral hygiene and adequate pain control; securing and ensuring the proper functioning of OGT, NGT and ETT tubes; assessing for signs of abdominal distension, swallowing dysfunction, aspiration or alterations in fluid volume status; closely monitoring pulse oximetry and arterial blood gas results; and considering the use of specialty beds. It is also important for the nurse to recognize that in those older adults undergoing hemodynamic monitoring, both preexisting pulmonary disease and manipulations of the abdominal and thoracic cavities may lead to the unreliability of traditional values associated with central venous (CVP) and pulmonary artery occlusion (PAOP) pressures (Rosenthal & Kavic, 2004 [Level VI]). Consequently, it is important to discuss with the ICU team any unusual preexisting or acute influences on these hemodynamic parameters so that adequate trends can be monitored.

Caring for the older adult who requires mechanical ventilation is a particularly challenging situation. Although age alone does not appear to predispose an older adult to need mechanical ventilation, debate exists as to whether age influences outcome in this population (Esteban et al., 2004 [Level IV]; Kleinhenz & Lewis, 2000 [Level VI]). However, evidence does suggest that chronic ventilatory dependency disproportionately affects older patients, whether as a complication of a critical illness or as a result of a chronic respiratory system limitation (Kleinhenz & Lewis, 2000 [Level VI]; Cox et al., 2007 [Level IV]). Studies have found that patients who require four or more days of mechanical ventilation are more likely to die in the hospital or, if they survive, to spend a considerable amount of time in an extended care facility upon discharge, experience an increased risk for hospital readmission, suffer from continued morbidity and experience a decreased quality of life (Chelluri et al., 2004 [Level IV]; Daly, Douglas, Kelley, O'Toole, & Montenegro, 2005 [Level II]; Douglas, Daly, Brennan, Gordon, & Uthis, 2001 [Level IV]; Douglas et al., 1997 [Level IV]; Douglas, Daly, Gordon, & Brennan, 2002 [Level IV]). A newer subset of ICU patients has developed over the years, termed the chronically critically ill (CCI); these patients can require ICU care for weeks or months, with over half of them 65 years of age and older (Carson, 2003 [Level VI]).

The number of older adults who will experience prolonged mechanical ventilation in the United States is expected to double between 2000 and 2020, with projections exceeding 300,000

in 2020 (Zilberg, deWit, Pirone, & Shorr, 2008) [Level IV]. Ventilator dependent patients admitted to long-term care facilities for weaning will continue to require considerable medical interventions and treatments (Scheinhorn et al., 2007 [Level IV]). In addition to advocating for weaning trials and extubation as early as possible, the healthcare team, including the ICU nurse, must include these potential consequences as part of a discussion of treatment options with patients and their families.

Older patients with preexisting obstructive or restrictive lung disease, such as chronic obstructive pulmonary disease, are also at increased risk for ventilator-assisted pneumonia (VAP) and delayed extubation. To minimize this complication, nurses should aggressively exercise standard VAP precautions, including keeping the head of the bed elevated to greater than thirty degrees, providing frequent oral care, maintaining adequate cuff pressures, assessing the need for stress ulcer prophylaxis, using continuous subglottic suctioning, turning the patient as tolerated and maintaining general hygiene practices (Dezfulian et al., 2005 [Level I]; Kunis & Puntillo, 2003 [Level VI]). There is also evidence to suggest that daily spontaneous awakening (interruption of sedatives) and breathing trials result in better outcomes for mechanically ventilated patients than traditional weaning approaches (Girard et al., 2008 [Level II]).

Cardiovascular System

The older ICU patient often represents a challenge to the ICU team from a cardiovascular standpoint. Because so many older adults live with hypertension, peripheral vascular disease or CAD, their individual responses to treatment can dramatically differ depending on the severity of their illness and any preexisting comorbidities. However, even the disease-free older adult may experience a decrease in their ability to respond to stressful situations due to the many changes that accompany normal cardiovascular aging (see Table 1). Some of these changes may be noticed by the nurse on routine physical exam. For example, upon auscultation many healthy older adults display a fourth heart sound (S_4), an aortic systolic murmur, higher systolic blood pressure with a widening pulse pressure and a slower resting heart rate (Bates, 1995 [Level VI]).

The age-related cardiovascular changes ultimately render the myocardium less compliant and responsive to catecholamine stimulation, can cause ventricular hypertrophy and predispose the older adult to the development of arrhythmias. It is important for the nurse to also realize that during times of stress an older adult often achieves an increase in cardiac output by increasing diastolic filling rather than increasing heart rate (Nagappan & Parkin, 2003 [Level VI]; Rosenthal & Kavic, 2004 [Level VI]; Urden, Lough, & Stacy, 2005 [Level VI]). The practical implication of this finding in the critical care setting is that older adults often require higher filling pressures (CVPs in the eight to ten range, PAOPs in the fourteen to eighteen range) to maintain adequate stroke volume and may be especially sensitive to hypovolemia (Rosenthal & Kavic, 2004 [Level VI]). However, over-hydration of the older adult should also be avoided as it can lead to systolic failure, poor organ perfusion and hypoxemia with subsequent diastolic dysfunction (Rosenthal & Kavic, 2004 [Level VI]). Given these findings, it is crucial for the nurse to carefully monitor the older adult's hemodynamic and fluid status, recognizing the influence of the patient's baseline cardiac status. New evidence suggests noninvasive cardiac index monitoring in some older critically ill patient populations may be reliable and correlate well with standard thermodilution techniques that may be higher risk (Brown, Shoemaker, Woo, Chan, & Demetriades, 2005 [Level IV]).

The nurse also needs to closely monitor the older adult's EKG for the many conduction abnormalities (atrial arrhythmias, sick sinus syndrome, and bundle branch blocks) seen in the aging heart. Recent studies indicate that the use of preoperative beta-adrenergic blockade decreases the incidence of postoperative cardiac complications and death in patients considered high risk, although this protective effect has been debated (Mangano et al., 1996 [Level II]);

Poldermans et al., 1999 [Level II]). Prolonged (greater than 12 hours), elevated heart rate in critically ill patients with a high-risk of cardiac complications, many of whom are 65 and older, puts them at increased risk for prolonged ICU stay and major cardiac events (Sander, Welters, Foex, & Sear, 2005 [Level III]).

There are several other nursing interventions that may reduce cardiac complications in the critically ill older adult. Since many older adults take a number of cardiac-related medications prior to their admission, the nurse should perform a comprehensive medication assessment to avoid any drug interactions and the abrupt, inadvertent cessation of any anti-arrhythmics. The nurse should also be cognizant of the fact that certain drugs commonly used in the ICU setting may prove to be either not as effective (e.g., isoproterenol and dobutamine) or more effective (e.g., afterload reducers) in the older adult population due to senescent adrenergic and vascular responses, respectively (Rosenthal & Kavic, 2004 [Level VI]). Furthermore, the nurse must be aware that symptoms of a myocardial infarction may be blunted in older adults, requiring the need to monitor for nonspecific and atypical presentations in this patient population, including shortness of breath, acute confusion or syncope (for more information, visit www.ConsultGeriRN.org and select Geriatric Topics: “Atypical Presentation”). Finally, since older adults may have difficulty thermoregulating, especially during a critical illness, and since intra-operative hypothermia in older patients with cardiac risk factors has been shown to be both an independent predictor of postoperative cardiac events and also impairs immunologic and coagulopathic functions (Rosenthal & Kavic, 2004 [Level VI]), the nurse should take active measures to maintain normothermia.

Neurologic System

There are many central and peripheral nervous system changes that accompany the normal aging process. These changes include decreases in both the overall size of brain and number of neurons, hypothalamic alterations, neurotransmitter turnover and anatomic changes to the auditory, visual and vestibular apparatus (see Table 1). On physical exam these changes are often manifested by a decreased papillary response to a penlight, as well as a decrease in near and peripheral vision and loss of visual acuity to dim light (Urden, Lough, & Stacy, 2005 [Level VI]). Failure to recognize these normal age-related changes can lead the nurse to inaccurate conclusions when assessing an older adult in the critical care unit; for instance, consider the case of an older adult whose pupils are miotic, unrelated to any level of consciousness change or use of medication, or when their eyes may appear sunken or recessed not due pathology (Urden, Lough, & Stacy, 2005 [Level VI]). Other significant neuromuscular changes include evidence of muscle wasting and atrophy on the dorsum of the hands, interosseous muscles and the appendages; presentation of a benign essential tremor; moving slower and less agilely than young adults; diminished peripheral reflexes; and even a decreased vibratory sense in the feet and ankles (Bates, 1995 [Level VI]).

Older adults often present to emergency departments or ICUs with acute neurologic symptoms. An atypical presentation may involve a change in the older person’s level of consciousness or some other acute cognitive change (for more information, visit www.ConsultGeriRN.org and select Geriatric Topics: “Atypical Presentation”). It is important to remember that these acute neurological changes are often reversible, including alterations caused by infection, an imbalance of electrolytes or drug toxicity. A thorough physical examination, with follow-up testing, must be conducted in order to accurately diagnose the origin of an older adult’s neurologic changes.

Age-related changes to the neurologic system, when coupled with acute pathology and the ICU environment, may interact and elevate a critically ill older adult’s risk for postoperative cognitive dysfunction, falls, restraint use, over-sedation, alterations in body temperature and

anorexia. These changes also elevate the risk for one of the most commonly encountered disorders in the hospitalized older adult—delirium (for more information, visit www.ConsultGerRN.org and select Geriatric Topics: “Delirium” and http://www.hartfordign.org/publications/trythis/issue13_c2m_icu.pdf). Research has shown that up to 45-70 percent of older adults admitted to an ICU experience an episode of delirium sometime during their hospital stay (Balas et al., 2007 [Level IV], McNicoll et al., 2003 [Level IV]; Peterson et al., 2006 [Level IV]) and that delirium is associated with multiple unfavorable short- and long-term outcomes, including increased morbidity, mortality, length of hospital stay and poor functional outcomes (Ely et al., 2001 [Level II]).

A number of factors are believed to place the critically ill adult at risk for the development of delirium. These factors include pain, sleep deprivation, visual impairment, severity of illness, prior cognitive impairment, dehydration, comorbidities, laboratory abnormalities, multiple medications, chemical/medication withdrawal syndromes, infections, fever, windowless units and ICU length of stay (Aldemir, Ozen, Kara, Sir, & Bac, 2001 [Level IV]; Dubois, Bergeron, Dumont, Dial, & Skrobik, 2001 [Level IV]; Inouye et al., 1999 [Level II]; Sveinsson, 1975 [Level VI]; Tullmann & Dracup, 2000 [Level VI]; Wilson, 1972 [Level III]). To compound the complexity presented by so many risk factors, delirium is often misdiagnosed and under recognized by clinicians (Ely et al., 2004 [Level IV]; Tanios, Epstein, & Teres, 2004 [Level VI]). Some research has shown that older adults experience hypoactive (versus hyperactive or mixed) delirium at a greater rate than younger patients; this type of delirium can be easily overlooked and must be monitored with vigilance (Peterson et al., 2006 [Level IV]).

Although interventions have been studied in the general acute care setting (Inouye et al., 1999 [Level II]; Milisen et al., 2001b [Level II]), no formal intervention has been tested in the ICU setting. However, clinicians often agree that a number of nursing interventions may help reduce the frequency and consequences of delirium and other neurologic conditions in the critically ill older adult. One of the most important is that the nurse maximizes the older adult’s ability to communicate their needs effectively. This element can be especially challenging in the ICU environment where many patients are unable to speak because of numerous tubes, pharmacological paralysis or heavy sedation or recently sustained neurologic damage (e.g., cerebrovascular accident, head injuries). The nurse should consider providing the older adult with alternate means of communication (providing them with a pen/paper, using non-verbal gestures or using specially designed boards with pictures) (Stovsky, Rudy, & Dragonette, 1988 [Level III]; Patak, Gawlinski, Fung, & Berg, 2004 [Level IV]; Connolly, 1992 unpublished dissertation [Level IV]). It is also helpful if the patient is allowed to wear their glasses, hearing aids and other assistive devices, easing their adaptation to the ICU environment. Other communication interventions, including facing the patient when speaking to them, getting the patient’s attention before talking, speaking clearly and loud enough for them to understand, allowing them enough time (pause time) to respond to questions, providing them with a consistent provider (i.e., a primary nurse), using visual clues to remind them of the date and time, and providing written or visual input for a message (Garrett & Beukelman, 1995 [Level III]; Lasker, Hux, Garrett, Moncrief, & Eischeid, 1997 [Level III]) may all serve to lessen anxiety and confusion in the highly stressful and stimulating ICU environment (Garrett, Happ, Costello, & Fried-Oken, 2007, [Level VI]; Happ, Tate, & Garrett, 2006 [Level VI]; Happ & Paull, 2008 [Level VI]).

Achieving adequate pain control for the critically ill older adult is of utmost importance (see pain section in this module; for more information, visit www.ConsultGerRN.org and select Geriatric Topics: “Pain”). However, the nurse also needs to avoid over- and under-sedation in

this population since both are associated with many negative outcomes (Graf & Puntillo, 2003 [Level VI]). A number of tools exist to assess a patient's level of sedation and delirium status: the Richmond Agitation and Sedation Scale (RASS) (Ely et al., 2003 [Level IV]) and the Confusion Assessment Method ICU (CAM-ICU) (Ely et al., 2001 [Level IV]) are two of the most common in the critical care setting. The use of these tools may help the ICU team develop an individualized plan of care to obtain desired outcomes. Other possibly effective interventions include promoting sleep, mobilizing as early as possible, reviewing medications that can lead to delirium, treating dehydration, reducing noise or providing "white noise," closing doors/drapes to allow privacy, providing a comfortable room temperature, encouraging family and friends to visit, allowing the older adult to assume their preferred sleeping positions, discontinuing any unnecessary lines or tubes and avoiding the use of physical restraints except when absolutely necessary (Flaherty, 2008 [Level VI]; Inouye et al., 1999: [Level II]; Tullmann & Dracup, 2000 [Level VI]; Yeh et al., 2004: [Level III]; Zeleznik, 2001 [Level VI]).

Gastrointestinal (GI)

Normal age-related changes to the GI system can predispose older ICU patients to complications during their ICU stay, ranging from altered presentations of illness to issues of medication effectiveness. Physiologic changes include delayed gastric emptying, alterations in the secretion of gastric enzymes and acid, loss of enteric nervous system neurons and a decrease in the number of hepatocytes and overall weight and size of liver, all of which influence the pharmacodynamics and pharmacokinetics associated with drug dosing, metabolism and sensitivity (see Table 1). In addition to these changes, older adults often exhibit alterations in their body composition and energy use.

Ironically, while many conditions affecting the GI system are more common in older adults (constipation, under and malnutrition, gastritis), their presence is not fully explained by normal aging processes (Rosenthal & Kavic, 2004 [Level VI]). When assessing the GI function of a critically ill older adult, it is important for the nurse to realize that age may blunt the manifestations of acute abdominal disease. For example, pain may be less severe, fever less pronounced or absent and signs of peritoneal inflammation, such as muscle guarding and rebound tenderness, may be diminished or even absent (Bates, 1995 [Level VI]; Crighton & Puppione, 2006 [Level V]). Other than some accumulation of fat near the hips and abdomen, there are no physical changes normally noticed on physical exam of the older adult (Bates, 1995 [Level VI]).

Because of changes in the secretion of gastric enzymes, the stomach wall of older adults can be more susceptible to acid injury, especially in the face of critical illness. ICU nurses must be alert for signs of gastrointestinal bleeding and be proactive in advocating for gastric protection, especially in those elders requiring mechanical ventilation. Delayed gastric emptying may predispose older adults to abdominal distension, nausea, vomiting, aspiration and constipation. This delayed motility is especially true in the postoperative period when many older adults are immobile and receiving narcotics. Early detection of some of these key symptoms, including increasing abdominal girth, nausea or vomiting, can help reduce the risk of additional complications provided appropriate intervention takes place. Nurses can promote GI motility by planning for and assisting with early ambulation, encouraging adequate hydration, monitoring fluid volume status, ensuring the proper functioning of GI tubes and drains, assessing for signs of fecal impaction and advocating for a bowel regimen that meets the older patient's needs.

Overall, there should be no changes in the gastrointestinal system sufficient to produce malnutrition in a *healthy* older adult (Urden, Lough, & Stacy, 2005 [Level VI]). However, many older adults take multiple medications and have various conditions that influence their intake of

solids and liquids. The nurse needs to be alert for ill-fitting dentures, swallowing difficulties, silent aspiration and the possibility of decreased saliva production (either because of salivary dysfunction or the use of drugs such as sympathomimetics) since these alterations can lead to insufficient mastication and can combine with other risk factors that put the older ICU patient at risk for aspiration.

Determination that an older adult is at risk for aspiration should be considered a life-threatening situation, requiring immediate nursing intervention. Simple interventions, such as keeping the head of the bed elevated to a high Fowler's position, frequent suctioning of copious oral secretions, bedside evaluation of swallowing ability by a speech therapist and assessment of phonation and gag reflex, along with astute observation of any dyspnea, are important nursing interventions designed to reduce an older adult's aspiration risk. For more information, visit <http://www.hartfordign.org/resources/education/tryThis.html> and select Try This: "Preventing Aspiration in Older Adults with Dysphagia."

Older adults who face stress from illness, injury or infection are at high risk for protein-calorie malnutrition (Nagappan & Parkin, 2003 [Level VI]; Rosenthal & Kavic, 2004 [Level VI]). The practical implications of this disorder are that the older adult is then at risk for low serum albumin levels, a decline in hepatic function, decreased muscle mass and strength and dysfunctions in those tissues with high cell turnover (Rosenthal, 2004 [Level VI]). These changes lead to a breakdown in barrier function, increased susceptibility to infection, delayed wound healing, fluid shifts, deconditioning and further impairment in absorption of essential nutrients (Rosenthal & Kavic, 2004 [Level VI]). It is, therefore, crucial that the nurse advocate for early enteral or parental nutritional support. Although not specifically studied in older adults, studies show enteral nutrition to be safer, with fewer infectious complications, and less costly than parenteral nutrition (Gramlich et al., 2004 [Level I]).

Reductions in the activity of the drug-metabolizing enzyme system and blood flow through the liver with old age influence the liver's capacity to metabolize various drugs (Urden, Lough, & Stacy, 2005 [Level VI]). Splanchnic blood flow is further compromised in states of shock or even mild hypotension. These changes may predispose older adults to adverse drug reactions (Urden, Lough, & Stacy, 2005 [Level VI]). For example, drugs, like warfarin, that work directly on hepatocytes may reach their therapeutic effect at lower doses (Rosenthal & Kavic, 2004 [Level VI]). It is important for the nurse to recognize that polypharmacy may elevate an older adult's risk for adverse events.

Furthermore, certain medications have been identified (known as the Beers criteria) as potentially inappropriate in adults sixty-five years and older, with adverse outcomes rated as 'high' or 'low' severity based on the probability of the event occurring and the significance of the outcome (Fick et al., 2003 [Level I]); the Beers criteria have also been applied to hospitalized seniors (Bonk, Krown, Matuszewski, & Oinonen, 2006 [Level IV]). For example, while histamine blockers are routinely prescribed as part of a VAP protocol, their use should be closely monitored in older ICU patients because of the likelihood of a prolonged half-life in even healthy older adults, increasing the risk for mental status changes (Kane, Ouslander, & Abrass, 2004, [Level VI]). Common pharmacologic agents used in the critical care setting and the frequent side effects experienced by the gerontologic patient are given in Table 2. For more information, visit <http://www.hartfordign.org/resources/education/tryThis.html> and select Try This: "Beers' Criteria for Potentially Inappropriate Medication Use in the Elderly."

Finally, many older adults have diabetes and even those older adults without preexisting diabetes may experience elevated blood glucose as a result of medications and a stress response to critical illness. Studies have shown that tight control of blood glucose using insulin drips can lead to better outcomes, across ages, in terms of mortality, bloodstream infections, acute renal

failure, blood transfusions needed and polyneuropathy (van den Berghe et al., 2001 [Level II]). However, the practice remains controversial among clinicians and researchers and may benefit only specific subgroups (Pittas, Siegel, & Lau, 2006 [Level I]). In the older ICU patient, glycemic control may be more difficult because of a declining glucose tolerance associated with aging. On the other hand, in light of an older adult's susceptibility to iatrogenesis, tight control of the exaggerated glucose response in this population may prove especially important (Rosenthal, 2004 [Level VI]). The use of histamine blockers and insulin in this population exemplifies the balancing act between treatment and risks necessary to achieve desired outcomes in critically ill older adults.

Genito-urinary (GU)

Preservation of the older adult's preadmission renal status is one of the goals of ICU care. Age-related renal changes to this system include declines in renal blood flow, glomerular filtration rate (GFR), creatinine clearance and a decreased ability to conserve sodium and excrete hydrogen ions (see Table 1). While there are no remarkable changes in physical assessment findings related to normal aging, on exam the nurse should note any urinary drainage tubes in use and the color, consistency and amount of urine the patient is producing.

Normal age-related changes in the GU system decrease the older adult's ability to excrete ammonia and drugs, diminish their capacity to regulate fluid and acid base balance and often impair their ability to properly empty their bladder (Nagappan & Parkin, 2003 [Level VI]; Rosenthal & Kavic, 2004 [Level VI]; Urden, Lough, & Stacy, 2005 [Level VI]). The coupling of these normal age-related changes with conditions commonly seen in the ICU environment such as hypovolemia, shock, sepsis, and polypharmacy render the older adult at increased risk for acute renal failure, metabolic acidosis, and adverse drug events. The increased prevalence in the older population of asymptomatic bacteriuria also exacerbates an older ICU patient's infection risk related to Foley catheter use (Richards, 2003 [Level VI]).

Several nursing interventions may minimize the risk for genitourinary complications in the critically ill older adult. As soon as the patient's condition and recovery warrants, the nurse should consider removing their Foley catheter. This will not only decrease their risk for hospital acquired urinary tract infections (UTIs), but will also make mobilizing easier. However, even without a Foley catheter, accurately accounting for "ins and outs" (I & Os) in the ICU setting remains important, especially for older adults. To facilitate urine collection the nurse may consider using external or condom catheters, offering the bedpan on a scheduled basis and keeping the call bell within the older adult's reach.

The nurse also needs to closely monitor for signs of dehydration especially in older patients at high risk for insensate loss (i.e., patients who are post surgical, hyperthermic, mechanically ventilated, receiving diuretics). Hypovolemia in older adults may not only lead to worsened diastolic function, but may contribute to further decreases in their already diminished GFR (Rosenthal & Kavic, 2004 [Level VI]). Especially if the older patient was chronically hypertensive prior to hospitalization, the patient may be used to a higher-than-normal blood pressure in order to perfuse their kidneys. Furthermore, common indicators of dehydration, such as skin turgor, should be considered an unreliable sign in an older adult, related to their loss of subcutaneous tissue (Sheehy, Perry, & Cromwell, 1999 [Level VI]).

Just as importantly, the nurse needs to monitor for signs of over-hydration, especially in patients with compromised hearts, since this may lead to systolic dysfunction and poor organ perfusion (Rosenthal & Kavic, 2004 [Level VI]). Finally, the nurse should be especially cognizant of medications known to contribute to renal failure including aminoglycosides, certain antibiotics and contrast dyes, and closely monitor laboratory results as warranted (Urden, Lough, & Stacy, 2005 [Level VI]).

Immune/hematopoietic

The changes that occur in the aged immune and hematological system are often underappreciated in the critical care setting. These changes mainly involve altered T and B cell functioning and a decrease in hematopoietic reserve (see Table 1). The consequences of these changes include an increased susceptibility to infection, increases in autoantibodies and monoclonal immunoglobulins and tumorigenesis (Rosenthal & Kavic, 2004 [Level VI]). These normal aging changes coupled with stress, malnutrition and the number of invasive procedures seen in the critical care environment may heighten the older adult's risk for a nosocomial infection. For example, the incidence of sepsis is disproportionately increased in older adults, with age an independent predictor of mortality (Martin, Mannino, & Moss, 2006 [Level IV]). Furthermore, because an older adult's ability to mount a febrile response to infection diminishes with age, related to a decline in hypothalamic function, the older patient may even be septic without the warning of a fever (Crighton & Puppione, 2006 [Level V]; Urden, Lough, & Stacy, 2005 [Level VI]).

While recent research suggests that giving blood more liberally to patients may be associated with worse patient outcomes, these findings may not necessarily apply to the older adult population for several reasons (Rosenthal & Kavic, 2004 [Level VI]). This research may not apply to older ICU patients due to the chronic anemia often seen in aging; the exclusion of many older adults from previous clinical trials; research findings that suggest higher transfusion triggers in older patients with acute myocardial infarction decreases mortality; and the association of low hemoglobin levels with increased incidence of delirium, functional decline and decreased mobility (Rosenthal & Kavic, 2004 [Level VI]). Further research is needed in this area.

Similarly, when the age-related immunologic changes are coupled with immobility, surgery-induced hypercoagulability, higher cancer risk, frequency of orthopedic injuries and frequency of atrial dysrhythmias, older adults are at higher risk for both deep vein thrombosis (DVT) and pulmonary emboli (PE) (Rosenthal & Kavic, 2004 [Level VI]). While heparin has been shown to protect against DVT, specifically lower limb DVTs, insufficient evidence exists related to its protective effects against PE; although foot and calf pumping devices are promoted as protective against DVT, compliance remains an issue (Handoll et al., 2006 [Level I]). Regardless of the method or combination of methods, prophylaxis is essential in this population.

Musculoskeletal

Older adults are at high risk for skin breakdown in the ICU setting. With age adults experience a loss of elastic, subcutaneous and connective tissue, a decrease in sweat gland activity and a decrease in capillary arterioles supplying the skin (Urden, Lough, & Stacy, 2005 [Level VI]) (see Table 1). On physical exam, the nurse may observe an older adult's skin as having multiple colors with diffuse benign lesions. Often it has become thin, fragile, wrinkled, loose and transparent; and is dry, flaky, rough and often itchy. Older adults' nails lose their luster, with loss of hair color and hair also occurring as a part of normal aging (Bates, 1995 [Level VI]).

Because the skin changes that occur in older adults can cause difficulty with thermoregulation, can heighten the risk for skin breakdown and IV infiltrations, may delay wound healing and can make hydration assessment difficult, the nurse should make every effort to prevent heat loss, carefully monitor hydration status and conduct thorough skin assessments (Bates, 1995 [Level VI] ; Urden, Lough, & Stacy, 2005 [Level VI]). For example, the nurse must vigilantly monitor room temperature, not leave the patient uncovered while bathing and carefully use and monitor rewarming devices. It is helpful and important to use methods known to reduce the friction and shear that often occurs with repositioning in bed. In severely

compromised patients, the use of specialty beds may be appropriate. The nurse also needs to closely monitor IV sites, frequently check for infiltrations and should consider the use of non-restrictive dressings and paper tape when possible in older adults with wounds and incisions, in order to protect the integrity of their healthy, intact skin (Urden, Lough, & Stacy, 2005 [Level VI]).

Older adults, especially those who are critically ill, are particularly vulnerable to the effects of inactivity. Bed rest often accompanies hospitalization, even beyond the period of critical illness. This decline in spontaneous physical activity compounds the 40% reduction of muscle cross-sectional area that occurs from age 20 to 80 (Griffiths, 1996 [Level VI]). Muscle breakdown has been shown to occur as early as several hours after the onset of disuse, even in healthy populations and independent of any injury or illness, placing the older critically ill adult at even greater risk for functional limitations and disability (Hirsch, 1990 [Level VI]; Kasper, 2001 [Level VI]). Furthermore, this muscle loss is exacerbated by cytokine-mediated mechanisms of inflammation during a critical illness (Winkelman, 2004 [Level V]). Prolonged immobility during a critical illness is also associated with joint contractures (Clavet, Hebert, Fergusson, Doucette, & Trudel, 2008 [Level IV]), which may further impede an elder's ability to recuperate from a critical illness.

Interventions that incorporate activity or promote mobility in older hospitalized patients have been shown to reduce mortality and morbidity (Inouye et al., 2000 [Level II]; Siebens et al., 2000 [Level II]; Suetta et al., 2004 [Level II]). However, these types of interventions have been slow to be studied in the ICU setting. More recently, though, studies have demonstrated that promoting physical activity even in intubated patients is safe, feasible, and efficacious once physiologic stability has been achieved (Bailey, Thomsen, Spuhler, Blair, & Jewkes, 2007 [Level IV]; Morris et al., 2008 [Level II]; Thomsen, Snow, & Rodriguez, 2008 [Level III]). Additional less activity-specific techniques such as frequent turning, range of motion, pressure-relieving devices, as well as early nutritional support should be prioritized as standard care for all critically ill patients, especially those who are older. These strategies can protect an older adult's skin and promote the health of their cardiovascular, respiratory, gastrointestinal, and neuromuscular systems..

Special Considerations

Pain

Chronic pain, defined as pain lasting longer than three months, is a common problem among older adults, with between 58 and 70 percent of community-dwelling older adults suffering from this condition (Helme & Gibson, 2001 [Level VI]). This chronic pain, coupled with postoperative pain or pain related to a critical illness, poses a pain management challenge to ICU providers. Studies have found that pain is frequent and often severe in seriously ill older patients during hospitalization, at follow-up and before death, even in patients with disease not typically associated with pain (Desbiens & Wu, 2000 [Level II]; Nelson et al., 2001 [Level IV]; Nelson et al., 2004 [Level IV]). Untreated or under-treated pain can have serious adverse consequences for an older ICU patient, potentially causing tachycardia, increased myocardial oxygen consumption, delirium, immobility and splinting, with resultant atelectasis and pneumonia (Graf & Puntillo, 2003 [Level VI]; Rosenthal & Kavic, 2004 [Level VI]). For more information, visit <http://www.ConsultGeriRN.org> and select Geriatric Topics: "Pain."

In attempting to adequately assess pain in the older ICU patient, the nurse should tailor their method of assessment to fit the patient's sensory and cognitive needs. It is important to note that reporting of pain is less frequent in older patients and that pain perception may even be altered with aging (Graf & Puntillo, 2003 [Level VI]; Rosenthal & Kavic, 2004 [Level VI]). Research has shown that verbal description scales can be more valid in an older population than

the visual analog scale (VAS) (Gagliese, Weizblit, Ellis, & Chan, 2005 [Level IV]), although the American College of Critical Care Medicine (ACCM) recommends using the numeric rating scale or the VAS in the ICU (Graf & Puntillo, 2003 [Level VI]). It may be useful to employ non-verbal scales, with cues such as facial expressions and body language, to assess pain in the sedated or delirious patient. Current research has focused on developing more objective pain assessment measures to be better able to evaluate pain in these types of non-verbal, non-communicative patients (Young, Siffleet, Nikoletti, & Shaw, 2006 [Level IV]). For more information on pain assessment, visit <http://www.hartfordign.org/resources/education/tryThis.html> and select Try This: “Assessing Pain in Older Adults.”

Patient-controlled analgesia has been shown to be effective in the older adult population and opioids, aside from meperidine (Demerol), are often the ideal agents of choice. In the surgical ICU, for many older adults, epidural infusion of opioids combined with local anesthetic agents are an excellent source of pain control (Rosenthal & Kavic, 2004 [Level VI]). Unfortunately, any opioid may contribute to confusion and over-sedation. Acetaminophen can relieve pain and some types of discomfort, such as generalized discomfort, headache and body aches, provided there are no contraindications to its use (e.g., liver impairment). The use of parenteral nonsteroidal anti-inflammatory drugs, while helpful, should be limited in the older adult population because of GI bleeding and renal complications and used only when acetaminophen has not been effective (American Geriatrics Society, 2002 [Level 1]). As a result of this multifactorial balancing act, providers can inadvertently undertreat an older patient’s pain, with older patients themselves not always readily communicating their experience of pain to providers (Yorke, Wallis, & McLean, 2004 [Level IV]). However, as a general rule relative to geriatric medication prescribing and administration, for both pain-related and other medications, the recommendation remains to start with smaller dosages and increase them gradually after appropriate monitoring and assessment (Kane, Ouslander, & Abrass, 2004 [Level VI]).

Many older adults with chronic pain who find themselves in the ICU can become painful or uncomfortable from their increased time in bed. In addition to treating with pain medications, nurses are well positioned to assess for and recommend nonpharmacological pain management strategies. Although research on its benefits has remained inconclusive, multiple strategies exist and include both cognitive and behavioral interventions. Interventions such as improving sleep, repositioning, massage, vibration, hot and cold applications and the use of transcutaneous electric nerve stimulation devices have been suggested as possible pain relievers (Graf & Puntillo, 2003 [Level VI]).

For all ICU providers, the take home point is to anticipate and treat pain in this population actively, aggressively and cautiously, referring to both hospital policies and ACCM clinical practice guidelines (Jacobi et al., 2002 [Level VI]). By proactively addressing pain for these older adults, they can rehabilitate more comfortably, suffer fewer physiological consequences of uncontrolled pain and be mobilized as early and as much as possible. Otherwise, a vicious cycle of immobility leading to pain, which then leads to more immobility, can develop.

Anticipatory Planning

As the older ICU patient recovers from their critical illness, it becomes important to begin formulating plans for transfer from the ICU. As part of this process, the ICU nurse should focus on the older adult’s medical stability, their rehabilitation and exercise progression, the advancement of the older adult’s nutrition and the involvement of any family or other caregivers (Bates, 1995 [Level VI]). Patient education and communication become an integral part of the transfer of care, either across settings, within one facility or between facilities. From a cognitive

perspective, changes in cognition do occur as a result of aging, but if care is taken to modify teaching techniques, older adults have just as great a capacity to learn as younger patients. Changes that can influence learning include slower processing time, the persistence of a stimuli (confusing a new word with an older word), decreased short-term memory and altered time perception (Wolf, 2001 [Level VI]). It is important to work with the patient and family, assessing the information they need and are ready to receive, without overwhelming them with too much information prematurely.

Many older adults experience sensory changes, which can influence their ability to learn and participate in their care. These sensory changes are often exacerbated by the effects of a critical illness, especially as a result of some of the medications given to them. Since many older adults use assistive devices, it is important to assess for sensory impairment, ask about their use of any assistive devices and include these considerations in the plan of their care and rehabilitation.

Transfer of Care

With decreasing lengths of stay, ICU providers must maximize the limited amount of time they have to prepare patients and their families for their transition out of the ICU. Older adults often have multiple comorbidities that require management. These clinical considerations, as well as other influencing factors, can converge to threaten their independence and serve as a risk for future hospital readmissions. During a transfer, either to another unit or to another facility, attention is often paid to the logistics related to the older patient, their care and the actual transfer. It is essential during this time, which can seem unpredictable to an older adult, to provide them with active attention and updates related to their inpatient care and discharge planning (Ekman, Lundman, & Norberg, 1999 [Level IV]). Studies have identified that many older patients are discharged without home follow-up or referrals despite having unmet discharge needs that may have benefited from a referral (Bowles, Naylor, & Foust, 2002 [Level IV]; Kleinpell, 2003 [Level IV]). Continuity of care is essential for this vulnerable population and requires comprehensive, integrated, proactive and well-communicated discharge planning. Patient characteristics, such as those who “look fine” or state they do not have needs, nurses’ workload and staffing patterns, and an insufficient knowledge related to the discharge process have all been identified as barriers to providing appropriate referrals to patients upon discharge (Bowles, Foust, & Naylor, 2003 [Level IV]).

A number of strategies have emerged to improve patient outcomes related to their discharge from an ICU setting. These innovations include a geriatric interdisciplinary team or unit, clinical guidelines that have been developed around common health problems, clinical pathways developed usually within a hospital for a specific population, disease management programs that typically target health conditions such as diabetes or heart failure, and case management across settings (Naylor, Bowles, Campbell, & McCauley, 2001 [Level VI]). Underlying these models lies the importance of interdisciplinary teams, the involvement of specialists, such as clinical pharmacists, and the improved use of information technologies, especially as it relates to post-hospital medication management (Foust, Naylor, Boling, & Cappuzzo, 2005 [Level VI]; for more information see Module 9). The nurse plays an essential role in accessing appropriate resources through their institution in order to optimize the older adult’s transfer of care.

End-of-Life Care

The issues surrounding end-of-life care for the terminally ill older ICU patient are complex and are often not quickly or easily resolved. End-of-life care can affect older ICU patients who do not recover as hoped or expected from an acute event. This element of care can also include older adults admitted from another setting, such as a nursing home, for problems

complicating their chronic medical course, such as a UTI, sepsis, pneumonia or delirium. Regardless of the reason for admission, it may become clear that the older patient is not progressing or recovering. In collaboration with the patient and family, care conferences or less formal conversations must regularly occur to evaluate the medical and emotional situation and to revisit the patient's and family's wishes. The largest study of end-of-life care and decisions in the acute care setting has been the Study to Understand Prognoses and Preferences for Outcomes and Risk of Treatment (SUPPORT). Across all five different teaching hospitals involved in the study, discussions with patients and families about the limitations of treatment occurred infrequently, even if the patient was seriously or terminally ill; do-not-resuscitate decisions were deferred until late in the illness, usually days before death; and patients' families were often the decision makers rather than the patients themselves (SUPPORT Investigators, 1995: Level of Evidence: Level II: Randomized Control Trial). Research also shows that few patients have advance directives, and when they exist, they are often too general to be helpful or are limited to cardiopulmonary resuscitation, which oversimplifies the choices related to medical treatment (Happ et al., 2002 [Level IV]).

Studies have shown that nursing greatly influences end-of-life care, in terms of both providing communication and emotional support to the patient and family in their decision making and by relieving the patient of troubling symptoms, including pain (Moody, Lunney, & Grady, 1999 [Level VI]). Communication, particularly the provision of reliable information about the condition and prognosis of their loved one, has been recognized as one of the most important factors in reducing families' stress and helping them cope (Kleinpell, 1991 [Level VI]; Norton, Tilden, Tolle, Nelson, & Eggman, 2003 [Level VI]; Wiegand, 2006 [Level IV]). Predicted quality of life has been shown to be as important as survival estimates in decision making (Lloyd, Nietert, & Silvestri, 2004 [Level IV]).

For those patients and families who do come to the decision to withdraw care or withhold additional care, the patient's care transitions from a curative model to a more palliative model of care. This shift focuses on alleviating suffering and providing dignified care at the end of life. The terms *hospice care* and *palliative care* are often used interchangeably. However, palliative care is becoming the preferred term since it is not connected to a prognosis (six months or less of projected remaining life is commonly associated with a hospice diagnosis) or to reimbursement, representing a multidisciplinary field poised to address symptom control, provider-patient-family communication, spiritual needs and even the needs of health care providers (Moody, 2001 [Level VI]; White & Luce, 2004 [Level VI]). Research supports the use of an interdisciplinary team and has shown that improved collaboration between nurses and physicians results in improved care for the dying (Baggs, 2002 [Level VI]; Baggs, Norton, Schmitt, & Sellers, 2004 [Level VI]).

In addition to the communication aspect of care, nurses must also manage the symptoms associated with the disease process as well as provide psychological and spiritual support to the patient and family. Some of the most common symptoms and conditions associated with terminal illness include pain, anxiety, dyspnea, fatigue, nausea, opioid-induced constipation and insomnia (Nelson et al., 2001 [Level IV]; Weitzner, Moody, & McMillan, 1997 [Level VI]). In addition to making the patient as comfortable as possible, often through a more liberal ordered dosing of narcotics or other analgesics, the nurse can make special arrangements to accommodate the preferences of the patient and family. Recent consensus statements and guidelines on end-of-life in ICU provide additional resources and guidance for clinicians (Truog et al, 2008 [Level VI]; Lanken et al, 2008 [Level VI]). An older ICU patient may have an older, possibly elderly, spouse or family member who may visit or be unable to visit due to coexisting chronic or serious illness. Furthermore, families may be dealing with more than one seriously ill family member or may

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have recently endured a death of another older adult. Understanding the family's experiences of death and loss is an important part of assessing their needs in their current end-of-life situation.

The nurse plays a pivotal role in the end-of-life-care of older ICU patients. This role includes multiple responsibilities that require the coordination of the healthcare team, the consistent incorporation and advocacy of the patient's wishes and best interests as part of all decision making, and clear communication with and emotional support provided to the patient and family (for more information, visit www.ConsultGerRN.org and select Geriatric Topics: "Treatment Decision Making"). In addition to supporting the patient and family, nurses must also recognize their own need for support, as well as any ambivalence and concerns about death that they may have. Only by actively processing end-of-life issues themselves can nurses fully and compassionately guide and care for patients and their families during this difficult time (Daly, 2006 [Level VI]).

	<p>Bladder - increase in collagen</p> <p>In women, alterations in estrogen cause changes in urethral sphincter</p> <p>In males, benign prostatic hypertrophy</p> <p>Common diagnoses seen in ICU: Renal cell cancer, chronic renal failure, acute renal failure, urosepsis</p>
Skin	<p>-Decreased subcutaneous and connective tissue, number of eccrine and sebaceous glands, vascular supply to dermis and skin turgor</p> <p>Common diagnoses seen in ICU: Necrotizing fasciitis, pressure ulcers, skin tears, ecchymoses</p>
Neurologic	<p>-Decrease in size of brain, number of neurons and dendrites, length of dendrite spines and cerebral blood flow</p> <p>-Increase in lipofuscin, neuritic plaques, neurofibrillary bodies and ventricle size</p> <p>-Changes in hypothalamus and neurotransmitter turnover and function</p> <p>-Decline in visual acuity and depth perception (secondary to anatomic and functional changes to the auditory and vestibular apparatus) and proprioception, balance and postural control and tactile and vibratory sensation</p> <p>Common diagnoses seen in ICU: Cerebral Vascular Accident (CVA), dementia, aneurysms, Alzheimer's disease, Parkinson's disease, closed head injury</p>
Cardiovascular	<p>-Decrease in number of myocytes, ventricular compliance, rate of relaxation, baroreceptor sensitivity, compliance of arteries, response of myocardium to catecholamine stimulation, resting heart rate and heart rate with stress</p> <p>-Increase in myocardial collagen content, stiffening of the outflow tract and great vessels (causing resistance to vascular emptying), ventricular hypertrophy, pulse wave velocity</p> <p>-Autonomic tissue is replaced by connective tissue and fat, while fibrosis causes conduction abnormalities through the intranodal tracts and the Bundle of His</p> <p>Common diagnoses seen in ICU: Acute myocardial infarction, Coronary artery bypass grafting, valve replacements, AAA, dysrhythmias</p>
Immune / Hematopoietic	<p>-Change in T-cell populations, products and response to stimuli; defects in B-cell function; mix of immunoglobulins change (i.e., IgM decreases, IGG and IGA increase) and decline in neutrophil function</p> <p>Common diagnoses seen in ICU: Sepsis, anemia, thrombocytopenia</p>
Adapted from Nagappan, R., & Parkin, G. (2003). Geriatric critical care. <i>Critical Care Clinics</i> , 19,	

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253-270; Rosenthal, R. A., & Kavic, S. M. (2004). Assessment and management of the geriatric patient. *Critical Care Medicine*, 32(4 Suppl), S92-105; Urden, Lough, & Stacy, 2005 [Level VI]. Gerontological Alterations and Management. In *Thelan's Critical Care Nursing: Diagnosis and Management* (Fourth ed., pp. 199-220). St. Louis: Mosby.

Table 2.
Medications Commonly Used in Older ICU Patients

Drug	Severity Rating	Potential Adverse Effects
*Amiodarone (Cordarone)	High	May provoke torsades de pointes and QT interval problems. Lack of efficacy in older adults.
*Clonidine (Catapres)	Low	Orthostatic hypotension, CNS adverse effects
*Diazepam (Valium)	High	Increased sensitivity to benzodiazepines; long half-life in older patients (can be several days); prolonged sedation; increasing risk of falls/fractures; short- and intermediate-acting benzodiazepines preferred
Digoxin (Lanoxin)	Low	Decreased renal clearance may lead to increased risk of toxic effects; dose should not exceed >0.125 mg/d except when treating atrial arrhythmias
*Diphenhydramine (Benadryl)	High	Strong anticholinergic effects, confusion, oversedation; also can cause dry mouth, urinary retention; aggravates benign prostatic hypertrophy and glaucoma; use smallest possible dose
*Ketorolac (Toradol)	High	Peptic ulceration, GI bleeding, perforation; GI effects can be asymptomatic
*Meperidine (Demerol)	High	Active metabolite accumulation may cause CNS toxicity, tremor, confusion, irritability; other narcotics preferred
*Promethazine (Phenergan)	High	Highly anticholinergic; confusion, oversedation; also can cause dry mouth, urinary retention; aggravates benign prostatic hypertrophy and glaucoma
Propofol (Diprivan)	Unrated	Lipophilic drug; decreased clearance in older adults related to increased total body fat
Cimetidine (Tagamet) and Ranitidine (Zantac)	Low	CNS effects, confusion
<p>Adapted from Bonk, M.E. et al. (2006). Potentially inappropriate medications in hospitalized senior patients. <i>American Journal of Health System Pharmacists</i>, 63 (12), 1161-1165 and from Fick, D.M. et al. (2003). Updating the Beers criteria for potentially inappropriate medication use in older adults: Results of a US consensus panel of experts. <i>Archives of Internal Medicine</i>, 163 (22), 2716-2724.</p> <p>*Identified in Bonk (2006) as seven most commonly prescribed Beers medications used in older hospitalized patients.</p>		

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Appendix A: Levels of Evidence Cited.

Level I

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Pittas, A. G., Siegel, R. D., & Lau, J. (2006).

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Level IV

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Cox, C.E., Carson, S.S., Lindquist, J.H., Olsen, M.K., Govert, J.A., & Chelluri, L. (2007).

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Douglas, S. L., Daly, B. J., Brennan, P. F., Gordon, N. H., & Uthis, P. (2001).

Douglas, S. L., Daly, B. J., Brennan, P. F., Harris, S., Nochomovitz, M., & Dyer, M. A. (1997).

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Gagliese, L., Weizblit, N., Ellis, W., & Chan, V. W. S. (2005).

Gist, Y., & Hetzel, L. (2004).

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Happ, M. B. (2000).

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Waldrop, J., & Stern, S. (2003).
Wiegand, D. L.-M. (2006).
Williams, T.A., Dobb, G.J., Finn, J.C., Knulman, M.W., Geelhoed, E., & Webb, S.A.R. (2008)
Wu, A. W., Rubin, H. R., & Rosen, M. J. (1990).
Yorke, J., Wallis, M., & McLean, B. (2004).
Young, J., Siffleet, J., Nikoletti, S., & Shaw, T. (2006).

Level V

- Chelluri, L., Grenvik, A., & Silverman, M. (1995).
Crighton, M. & Puppione, A. (2006).
Winkelman, C. (2004).

Level VI

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Baggs, J. G., Norton, S. A., Schmitt, M. H., & Sellers, C. R. (2004).
Bates, B. (1995).
Carson, S.S. (2003).
Creditor, M. C. (1993).
Daly, B. J. (2006).
Flaherty, J.H. (2008).
Foust, J. B., Naylor, M. D., Boling, P. A., & Cappuzzo, K. A. (2005).
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- Zelevnik, J. (2001).

Appendix B: Web-based resources

www.ConsultGeriRN.org

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Geriatric Topics:

Falls
Urinary Incontinence
Atypical presentation
Delirium
Pain
Treatment Decision Making

Try This Series:

Brief Evaluation of Executive Dysfunction an Essential Requirement in
Assessment of Cognitive Impairment
Decision Making and Dementia
Recognition of Dementia in Hospitalized Older Adults
Prevention of Aspiration in Older Adults with Dysphagia
I need help "STAT":
Abrupt Changes in Mental Status
Beers Criteria for Potential Inappropriate Medication Use in the Elderly

American Association of Critical Care Nurses (AACN): Available on line at: <http://www.aacn.org>

Society for Critical Care Medicine (SCCM): Available on line at: <http://www.sccm.org>

American Thoracic Society (ATS): Available on line at: <http://www.thoracic.org>

Appendix C: Examples of Teaching Pedagogies for Older Adults in the ICU

<u>Content Area: Topic</u>	<u>Recommended Pedagogies</u>
1. Co-contribute, as a team member, to ethical discussions related to care and management of critically ill older adults	<ol style="list-style-type: none">1. Review /analyze AGS position statement on end-of-life care and determine applicability to current clinical situation and ethical issues2. Review selected patient medical record to identify documented end-of-life decisions for care and management; identify if healthcare proxys or surrogates are involved; is there a living will? are all components of end of life care addressed?3. Identify and list nursing interventions to promote autonomy and independence for hospitalized older adults in ICU.4. Identify and list the possible untoward patient outcomes of: untreated urinary incontinence/treated urinary incontinence with Foley catheterization; bed falls treated by immobilization or restraint use.5. Plan to attend an ethics committee meeting and prior to attending, use a journal and jot down your expectations of the meeting, problems that need resolution and the pros/cons of various treatment decisions (from the patient perspective and the provider prospective).6. Prior to attending the ethics meeting, critically appraise the older adults' current ability for decisional capacity and their ability to communicate and make needs known (includes verbal and non-verbal cues, may include administration of selected measures to assess cognition, executive function and levels of alertness). Be prepared to share this information with others.7. Identify roles and responsibilities of healthcare providers and professionals who attend the ethics committee--are there appointed members; are their members other than health care personnel; if so, who, and what is their role?

8. Identify relevant family caregiver's roles in caregiving and end of life care

7. Case follow-up after the ethics meeting. Using the journal, write your thoughts and impressions and share with peers.

Questions to shape a small group clinical discussion:

What were the anticipated outcomes?

What actually happened? Did you expect this?

Was the AGS position statement referenced or helpful in problem resolution?

Did discussion relative to the care or management of a geriatric syndrome such as incontinence or falls occur?

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