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Safety First!
Using a Checklist for Intrafacility Transport of Adult Intensive Care Patients
Odette Y. Comeau, Josette Armendariz-Batiste, and Scott A. Woody
Page 16

Caring for Patients Treated With Therapeutic Hypothermia
Claranne Mathiesen, Denise McPherson, Carolyn Ordway, and Maureen Smith
Page e1 (Page 15)

CCN FAST FACTS
Implementation of a Progressive Mobilization Program in a Medical-Surgical Intensive Care Unit
Page 42
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FEATURE
Implementation of a Progressive Mobilization Program in a Medical-Surgical Intensive Care Unit
April Messer, Linda Comer, and Steve Forst
Page 28

COLUMNS

END-OF-LIFE CARE
Overcoming Barriers to Palliative Care Consultation
Kathleen Ouimet Perrin and Mary Kazanowski
Page 44

PEDIATRIC CARDIOVASCULAR SURGERY
Prenatal Counseling and Care for Single-Ventricle Heart Disease: One Center’s Model for Care
Terra Lafranchi and Patricia Lincoln
Page 53

RURAL SETTINGS
Critical Care in Critical Access Hospitals
Teresa J. Seright and Charlene A. Winters
Page 62

DEPARTMENTS

EDITORIAL
Heart Failure and Low Health Literacy: Mitigating This Lethal Combination
JoAnn Grif Alspach, Editor
Page 10

CERTIFICATION TEST PREP
The Devil Is in the Details
Carol Rauen, Nicole Gendron-Trainer, and Melanie L. Muller
Page 68

ASK THE EXPERTS
Use of Bicarbonate in Patients With Metabolic Acidosis
Myra F. Ellis
Page 73

IN OUR UNIT
Against All Odds: Preventing Pressure Ulcers in High-Risk Cardiac Surgery Patients
Danielle Nicole Cooper, Sarah Layton Jones, and Linda Ann Currie
Page 76

ALSO IN THIS ISSUE

Contributors
Page 8

OnlineNOW
Page 15

Book Reviews
Page 83

New Products
Page 85

Education Directory
Page 86

I Am a Critical Care Nurse
Page 88
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Nearly 6 million Americans are afflicted with heart failure (HF), with 825,000 new HF cases diagnosed annually, incurring direct costs of care that exceed $21 billion. Current estimates of this burden project that by 2030, nearly 8 million Americans will be diagnosed with HF and direct costs will escalate to over $53 billion. Heart failure ranks high among the most frequent causes of adult hospital admissions; representing the greatest cause of hospital readmission among both medical and surgical patients, and, for the Medicare patient population, the single most common reason for hospitalization. After hospital discharge, more than 30% of HF patients are readmitted to the hospital or die within 90 days. Because those who are hospitalized for acute HF have a 3 times greater risk of death compared to those who can be managed in an outpatient setting, considerable research and reimbursement incentives have been generated to reduce preventable readmissions.

Many of the efforts to reduce the toll of HF have examined approaches for reducing rehospitalization by targeting its known risk factors. Although some of these risks (advanced age, medical history of diabetes mellitus, pulmonary or renal disease, sleep apnea, myocardial infarction, coronary artery disease, cardiac valvular disease, cardiomyopathy, and myocarditis) are not amenable to modification, targeting other risk factors such as diet, exercise, obesity, hypertension, and medication adherence has not produced resounding success tales. One of the reasons for this limited success may relate to the complexity of this clinical disorder as well as to the number and range of therapies employed. Another reason relates to the capacity of these patients to provide the self-care that this condition demands. At a minimum, even patients with stable, chronic HF need to be able to manage their salt, fluid, and calorie intake; measure and document their weight; exercise regularly; take prescribed medications; and recognize when to notify their health care provider. Several studies show that low patient health literacy is a significant contributor to the high mortality in patients with acute HF.

**Definition of Health Literacy**

Many definitions of health literacy exist. Ratzan and Parker’s definition of health literacy, widely used and adopted by the Institute of Medicine (IOM), defines this term as “the degree to which individuals can obtain, process, and understand the basic health information and services they need to make appropriate health decisions.” The IOM website presents important facts about the relevance of health literacy:

- Nearly half of all American adults (90 million people) have difficulty understanding and using health information
- There is a higher rate of hospitalization and use of emergency services among patients with limited health literacy
- Limited health literacy may lead to billions of dollars in avoidable health care costs.

Health literacy requires more than just reading comprehension; it includes a wide repertoire of multidimensional skills necessary to secure and respond to relevant information. These skills include facility with printed
information (accessing, reading, writing, interpreting, and acting upon written text), with numeric information (understanding, calculating, acting upon quantitative facts), and verbal literacy (listening and speaking effectively). Without these skills, patients with chronic and acute HF are disadvantaged to provide the self-care they need and, for many, a lack of health literacy leaves them more likely to die from this disorder.16 In order for critical care nurses to provide evidence-based care for patients with HF, we need to examine research that supports these concerns.

Effects of Low Health Literacy on HF Patients

A substantial number of studies across multiple settings and geographic locations in the United States have reported inadequate levels of health literacy in adult patients with chronic and acute HF.10,17-22 In addition to broad, theoretical concerns of the problems that low health literacy might pose to HF patients, an expanding body of evidence of these detrimental effects already exists:

- **Low health literacy is associated with diminished HF-related knowledge attainment.** Newly referred HF patients with inadequate health literacy had less HF knowledge after educational intervention than those with adequate health literacy. Low health literacy may create a barrier to the acquisition of knowledge related to HF and performance of self-care behaviors.23

- **Low health literacy is associated with lower HF-related knowledge, self-efficacy, self-care behaviors, and quality of life.** Low health literacy was found in 37% of more than 600 HF patients in southern California. Patients with adequate health literacy had higher general HF knowledge than those with low literacy, higher self-efficacy, higher prevalence of key self-care behaviors, and higher quality-of-life scores compared to those with low literacy.20

- **Low health literacy is associated with diminished adherence to prescribed HF drug therapy.** For 314 HF patients, 29% had inadequate health literacy. Patients with adequate health literacy demonstrated significantly greater HF-related drug adherence (69.4%) compared to those with inadequate (54.2%) health literacy.18

Of greatest concern, of course, is the continuing weight of evidence from studies that confirm high rates of mortality associated with diminished health literacy in HF patients:

- **Low health literacy is associated with higher mortality in outpatients with chronic HF.** One study of 1494 HF outpatients reported that although low health literacy was found in only 17.5%, that finding was independently associated with higher mortality.17 In another study,19 37% of ambulatory patients with symptomatic HF had low literacy. Patients with low literacy had higher rates of all-cause hospitalization or death as well as HF-related hospitalization.19

- **Low health literacy is also associated with higher mortality following hospitalization for acute heart failure.** In a study designed to examine that relationship, researchers found that after adjusting for age, gender, race, insurance, education, hospital length of stay, and comorbid conditions, the risk of death for patients with low health literacy was 32% higher than for patients with higher literacy scores.10 The lethal outcomes associated with low health literacy held true not just at the lowest health literacy level, but remained significant for an increased risk of death at each higher level approaching adequate literacy. These findings suggest that any health literacy level less than adequate contributes to higher mortality in patients with acute HF. An inverse and step-wise relationship was demonstrated between health literacy level and mortality risk: each lower level of health literacy was associated with an increased risk of death. Finally, low health literacy was associated with a shorter median time to death than for those with higher health literacy scores.20

In individuals with HF, low health literacy can predict morbidity and mortality. In one study, adults hospitalized for HF were followed for at least 2 years. Those with inadequate or marginal health literacy were 1.94 times more likely to experience HF readmission and 1.91 times more likely to die from any cause. Even after adjustment for covariates, health literacy remained a predictor of those outcomes, so both inadequate and marginal health literacy are risk factors for HF-related rehospitalization and for mortality from any cause.24

Despite numerous attempts at reducing rehospitalizations and mortality from HF, little substantive progress has been made. Sperry et al,7 who recently completed “a novel analysis” of this “longstanding problem,” observed that although a few interventions have demonstrated some reduction in HF readmissions, the measures usually target only a single aspect of care. They recommend
integrating promising strategies into a comprehensive, patient-centered model that includes 6 categories: early reassessment, neuropsychological status, functional status, medical management, financial means, and health literacy. If health care providers could screen for deficiencies in each of those categories, then resources could be targeted to interventions known to reduce readmissions and improve survival outcomes in HF.

How Critical Care Nurses Can Contribute to Improved Health Literacy in HF Patients

Although critical care and progressive care nurses provide care that supports patients with HF along the full spectrum of their needs, we do not know to what extent health literacy is included in that care. In order for critical care nurses to contribute toward improving health literacy for HF patients, the following series of actions may be helpful:

Step 1: Familiarize yourself and your colleagues with the concept of “health literacy” and its important implications for a person’s health

Health care professionals may not be conversant with the term, health literacy, or may view it as something more relevant to a patient’s self-care, primary care, or home care rather than to progressive or critical care. As a result, providers may not fully appreciate its direct and indirect impact on virtually every patient we encounter and along the entire health wellness-illness continuum. Becoming acquainted with what health literacy is represents a necessary first step in recognizing its essential role in a person’s health. Some good sources of information on health literacy include the following: United States Department of Health and Human Services, Health Resources and Services Administration and Office of Disease Prevention and Health Promotion websites, the Agency for Health Care Quality and Research’s Health Literacy Universal Precautions Toolkit, the Medical Library Association’s Consumer and Patient Health Information Section, and a book on the topic from experts at the Harvard School of Public Health.

Step 2: Get acquainted with research evidence that describes the effects of health literacy on patients with HF

Even from the brief review of the literature in this area presented here, there is clear evidence of a direct relationship between health literacy and desired HF outcomes. Not every study supports those findings for chronic and acute HF patients, but a substantial number confirms those findings. Before we can develop evidence-based approaches to reverse negative effects of low health literacy, we need to be well informed on what the evidence shows.

Step 3: Exercise due diligence in selecting a means to measure health literacy

Some sources suggest that health literacy is sufficiently important to warrant its designation as one of our customary “vital signs.” Whether you agree or not, to the degree that health literacy represents a clinical marker with potentially lethal implications, it can legitimately be considered a highly relevant clinical sign.

As with any other clinical parameter, a patient’s health literacy needs to be measured as objectively as possible, rather than assumed or inferred on the basis of other attributes. One cannot assume patients are health literate based on their level of formal education or their experience in other fields or careers. Even for health care providers, although we may be competent in providing care for our patients, research shows that health care professionals may not be aware of or overestimate the health literacy capability of their patients. Making erroneous assumptions on this attribute could allow the possibility or probability that a patient with unrecognized low literacy is then transferred or discharged without the ability to understand or follow through on complex courses of therapy and polypharmacy; recall important details such as signs and symptoms to report; integrate activities, medications, and dietary demands into a coherent daily schedule; or follow explicit instructions essential to their recovery and well being. The potentially harmful sequelae of that scenario dictate the need for using an instrument known to be effective and accurate in measuring health literacy.

A wide array of devices is available to measure various aspects of health literacy (see Table) and a number of these are available in both English and Spanish. A few resources provide summaries and comparisons of relevant features of these instruments. For example, the Medscape website (www.medscape.org/viewarticle/566053_5) provides a helpful summary of the major features of many of these tools.

Because of the differing attributes of these tools to measure health literacy, it will be helpful for your unit or facility to identify the attributes most desired as selection criteria to determine which device will be used. Some
Selection criteria you might consider for this decision include the following:

- Validity: types and target test results
- Reliability: types and target test results
- Usefulness: overall ease of use, ease of use in clinical setting, ease of scoring, interpretation, documentation, communication
- Benchmark variability with patients of different ages or with certain health conditions
- Administration: who must or could
- Cost: initial, subsequent
- Completion time
- Availability in languages matching patient populations

One report investigated the relationship between the total scores on the shortened version of the Test of Functional Health Literacy in Adults when measured at its recommended 7-minute time limit compared to scores obtained when no time limit is imposed. Researchers found that 27% of patients improved literacy levels when no time limit was imposed and expressed concern that these differences in literacy scores may reflect the older age and compromised cognitive function of many HF patients, rather than diminished health literacy, and suggested the need for more sensitive means of appraising health literacy in older adults.

**Step 4: Monitor health literacy as an essential parameter of care for patients with HF**

As with any other important clinical indicator, a patient’s health literacy needs to be assessed as soon as feasible following admission and at all care transitions and handoffs thereafter, and its documentation needs to be readily accessible to all staff who need to be informed of this finding. Health care staff cannot improve health literacy if no data are available to determine whether a deficiency in this area exists. Because low health literacy is known to be a potentially lethal influence on HF patient outcomes, the plan of care must provide for interventions tailored to mitigate or reverse those effects.

**Step 5: Contribute to your facility’s program(s) to promote health literacy, especially in vulnerable patient populations**

If you work within a health care organization that has already launched initiatives aimed at optimizing health literacy, you and your colleagues might see how you could design programs at the unit or critical care division level to further contribute to this dimension of patient care. You could also partner with colleagues and advanced practice nurses within your facility or from nearby academic centers to design and complete quality improvement or research projects devoted to this problem.

On an ongoing basis, sign up for alerts to monitor the literature for identification of strategies that are successful in improving HF, in reducing HF readmissions, and for improving survival/reducing mortality from chronic and acute HF.

**Closing**

Health literacy has become an increasingly more essential ingredient as our health care system has transformed from one provided almost exclusively by physicians with patients as passive recipients to one where multiple categories of providers interact with patients, whose responsibilities for self-care are often required at every level and setting of care. In this health care environment with short hospital stays and thousands of patients with newly acquired health insurance competing for care, the patient’s ability to effectively navigate a complicated system of health resources and services can be repeatedly tested. For HF patients, many of whom may be older with low functional or ongoing health literacy, limitations in this essential attribute may manifest in higher rates of rehospitalization and death. Critical care nurses can become active participants in combating and reversing those outcomes for patients with HF.

JoAnn Grif Alspach, RN, MSN, EdD
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Caring for Patients Treated With Therapeutic Hypothermia
Claranne Mathiesen, RN, MSN, CNRN, SCRN, Denise McPherson, RN, MSN, CRNP, CCRN, Carolyn Ordway, RN, MSN, CRNP, CCRN, Maureen Smith, RN, MSN, CNRN

Numerous studies have indicated that therapeutic hypothermia can improve neurological outcomes after cardiac arrest. This treatment has redefined care after resuscitation and offers an aggressive intervention that may mitigate postresuscitation syndrome. Caregivers at Lehigh Valley Health Network, Allentown, Pennsylvania, an academic, community Magnet hospital, treated more than 200 patients with therapeutic hypothermia during an 8-year period. An interprofessional team within the hospital developed, implemented, and refined a clinical practice guideline for therapeutic hypothermia. In their experience, beyond a protocol, 5 critical elements of success (interprofessional stakeholders, coordination of care delivery, education, interprofessional case analysis, and participation in a global database) enhanced translation into clinical practice. (Critical Care Nurse. 2015;35[5]:e1-e13).

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Safety First! Using a Checklist for Intrafacility Transport of Adult Intensive Care Patients

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BACKGROUND
Adult critical care patients in an academic medical center experienced adverse events during intrafacility transport resulting from lack of preparation. An intervention was needed to help keep patients safe during intrafacility transport.

OBJECTIVE
To develop a checklist for transport that is easy to use and effective in preparing patients for transport.

METHOD
A checklist was developed and implemented. Elements of the checklist include preparation of the patient before transport, screening of patients for criteria that may place them at higher risk during transport, and a checklist for the procedural site.

RESULTS
From May 2011 through July 2014, 2506 transports were conducted. Of these, 97.6% (n = 2445) involved no reported complications.

CONCLUSION
This tool is suitable for bedside clinicians to use when preparing patients for transport. (Critical Care Nurse. 2015;35[5]:16-26)

In 1999, the Institute of Medicine challenged the health system in the United States to focus on safety. Since the publication of that report by the Institute of Medicine, the health care industry has turned to strategies learned from the aviation industry to address safety initiatives; one of those strategies is the use of checklists. Intrafacility transport of patients is a procedure in which checklists are advocated for safety, and a few authors have published their tools. The benefits of checklists include standardization, promotion of evidence-based care, improved communication, use of appropriate equipment, minimizing errors, and mitigation of the unreliability of memory.

This article has been designated for CE credit. A closed-book, multiple-choice examination follows this article, which tests your knowledge of the following objectives:

1. List 5 adverse events associated with intrafacility transport
2. Identify a benefit of an intrafacility transport checklist
3. Describe a physiological impact of intrafacility transport

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In the course of hospitalization, critically ill patients may require transport within the facility for the purpose of tests, treatments, or both. Although publications on intrafacility transport have increased in recent years, the topic is less widely discussed than transports outside or between facilities. The paucity of research on intrafacility transports is mentioned in the transport guideline published by the Intensive Care Society. A systematic review was published in 2011 on factors influencing the quality and safety of nonemergency transports of patients. Of the 12 articles reviewed, none were about intrafacility transports. In their editorial published 10 years ago, however, Shirley and Bion pointed out that transports within facilities occur more frequently and “since they reflect in microcosm the same challenges of inter-hospital land transfer, they deserve more attention.”

Intrafacility transports are not without risk. Many authors caution readers that a risk-to-benefit evaluation should be made by the treatment team before the decision is made to transport a patient in order to ensure that the need for transport justifies the risk of moving the patient. In one study of neurologically injured patients, only 5.5% of computed tomography (CT) scans led to a new surgical decision. It is important to note, however, that not obtaining a CT scan may have serious consequences. However, this example is intended to illustrate the importance of ensuring that moving a patient off a unit will justify information received from a test.

The physiological impact of transports include movement (from bed to stretcher to procedure table), acceleration, deceleration, and vibration from moving through hallways and elevators (which may cause discomfort or tissue damage), changes in position (which may cause patient discomfort or accidental disconnection of tubes/catheters), environment (which may cause temperature variations such as hypothermia), and noise (which may cause anxiety or agitation). Another impact includes testing areas in which patients may not be easily visible by staff accompanying them. For example, during magnetic resonance imaging, nurses remain in a separate room, which makes close monitoring of the patient very difficult.

Adding to the challenges of movement to/from a testing area, patients who require transport may have higher acuity and increased risk. In a study of all patients admitted to an intensive care unit (ICU) in a 2-year period, reported that 44% of ICU patients required intrafacility transport during their hospitalization. More importantly, patients undergoing transports had higher acuity scores, were more likely to be receiving vasopressors and mechanical ventilation, and had greater lengths of stay and mortality rates than did patients who were not transported. In a multicenter cohort study describing transport complications in patients receiving mechanical ventilation, also reported longer ICU stays.

Adverse Events During Transport

The incidence of adverse events during intrafacility transport has been reported and ranges from 1.7% to 75.7%. This wide variation is largely based on differences in definitions of adverse events. As an example, in the study by Kue et al, who reported an overall adverse event rate of 1.7%, technical events such as losing an intravenous catheter or equipment malfunction were excluded as adverse events. Conversely, and included these events and reported an incidence of 75.7% for adverse events. also included multiple types of events, including equipment problems and tangling of tubes/vascular access tubing, with unexpected events occurring in 67.9% of patients. In their formal recommendations for intrahospital transport, the French-language society of intensive care describes the necessity to standardize these definitions. These variations add to the difficulty in identifying appropriate interventions.

Adverse events related to patients and to equipment have been described in published reports. Reported
adverse outcomes for patients include alterations in vital signs, changes in intracranial pressure, variations in partial pressure of oxygen in brain tissue, hypoxia, deep vein thrombosis, pneumothorax, ventilator-associated pneumonia, atelectasis, and alterations in blood glucose levels. Equipment-related events are also frequently reported. Examples include equipment failure, disconnected or tangled tubes and wires, and depleted oxygen supply.

**Transport Guidelines**

Guidelines on intrafacility transport, which may be helpful to clinicians who are developing their own transport checklist, have been published. Day published a comprehensive overview for the safe transport of ICU patients. This article listed “physiological red flags” that indicate patients who may be at greater risk for complications: (1) high ventilator requirements, (2) more than 2 chest tubes and/or unable to tolerate being off suction, (3) hemodynamically unstable cardiac rhythm, (4) labile blood pressure, (5) bleeding, (6) retractive intracranial pressure, (7) abdominal compartment syndrome, (8) continuous renal replacement therapy, and (9) unstable cervical spine fracture. Parmentier-Decruq et al identified risk factors for the development of adverse events during transports. These included (1) positive end-expiratory pressure (PEEP) greater than 6 cm H₂O, (2) sedation before transport, and (3) fluid challenge for transport. Finally, a publication detailing the safe transport of obese patients, Roland et al provide a table that outlines their safety checklist. This table includes assessments for respiratory, hemodynamic, gastrointestinal/genitourinary, and patient comfort and safety concerns.

Six publications specifically evaluating and/or publishing an intrafacility transport checklist were retrieved. One published checklist is focused on improved standardization of handoff communication. This tool incorporates several patient safety features such as checking an identification band and routine checks of oxygen regulators. The checklist is not specifically for adult ICU patients, but is certainly applicable for a lower acuity environment. The outcomes reported by the authors are (1) eventual reduction in oxygen-related events, (2) a 43% decrease in cardiac/respiratory arrest in testing areas, and (3) an increase in patient satisfaction. Another study done to evaluate an intrafacility transport checklist for the emergency department has been published. This tool is reportedly used for transports to ICUs, procedural areas, and general medical care areas. A reduction in unexpected events from 36.8% to 22.1% occurred when the tool was used, although the authors report differences in the groups of patients studied before and after the intervention, as well as use of the checklist only 56.7% of the time after the intervention. It is unclear what impact these differences may have had on their results.

The intrafacility transport checklist is not specifically for adult ICU patients, but is certainly applicable for a lower acuity environment.
pretransport checklist and a system-by-system assessment to determine level of monitoring. No outcome data on using the checklist are reported; the authors report plans to measure the effectiveness of the tool going forward. In 2010, Jarden and Quirke published a transport record developed at a facility in New Zealand that includes a pretransport checklist, a form to document assessments and other parameters at intervals during transport, and a posttransport assessment. The tool is used only by nurses, but physicians do accompany patient transports. The authors describe an audit completed on the tool that was focused on nurses’ perceptions and documentation. The results are described as “enhancement” of preparation, documentation, and identification/documentation of complications. No other patient outcomes are described.

In a review of the literature, Fanara et al published a “proposed” transport checklist, which includes reminders regarding equipment, patient preparation, team members, and evaluation of clinical stability. As this is a proposed checklist, no outcome data on its use are reported. The fourth published checklist was from a medical center in Canada and includes an evaluation of risk factors within 2 hours of transport, along with preventive measures to be implemented, based on the identified risk factors. An evaluation of 180 patients before and 187 patients after the intervention resulted in a 20% absolute reduction in transport incidents, with statistical significance in 3 areas: requirement for emergency medication, failure of monitor batteries, and difficulties with mobilization of the patient from the bed to the examination table.

**Methods: Implementing the Checklist**

In the fall of 2006, the adult critical care intrafacility transport checklist was implemented in 4 adult ICUs. For each intrafacility transport, nurse and respiratory therapy clinicians were asked to fill out the checklist; upon return from the transport, the completed checklist was submitted to the nurse manager of that unit. The first page (Figure 1) provides instructions for nurses and respiratory therapists before transport, and a section at the bottom is to be completed once they have arrived at the procedural or testing area. The second page is a patient screening tool (Figure 2). This page is designed to assist staff with the identification of higher risk patients, or patients most likely to experience instability or complications during transport. If a patient falls into 1 of 2 categories of higher risk, additional steps and/or resources are needed such as conversations with the testing area(s) and/or faculty physicians. In the case of the highest risk patients, a physician is required to be in attendance throughout the transport. The reason for requiring physician attendance is the higher likelihood of interventions requiring a physician’s order during the procedure and/or test. These criteria were discussed and agreed upon by the multidisciplinary committee who sponsored the checklist. Some statements do require a clinical judgment by the nurse screening the patient. Examples include statements such as “active increased titration of vasopressors” or “sustained RASS [score on Richmond Agitation and Sedation Scale] +2 to +4 despite medical management.” This portion of the checklist is intended to assist staff to consider patient circumstances that are less desirable for a transport environment. Nurses report that these statements and criteria are helpful in order to help them “think through” higher risk situations.

**Project Implementation**

In 2006, staff at University of Texas Medical Branch in Galveston, Texas, an academic medical center with 4 adult ICUs, identified opportunities for improvement in patient safety during the intrafacility transport of adult ICU patients. A series of adverse events were noted that had resulted from lack of preparation, insufficient availability of resuscitation equipment, oxygen tanks not being full, transport monitors with batteries not being fully charged, and traveling to procedure areas after a physician had cancelled a test.

An adult ICU multidisciplinary committee, composed of physicians, nurses, respiratory therapistes, pharmacists, and staff from the clinical laboratory and the institutional quality and risk management departments determined that an intervention was necessary. The decision was made to develop a checklist. A work group composed of nurses and respiratory therapists was convened to develop an adult ICU intrafacility transport checklist. The final version was approved by the same adult ICU multidisciplinary committee who sponsored the project. The goal of the checklist from its inception was to assist in the identification of patients at high risk for transport and to serve as a reminder to ensure that required equipment and resources are available and fully functioning. The intent was for the checklist to promote patient safety by minimizing adverse events.
Another anecdote by nurses is that they use the checklist to “back” their decision to approach a physician about concerns related to transporting a patient. The patient scenarios described next explore 3 typical transports.

### Patient Scenario 1

J. C. was a 35-year-old man admitted to the ICU for respiratory distress. He was alert and oriented, with oxygen saturation levels ranging from 90% to 93% on 40% FiO2.

<table>
<thead>
<tr>
<th>Nursing - Prior to transport</th>
<th>RN Initials</th>
<th>RT Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN given 45 minute notification from procedural area to prepare</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral contrast given or 20g IV in antecubital (AC) vein obtained (for CT PE protocol) (If no AC IV can be obtained, consider alternative of VQ scan)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upon notification of procedure, verify with MD that test is needed and consent obtained.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IF NOT Vented: Full oxygen tank obtained. RN will bring ambu bag with mask.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Respiratory Therapy - Vented Patients - Prior to transport</th>
<th>RN Initials</th>
<th>RT Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtain ambu bag with face mask and PEEP valve. Oxygen tank is FULL. One disposable ETCO2 check device available.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport ventilator set up and trialed to assess patient tolerance and stability. If PEEP ≤ 8 and FiO2 ≤ 50%, MD approval and order may be obtained for transport via manual bag/valve ventilation in situations in which a delay may be incurred and a risk: benefit ratio has been evaluated. Portable continuous ETCO2 monitor in place.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nursing/Respiratory Therapy - At procedural site</th>
<th>RN Initials</th>
<th>RT Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch to procedural area monitor if available. Transport monitor plugged in and charging.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report given to procedural area RN (if ICU RN is not staying, and patient is going to an area other than Cardiac Cath Lab or GI suite, physician order is required)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN confirms vital signs are stable prior to leaving patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RT places patient on procedural area ventilator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RT and RN agree that patient’s respiratory status is stable and RT may leave</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RT will stay with patient if patient remains on transport ventilator</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1** First page of University of Texas Medical Branch (UTMB) adult critical care transport checklist.

Abbreviations: cath lab, catheterization laboratory; CT, computed tomography; ETCO2, end-tidal carbon dioxide; FiO2, fraction of inspired oxygen; GI, gastrointestinal; ICU, intensive care unit; IV, intravenous; MD, physician; MRI, magnetic resonance imaging; PACU, postanesthesia care unit; PE, pulmonary embolism; PEEP, positive end-expiratory pressure; RN, registered nurse; RT, respiratory therapist; VQ, ventilation/perfusion.

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oxygen by mask. His blood pressure was within normal limits; heart rate ranged from 105/min to 110/min. A CT scan to rule out a pulmonary embolism was ordered. The nurse and respiratory therapist completed the adult critical care transport checklist (Figures 1 and 2). The answers to all of the questions on page 2 were “no.” The nurse gathered the transport monitor and other supplies, checking for proper function, adequate battery, and setting alarms. The patient was then escorted by the ICU nurse to the radiology department and back to the ICU without any adverse outcomes.

Patient Scenario 2

J. H. was a 65-year-old admitted to the ICU for altered mental status and hypercapnic respiratory failure. The patient was successfully weaned from invasive mechanical ventilation, but continued to require...
ongoing use of noninvasive ventilation. Because of the patient’s continued altered mental status, a CT scan of the head was ordered. Both the respiratory therapist and nurse accompanied the patient during transport. Completion of page 2 (Figure 2) of the transport checklist also prompted approval of the transport by the faculty/attending physician and notification of the CT area personnel. The ICU nurse obtained final approval from the faculty/attending physician to proceed with the transport, and CT personnel were alerted of the acuity of the patient. The transport was facilitated without any complications.

Patient Scenario 3

C. M. was a 58-year-old admitted to the ICU after a motor vehicle accident, resulting in an unstable cervical spine fracture. A CT scan of the head was ordered. The ICU nurse and respiratory therapist completed page 1 of the adult ICU transport checklist (Figure 1) to prepare for transport. Upon completion of page 2 of the transport checklist (Figure 2), it was noted (because of the presence of the unstable cervical spine fracture) that a physician would be required for safe transport. In addition, the ICU nurse notified radiology staff of the patient’s acuity before the transport. The patient transport was facilitated without any adverse events.

The Checklist

The adult critical care transport checklist is not intended to duplicate information on the patient that has already been documented. In their discussion of checklists, Winters et al³ caution that checklists should be short and organized; checklists that are lengthy and disorganized tend not to be used. As an example, the bedside nurse clinician is usually assigned 1 to 2 patients. Assessments and reassessments occur throughout the shift, and a full head-to-toe assessment is documented every 4 hours and more frequently if needed. Because the same nurse prepares the patient for transport, the intent of the tool is to prepare and screen for transport, not duplicate an assessment documentation form. This concept was deemed important in order to facilitate buy-in of staff. An additional strength of the tool is that it is interdisciplinary; both nursing staff and respiratory therapists participate collaboratively to capture assessment and other data. This approach encourages communication among the disciplines primarily responsible for the patient during transport. A transport assistant will commonly accompany the nurse and/or respiratory therapist—page 1 of the checklist includes the reminder “transportation present” (Figure 1). Transportation assistants in our facility are unlicensed staff whose roles are assisting with transports, delivering supplies, transporting laboratory specimens, and other assistive functions. Transportation assistants will also assume responsibility for transporting patients within the facility who are not in the ICU and do not require licensed staff members for transport.

Evaluation

In 2011, outcomes of transports began to be collected as part of our checklist via one question answered at the conclusion of the transport (Figure 2). This outcomes question is stated as an unexpected event (eg, hypotension, hypoxia) that required intervention to correct, either during or immediately after transport. This statement is intentionally broad, as we wanted to encourage the reporting of any complication. In addition to not knowing (initially) what the unexpected events might be, we also did not want clinicians being narrowly focused on only those events that we might preselect.

Results

From May 2011 through July 2014, 2506 transports were conducted. Of these, 97.6% (n = 2445) experienced no reported complications. Complications were reported on 2.4% (n = 61) of transports that required intervention, either during or immediately after the transport (see Table). When these occurred, physicians and/or other members of the treatment team were contacted for assistance. This process would not be different than if the nurse were caring for the patient on the unit. If a patient requires intervention from a physician, they are contacted by pager or phone if not immediately available.

Discussion

Many authors report on an intrafacility transport process that includes a physician as a routine member of the transport team.⁵,⁷,¹¹,¹⁹,²¹,²³,²⁶-²⁹,³⁸ Lahner et al²⁵ reports that anesthesiologists perform all transports; nurses do not routinely accompany patients during transport. Winter⁴⁰ recommends that an intrafacility transport be delayed until an adequately trained physician is present.
Other published reports advocate the use of a specialized transport team. Such a team is not in existence in our institution; the transporting nurse is either the patient’s primary bedside nurse or another nurse who is similarly familiar with the patient. Only the highest acuity patients (Figure 2, bottom section of the transport checklist) are accompanied by a physician throughout the transport. When physicians are not present during the transport, they are available by phone and/or pager and can respond in person should the nurse or respiratory therapist require assistance.

One of the successes we have experienced with the transport checklist is its ease of use. In addition, this tool does not duplicate work that the bedside nurse has already completed, such as physical assessments. It is a tool to augment safety for an off-unit transport. Winters et al summarize the importance of ensuring that checklists evolve with current evidence or experience. We have made a number of revisions over the years, such as when we have new equipment. Two revisions, one in 2010 and one in 2011, were based on complete evidence-based reviews conducted by using the medical center’s evidence-based practice model: Disciplined Clinical Inquiry. The first focused question was about patient-related factors predisposing them to instability during transport. The results of the review both validated aspects of our checklist and prompted us to refine it. One revision was the addition of “unstable cervical spine fracture” to page 2 of the checklist, requiring a physician to accompany the patient on a transport. The second evidence-based practice review was the method of respiratory support in patients undergoing mechanical ventilation to prevent respiratory deterioration during transport. Before this review, the most common method of support was the use of manual bag/valve ventilation for transport. The results of the evidence-based practice review led to the modification of the checklist to require a transport ventilator. Going forward, as new evidence regarding transports becomes available, we anticipate modifying the checklist further.

We have encountered some challenges with the checklist. We have been unsuccessful in gaining support for the inclusion of the checklist in our electronic medical record (EMR). Therefore, it remains on paper. As more and more of our documentation becomes incorporated into the EMR, “old-fashioned” paper documentation becomes perceived as “cumbersome.” Additionally, because paper forms and charts are not used frequently, the risk for inadvertently failing to complete the form may increase.

<table>
<thead>
<tr>
<th>Complication</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased oxygen saturation</td>
<td>10</td>
</tr>
<tr>
<td>Unspecified</td>
<td>6</td>
</tr>
<tr>
<td>Hypotension</td>
<td>4</td>
</tr>
<tr>
<td>Vomiting</td>
<td>3</td>
</tr>
<tr>
<td>Respiratory distress</td>
<td>3</td>
</tr>
<tr>
<td>Cardiopulmonary arrest/code called</td>
<td>2</td>
</tr>
<tr>
<td>Hypertension</td>
<td>2</td>
</tr>
<tr>
<td>Hypotension; bradycardia</td>
<td>2</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>2</td>
</tr>
<tr>
<td>Restlessness and agitation; unable to complete examination</td>
<td>2</td>
</tr>
<tr>
<td>Claustrophobia</td>
<td>2</td>
</tr>
<tr>
<td>Malfunctioning pulse oximeter probe</td>
<td>2</td>
</tr>
<tr>
<td>Supraventricular tachycardia</td>
<td>1</td>
</tr>
<tr>
<td>Hypoxia; unsustained supraventricular tachycardia</td>
<td>1</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>1</td>
</tr>
<tr>
<td>Hypoxia and vomiting</td>
<td>1</td>
</tr>
<tr>
<td>Hypertension, hypoxia</td>
<td>1</td>
</tr>
<tr>
<td>Hypertension, tachycardia</td>
<td>1</td>
</tr>
<tr>
<td>Hypotension, decreased oxygen saturation</td>
<td>1</td>
</tr>
<tr>
<td>Nausea, tachycardia</td>
<td>1</td>
</tr>
<tr>
<td>Self-extubation</td>
<td>1</td>
</tr>
<tr>
<td>Transport ventilator failure</td>
<td>1</td>
</tr>
<tr>
<td>Transport ventilator battery failure</td>
<td>1</td>
</tr>
<tr>
<td>Pain, tachypnea</td>
<td>1</td>
</tr>
<tr>
<td>External ventricular drain pulled out</td>
<td>1</td>
</tr>
<tr>
<td>Infiltrated intravenous catheter</td>
<td>1</td>
</tr>
<tr>
<td>Coughing</td>
<td>1</td>
</tr>
<tr>
<td>Tachycardia; did not tolerate lying flat</td>
<td>1</td>
</tr>
<tr>
<td>Agitation; biting endotracheal tube, bradycardia</td>
<td>1</td>
</tr>
<tr>
<td>Agitation, infiltrated intravenous catheter</td>
<td>1</td>
</tr>
<tr>
<td>Chest pain</td>
<td>1</td>
</tr>
<tr>
<td>Required restarting esmolol hydrochloride (Brevibloc)</td>
<td>1</td>
</tr>
<tr>
<td>Bed malfunction (difficulty turning)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>61</strong></td>
</tr>
</tbody>
</table>
Limitations
The limitations of our project include the uncertainty that the checklist is used 100% of the time. Although its use is mandated, no formal tracking mechanism is available to cross-reference the availability of a completed checklist for every patient transport in the adult ICUs. Checklists also periodically have incomplete data, and attempts are made to complete the data retrospectively. We were unable to use 13% of our checklists because of incomplete data. This difficulty is not unique; other authors report similar challenges. Choi et al. reported that the checklist in their study was not used when the emergency department was crowded; its use was 56.7% in the postintervention period. Berube et al. were able to analyze data on 90% of their transports (n = 408). Their challenges also included missing data. Discussions and reminders about the checklist occur in staff meetings and educational opportunities. The strength of our work includes the number of transports on which we have collected data (n = 2506). To date, we have not found other published work on intrafacility transport outcomes on adult critical care patients that uses a structured checklist with similar numbers of patient transports.

Conclusion
To date, our tool has been suitable for preparing patients for transport by bedside clinicians and for screening for patients who require additional resources. The checklist may be beneficial for facilities that do not have the resources for dedicated transport teams and/or physicians available for all transports. Suggestions for further study may include randomized treatment groups, or additional pre/post studies in order to determine if this intervention is the best choice for transports. Other data for collection in future studies include the skill(s) of the nurses and respiratory therapists and identifying whether the transport was planned versus emergent. This information may be useful in evaluating trends in adverse outcomes that do occur.

Patient safety is a hot topic and an expectation of accrediting agencies. The Joint Commission, for example, describes environmental safety, management of conflict, implementation of hospital-wide safety programs, staff members’ roles in patient safety, and the creation and maintenance of a culture of safety. Our duty and responsibility to our critical care patients encompass many dimensions of safety. A famously quoted Hotspur proclaims in William Shakespeare’s King Henry IV, “out of this nettle, danger, we pluck this flower, safety.” Although it may be said that “dangers” exist in critical care environments, the safety of our patients must remain at the forefront of our priorities. The use of an intrafacility transport checklist is one example of a tool to keep our patients safe. CCN

Financial Disclosures
None reported.

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To learn more about transport of critical care patients, read “Inhaled Nitric Oxide to Improve Oxygenation for Safe Critical Care Transport of Adults With Severe Hypoxemia” by Teman et al in the American Journal of Critical Care, March 2015;24:110-117. Available at www.ajcconline.org.

References


1. Which of the following was *not* identified as a benefit of checklist use?
   a. Efficiency
   b. Improved communication
   c. Minimized error
   d. Standardization

2. Which of the following was *not* included in the study hospital’s transport checklist?
   a. A checklist for the procedural site
   b. Preparation of the patient
   c. Screening for high-risk criteria
   d. Use of a dedicated team

3. Which of the following was identified as a physiologic impact of intrafacility transport?
   a. Desaturation
   b. Hyperthermia
   c. Tissue damage
   d. Tube dislodgment

4. Adverse outcomes during transport include which of the following?
   a. Agitation
   b. Hyperthermia
   c. Desaturation
   d. Tube dislodgment

5. Which of the following is an example of an equipment-related event during transport?
   a. Incorrectly anticipating what emergency equipment would be needed
   b. Not verifying staff requirements for transport
   c. Transport time taking longer than anticipated
   d. Travel to procedures after tests had been cancelled

6. Which of the following is a “physiologic red flag” that indicates a patient may be at greater risk for complication if transported?
   a. Chest tube to active suction
   b. Continuous renal replacement therapy
   c. High-frequency oscillatory ventilation
   d. Unstable pelvic fracture

7. A consideration for intrafacility transport of an obese patient should include which of the following?
   a. Cancellations of transports that exceed the lifting capacity of staff
   b. The weight and size limits of the testing area
   c. A review of tests that require prolonged supine positioning
   d. Both b and c

8. In a protocol referred to in the article, which of the following was listed as minimizing adverse transport events?
   a. Calling report to the test area
   b. Gathering the required equipment
   c. Preparing the cardiac monitor
   d. Preparing the family members

9. Which of the following outcomes is achieved by using a checklist to standardize handoff communication?
   a. A decrease in time off of the unit
   b. An increase in patient comfort
   c. An increase in ID band accuracy
   d. A reduction in oxygen-related events

10. Which of the following factors contributed to a series of adverse events during intrafacility transport of adult intensive care unit patients at the study hospital?
    a. Incorrectly anticipating what emergency equipment would be needed
    b. Not verifying staff requirements for transport
    c. Transport time taking longer than anticipated
    d. Travel to procedures after tests had been cancelled

11. Which of the following is an identified goal for implementing the checklist for intrafacility transport?
    a. Decrease delays
    b. Identify high-risk patients
    c. Improve efficiency
    d. Increase patient satisfaction

Test answers: Mark only one box for your answer to each question. You may photocopy this form.

1.  a  2.  a  3.  a  4.  a  5.  a  6.  a  7.  a  8.  a  9.  a  10. a  11. a
   a  b  a  b  a  b  a  b  a  b  a  b
   c  c  c  c  c  c  c  c  c  c  c  c
   d  d  d  d  d  d  d  d  d  d  d  d

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Implementation of a Progressive Mobilization Program in a Medical-Surgical Intensive Care Unit

April Messer, RN, MSN, CCRN
Linda Comer, RN, PhD, CNE, LPC
Steve Forst, RN, MSN, CNE

BACKGROUND  Current literature supports implementation of progressive mobility protocols in intensive care units. Education can help nurses overcome barriers to mobility and increase knowledge about the positive effects of mobility.

OBJECTIVE  To evaluate the effect of education for a progressive mobilization program for intensive care nurses on knowledge and performance.

METHODS  A pretest-posttest evaluation was conducted for 41 nurses, and a chart review was performed before and after implementation of the educational intervention to evaluate changes in knowledge and mobilization.

RESULTS  Scores after the educational intervention were significantly higher than scores before the intervention ($t = 2.02; P < .001$). Overall mobilization ($P = .04$) and dangling ($P = .01$) increased significantly after the education. No significant increases occurred in ambulating or getting patients up to a chair.

CONCLUSIONS  Mobilization education was effective and increased nurses’ knowledge about the benefits of mobility for critically ill patients. The educational program also affected how nurses performed mobility interventions. Although provision of education had positive effects on patients’ mobility, leadership and coaching are still important components in implementing change. (Critical Care Nurse. 2015;35[5]:28-42)

Research on early and progressive mobility is currently challenging the traditional standard of care that patients who are critically ill and treated with mechanical ventilation must remain bedfast for days or weeks. Survival of critically ill patients has improved since the mid-1990s, but many of these patients experience long-term disabilities and require rehabilitation after discharge from the intensive care unit (ICU). In the ICU, the focus of care has been the short-term goal of survival, with little attention given to the functional and cognitive impairment of patients. One study revealed that the quality of life of ICU patients was largely reduced 6 years after ICU admission; approximately half of the patients still had health problems, including cognitive dysfunction and problems with mobility. The traditional ICU standard of care for patients treated with mechanical ventilation has included deep sedation and prolonged immobility. Although current research indicates a need for a...
culture shift in ICU care to include strategies to mobilize ICU patients,\textsuperscript{2,5,6} many ICUs in the United States have not changed their practice to include mobility of patients.\textsuperscript{2,7,8}

Nurses are often the key providers of mobility for patients who are critically ill. Barriers to mobility in the ICU include, but are not limited to, clinicians’ fear and lack of knowledge;\textsuperscript{7} competing priorities, with a lack of emphasis on patients’ mobility;\textsuperscript{7} current ICU culture of mobility;\textsuperscript{7,9} the limited view of how much mobility a critically ill patient is capable of;\textsuperscript{7} sedation and delirium;\textsuperscript{11} lack of staff and equipment;\textsuperscript{9,11,12} and risk of self-injury of patients.\textsuperscript{11} Staff education on these issues must be effective for successful mobility in the ICU.

Local Problem

On the basis of current evidence, an educational intervention was planned for a medical-surgical ICU at Mission Health, Asheville, North Carolina, where a new mobility protocol was being implemented. The unit and hospital had previously implemented awakening trials for patients receiving mechanical ventilation; spontaneous breathing trials; coordination of care between nurses and respiratory therapists to perform breathing trials while patients were awake; and a new tool for assessment, prevention, and treatment of delirium based on the Awakening and Breathing Coordination, Delirium Monitoring and Management, and Early Mobility (ABCDE) bundle of care.\textsuperscript{13} On the basis of research and because mobility of patients was not a part of the culture on the unit, the educational intervention was designed to address obstacles to mobility of critically ill patients, benefits of mobility in these patients, and how to mobilize critically ill patients.

Intended Improvement

The specific aim of this project was to increase mobility of patients on the unit and to determine how providing education to ICU staff nurses about a progressive mobilization program affected their subsequent knowledge base and patient care practices.

Key stakeholders, including an ICU quality manager, the current ICU manager, the manager of another ICU in the hospital, the ICU nurse educator, 3 ICU staff nurses, and a physical therapist educator worked on the project. After incorporating the awakening and breathing coordination and delirium monitoring and management parts of the ABCDE bundle, efforts to incorporate early mobility on the unit were needed to improve overall outcomes for patients. No protocol or standardized method to mobilize patients on the unit existed, and as indicated by research and mobility on other ICUs in the hospital, nurses in the unit were not assisting patients to mobilize to the patients’ full potential.

Methods

The project was approved by the appropriate institutional review boards. All nurse participants provided informed consent. No patient identifiers were used in data collection during the chart review.

Setting

The medical-surgical ICU at Mission Health, a large metropolitan hospital, is a 14-bed unit dedicated to critically ill patients. The unit is staffed by board-certified pulmonologists who specialize in intensive care. The patients treated in the unit are adult, are socioeconomically and racially diverse, and have a wide range of acute illnesses, including pneumonia, renal failure, sepsis, cardiac and respiratory arrest, and maternal critical illness. The mean age of patients is 64 years, and the mean length of stay in the unit is 2.5 days.

Planning the Intervention

A review of the literature revealed several studies that supported early mobilization in critically ill patients. When ICU patients are not mobilized effectively, marked problems can occur.\textsuperscript{14} Research\textsuperscript{15-41} has indicated the effects of early mobilization of ICU patients on mortality, hospital and ICU length of stay, duration of mechanical ventilation, functional status, delirium, discharge to care facilities, prevalence of pressure ulcers, and adverse events (Table 1).
<table>
<thead>
<tr>
<th>Reference, year</th>
<th>No. of patients</th>
<th>Type of study</th>
<th>Major findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahadur et al,15 2008</td>
<td>30 patients, all with tracheostomies and receiving mechanical ventilation</td>
<td>Descriptive observational study</td>
<td>Researchers compared ventilator/tracheostomy patients who sat on the edge of the bed or sat out of bed with ventilator/tracheostomy patients who did not. Patients who did not sit out of the bed or on the side of the bed had a higher mortality rate. Staff members' perception that patients were too sick to mobilize reduced the frequency of mobility.</td>
</tr>
<tr>
<td>Bailey et al,16 2007</td>
<td>103</td>
<td>Prospective cohort</td>
<td>Researchers measured mobility and adverse events for 1449 mobility events (sitting in bed, sitting in chair, or ambulating). Less than 1% activity-related adverse events occurred, defined as falling to the knee, tube removal, systolic blood pressure &lt;90 mm Hg, systolic blood pressure &gt;200 mm Hg, or oxygen desaturation to &lt;80% or extubation. No patients were extubated during the trial.</td>
</tr>
<tr>
<td>Bassett et al,17 2011</td>
<td>Unspecified, 13 intensive care units (ICUs)</td>
<td>Retrospective chart review, direct observational study</td>
<td>After implementation of a progressive mobility initiative, patients had a reduction in days of mechanical ventilation (the difference “trended toward” significant). No significant differences in the mean number of ventilator-free days before and after implementation of initiative. No significant change in mortality occurred after the initiation of a mobility program. No significant difference in hospital or ICU stay was detected.</td>
</tr>
<tr>
<td>Bourdin et al,18 2010</td>
<td>20 ICU patients who had no mechanical ventilation &gt;2 days</td>
<td>Prospective observational study</td>
<td>During a total of 424 mobility interventions (chair sitting, tilting up, and walking), researchers recorded vital signs. Adverse events occurred in only 3% of the interventions, none of which had harmful consequences.</td>
</tr>
<tr>
<td>Brownback et al,19 2014</td>
<td>1</td>
<td>Case study</td>
<td>On day 4 of continuous renal replacement therapy (CRRT), the patient stood and took steps to the chair; during 9 days of CRRT, the patient participated in 11 out-of-bed mobility activities. Authors recommended that CRRT patients who are appropriate for mobility should not be excluded from mobility.</td>
</tr>
<tr>
<td>Chavez and Bortolotto,20 2014</td>
<td>Unknown</td>
<td>Abstract only</td>
<td>After implementation of a standardized mobility guideline, patients “in bed in chair position” increased from 50% to 56%, patients sitting in a chair decreased from 51% to 46%, and patients ambulating increased from 30% to 39%. No adverse safety events were noted.</td>
</tr>
<tr>
<td>Dickinson et al,21 2013</td>
<td>1348</td>
<td>Retrospective review</td>
<td>Researchers recorded pressure ulcer rate in 2 groups: before mobility protocol and after mobility protocol. Differences between the 2 groups in the pressure ulcer rate were not significant.</td>
</tr>
<tr>
<td>Esteban et al,22 2014</td>
<td>Unspecified</td>
<td>Abstract only</td>
<td>After implementation of a unit-based early progressive mobility champion, a unit staff nurse, the mean number of patients mobilizing with physical therapists decreased from 7 to 2.6, and the mean number of patients mobilizing with nursing staff increased from 0 to 4.5 in 6 months.</td>
</tr>
<tr>
<td>Fraser et al,22 2014</td>
<td>Unspecified</td>
<td>Abstract only</td>
<td>After a designated mobility team (ICU nurse, physical therapist, rehabilitation technician) was implemented, 90% of patients working with mobility team achieved edge-of-bed or higher mobility activity. Researchers documented a significant decrease in the score on the Richmond Agitation-Sedation Scale and days of delirium for patients after implementation of the team.</td>
</tr>
<tr>
<td>Reference, year</td>
<td>No. of patients</td>
<td>Type of study</td>
<td>Major findings</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Gehlback et al, 2011</td>
<td>568 ICU survivors</td>
<td>Retrospective cohort study</td>
<td>Of the 568 patients, 143 were discharged to a care facility instead of home. Factors strongly and independently associated with discharge to a care facility included mechanical ventilation, severe cognitive dysfunction, and poor strength or mobility.</td>
</tr>
<tr>
<td>Harris and Shahid, 2014</td>
<td>906 (total number of physical therapy evaluations)</td>
<td>Retrospective chart review</td>
<td>Physical therapy sessions were recorded for 2 years, before the introduction of a mobility program and after. Evaluations increased from 364 (before implementation) to 542 (after implementation).</td>
</tr>
<tr>
<td>Hill et al, 2013</td>
<td>181 ICU patients who received mechanical ventilation for &gt;7 days</td>
<td>Chart review</td>
<td>In 12 months after hospitalization, patients who did not ambulate independently during their ICU stay experienced longer cumulative lengths of stay in the hospital and were more likely to be readmitted to an acute care facility. The length of time from ICU admission until the time the patient stood correlated with the length of hospital stay and hospital readmissions during the 12-month period.</td>
</tr>
<tr>
<td>Matthews et al, 2010</td>
<td>375 trauma and burn ICU patients</td>
<td>Abstract only</td>
<td>Researchers compared outcomes for patients before initiation of a mobility protocol with outcomes for patients after implementation of the mobility protocol. Mean hospital stay decreased from 17 to 15.3 days. Mean ICU stay decreased from 11 to 9.4 days. No adverse events were reported.</td>
</tr>
<tr>
<td>Morris et al, 2011</td>
<td>280 ICU patients who survived acute respiratory failure</td>
<td>Chart review</td>
<td>Of the 280 patients, 132 had either died or been readmitted within 1 year after hospitalization. Predictors of readmission or death included tracheostomy, a higher Charleston Comorbidity Index, and a lack of ICU mobility.</td>
</tr>
<tr>
<td>Mulkey et al, 2014</td>
<td>26</td>
<td>Prospective study</td>
<td>A total of 39% of patients never progressed beyond uniform turning, range-of-motion activities, and elevated head of bed. Only 10% of patients walked. Limited mobility progression was associated with poorer clinical outcomes. Researchers cited a need for mobility protocols in neuroscience ICUs.</td>
</tr>
<tr>
<td>Needham et al, 2010</td>
<td>Unspecified</td>
<td>Prospective study</td>
<td>After implementation of a quality improvement intervention that included increased staffing of physical therapists, occupational therapists, new guidelines for physical and occupational therapy consultations, and a reduction in heavy sedation, patients had a greater proportion of treatments with a functional mobility level of sitting or greater than did the patients before the implementation of the program. Overall hospital length of stay was reduced by 3.1%. ICU length of stay was reduced by 2.1%. Adverse events were measured as a secondary end point; no adverse events led to serious harm of patients.</td>
</tr>
<tr>
<td>Nydahl et al, 2014</td>
<td>783, in 116 ICUs</td>
<td>One-day point prevalence</td>
<td>At least three-quarters of patients were not mobilized out of bed, and standing or higher levels of mobility were rare. Patients receiving mechanical ventilation were mobilized significantly less than were other patients. Perceived barriers to mobility were reported for 73% of patients. Complications of mobility occurred with 21% of patients, but serious complications were rare. No serious complications occurred with out-of-bed mobility.</td>
</tr>
<tr>
<td>Reference, year</td>
<td>No. of patients</td>
<td>Type of study</td>
<td>Major findings</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Patel et al, 32 2014</td>
<td>104</td>
<td>Secondary analysis</td>
<td>Increased dose of insulin and early mobility reduced the incidence of ICU-acquired weakness, independent of known risk factors for weakness</td>
</tr>
<tr>
<td>Perme et al, 33 2011</td>
<td>30 patients with femoral arterial catheters</td>
<td>Retrospective case series</td>
<td>During 47 mobility activity sessions, no femoral arterial catheter–related adverse events occurred</td>
</tr>
<tr>
<td>Roberts et al, 34 2014</td>
<td>71 patients and 238 mobility activities</td>
<td>Observational</td>
<td>Researchers compared mean and standard deviation of activity times for dangling, progression to a chair, standing or marching and ambulating for standard equipment and platform. Both treatments were safe and effective. The times for activities done with standard equipment were longer for dangling, standing, or marching in place. Mean activity times for walking were longer when the platform was used. Researchers recommended use of the platform for walking</td>
</tr>
<tr>
<td>Ronnebaum et al, 35 2012</td>
<td>28 ICU patients experiencing respiratory distress</td>
<td>Retrospective chart review</td>
<td>Outcomes for patients who received early mobility interventions were compared with the outcomes for patients who received standard physical therapy. Patients in the early mobility group spent a mean of 13.3 (SD, 6.3) days and patients receiving standard physical therapy spent a mean of 24.9 (SD, 13.7) days in the ICU. Duration of mechanical ventilation for patients who participated in early mobility was 14.5 (SD, 8.7) days versus 30.9 (SD, 20) days for the physical therapy group</td>
</tr>
<tr>
<td>Skinner et al, 36 2009</td>
<td>12</td>
<td>Pilot study</td>
<td>During a pilot exercise program, researchers performed a physical function ICU test. Patients demonstrated an improvement in function and muscle strength and increased “marching on the spot” by a mean difference of 86.3 steps and 56 seconds and increased shoulder flexion by 8 repetitions. No adverse events were reported</td>
</tr>
<tr>
<td>Schweickert et al, 37 2009</td>
<td>104 patients undergoing mechanical ventilation</td>
<td>Randomized controlled trial</td>
<td>The number of patients returning to functional status at hospital discharge was the primary end point. Among the patients assigned to the intervention group (interruption of sedation and early mobility), 59% returned to functional status compared with 35% of the patients in the control group (daily interruption and mobility as ordered by a physician). Patients receiving mobility interventions had significantly more ventilator-free days (23.5) than did a control group (21.1 days). Patients in the intervention group experienced significantly shorter periods of delirium (2 days) than did the control group (4 days). Adverse events were measured as a secondary end point; no adverse events led to serious patient harm</td>
</tr>
<tr>
<td>Talley et al, 38 2013</td>
<td>109</td>
<td>Unspecified</td>
<td>After implementation of a mobility protocol to guide nurses with appropriate selection and safe mobilization of CRRT patients, 104 of the 109 patients received mobility interventions. Patients with jugular venous access were more likely to progress to advanced mobility activities. During the 6-month period, no falls, dislodgements of catheters, or other serious adverse events occurred. One disconnection between a catheter and extension line occurred during the early phase of the 6-month period. Researchers concluded that mobilization of CRRT patients is feasible and safe</td>
</tr>
</tbody>
</table>

Continued
Mobilization of patients is a fundamental nursing activity, and knowledge of and skill in achieving mobilization are essential for early and progressive mobility of patients. Implementation of a program and education of staff are important factors in mobilizing ICU patients. Although many studies support the use of mobility protocols to effectively mobilize patients in the ICU, research on the effects of education on mobilization in the ICU is lacking. Fitzgibbon found that before an educational intervention, 40% of nurses understood the concepts of early mobility, and 30% of nurses performed passive range-of-motion exercises on patients. After the educational intervention, 98% of nurses understood concepts of early mobility, and 100% performed passive range-of-motion exercises on their patients.

Recent research on ICU mobility suggests that patients who are critically ill should engage in daily, early exercise to achieve better outcomes. Although implementing mobility in ICU patients should be done cautiously, mobility is safe and feasible. On the basis of the literature review, key stakeholders in the medical-surgical ICU project decided that the nursing education on ICU mobility should address the benefits of mobility, the adverse effects of immobility, and instructions on overcoming barriers to mobility.

According to the theory of adult education of Malcolm Knowles, adults engage in learning on the basis of their current life or job situation and tend to approach educational activities from a performance-centered perspective. Adult learners need to understand why specific material is being taught, but instruction should be task oriented, with learning activities based on the context of the task being taught. In addition, the theory of change of Kurt Lewin indicates that during the unfreezing stage, disequilibrium occurs within a system, and the change agent is motivated to create change. During the moving stage, the change is initiated through planning, examination, acceptance, and trial. Last, during the refreezing stage, the changes are accepted as part of the system. On the basis of adult learning theory, Lewin’s theory of change, and a review of the literature, educational classes were planned for all staff nurses in the medical-surgical ICU.

<table>
<thead>
<tr>
<th>Reference, year</th>
<th>No. of patients</th>
<th>Type of study</th>
<th>Major findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thompson et al, 2008</td>
<td>330</td>
<td>Abstract</td>
<td>Patients assigned to an early mobility protocol group (n = 165) experienced a significant reduction in hospital and ICU length of stay compared with patients who did not receive early mobility intervention (n = 165). No adverse events were reported.</td>
</tr>
<tr>
<td>Titsworth et al, 2012</td>
<td>12,480</td>
<td>Prospective intervention trial</td>
<td>Patients spent a mean of 12 days in the hospital for 10 months before a mobility protocol was implemented; during a 6-month period after the implementation of the protocol, the mean hospital stay was 8.6 days. ICU length of stay was reduced by 13% from 4 days before the mobility protocol implementation to 3.46 days after the implementation. The authors concluded that increased mobility did not lead to an increase in adverse events, as measured by falls or inadvertent disconnection of catheters.</td>
</tr>
<tr>
<td>Winkelman et al, 2012</td>
<td>75</td>
<td>Prospective repeated-measures study</td>
<td>After the initiation of a mobility protocol that included a 20-minute episode of daily exercise for 2 or more days, patients had a significant reduction in ICU length of stay. Adverse events were measured as a secondary end point; no adverse events led to serious patient harm.</td>
</tr>
</tbody>
</table>

Instruction for adult learners should be task oriented, with learning activities based on the context of the task being taught.
The educational sessions consisted of a didactic classroom presentation with a focus on evidence-based benefits of and barriers to mobility and adverse effects of immobility in critically ill patients (the presentation was made by a unit manager who pilot tested the mobility program in another unit). In addition, a physical therapist educator and a physical therapist planned a presentation that included simulations of range-of-motion exercises, dangling, the Egress test (a simple screening tool to predict safety of transfer of bariatric patients), transferring to a chair, and use of assistive devices. The didactic and demonstration parts of the educational sessions were designed to be interactive, allowing the nurses to participate by presenting their own experiences, concerns, and questions and to acquire hands-on experience in the mobility demonstrations (Table 2).

Planning the Study of the Intervention and Methods of Evaluation

A correlational, descriptive research design was used. Data were collected during a 6-week period. Two methods were used to evaluate the effectiveness of the intervention: a chart review and a pretest-posttest survey.

A chart review was conducted for 3 weeks before and 3 weeks after the educational intervention to determine if a change in behavior occurred after the intervention. Data were collected on 9 randomly selected days before and 9 randomly selected days after the intervention (3 days per week). Data collected included the number of patients on the unit, the total number of mobility activities performed (dangling, up to a chair, and ambulating), the number of patients not participating in mobility activities, and the number of patients who met exclusion criteria.

For the behavior measure, a convenience sample of medical records for patients on the unit (admitted to the unit for half a day or longer) during data collection was included in the study. Exclusion criteria were based on the unit mobilization protocol; the record of any patient who met the following criteria was excluded from the study: active order for bed rest, active order for comfort care of the imminently dying, unstable hemodynamic status (>2 vasoactive drugs), and chemical paralysis.

During 5 educational sessions, pretests and posttests were administered to nurses participating in the education to determine if a change in knowledge occurred. The pretest-posttest was pilot tested and completed by 10 nurses from another unit where the mobilization education and program had been implemented. The tests consisted of 7 multiple-choice items and 1 true-false question. On the basis of feedback on the pilot test, the wording of some questions was changed before the study began. Participants in the pilot testing needed less than 10 minutes to complete each test.

Demographic information was collected for all nurses who participated in the study. Nurses were given 15 minutes to complete the pretests. Directly after the nurses completed the tests, the educational intervention started. Directly after the educational session ended, the nurses were given 15 minutes to complete the posttests. Time was limited to 15 minutes for the pretests and posttests because of time and budget allotments and because nurses in the pilot testing needed less than 10 minutes to complete each test.

Data Analysis

A paired t test was used to compare the mean of the pretest scores with the mean of the posttest scores (N=41). All nurses who completed the pretest also completed the posttest. A confidence interval was constructed around the mean difference. A t test for independent samples was used to compare the overall percentage of patients who engaged in mobilization activities (dangling, ambulating, or up to a chair) before the educational intervention with the percentage of patients who engaged in mobilization activities after the intervention. A total of 3 separate t tests for independent samples were also used for the percentage of dangling events, ambulation events, and up-to-a-chair events before and after the educational intervention. The number of potential mobility events before the educational intervention was 75. The total number of potential mobility events after the educational intervention was 85. Participants included adult patients in the ICU who were eligible for mobilization activities (those who did not meet exclusion criteria).

Results

Sample

A total of 45 nurses worked on the medical-surgical ICU at the time the educational sessions were implemented. A convenience sample of 41 nurses was used for the knowledge measure, which included all the nurses working in the unit who participated in the progressive mobility education. Any nurse who chose not to participate would have been excluded from the study, but all
### Table 2 Instructional teaching plan: progressive mobility

**Learners:** Registered nurses for MSICU

**Objectives:** At the end of the session, learners will be able to
- State 3 consequences of immobility in ICU patients
- State 3 benefits of early mobility in ICU patients
- Demonstrate how to safely perform mobility activities with ICU patients (range-of-motion exercises, sitting position, Egress test, ambulation)
- Assess patients’ need for mobility and level of mobility a patient is able to participate in (based on patient status and physical therapy notes)
- Acknowledge the importance of working in a team atmosphere to increase mobility for ICU patients

**Instructors**
Facilitator of lecture and discussion group: nurse manager, pilot ICU for progressive mobility protocol
Facilitator of mobility demonstrations, physical therapist, and education coordinator for physical therapy department
(AN ADDITIONAL PHYSICAL THERAPIST TO ASSIST ALL CLASSES, PHYSICAL THERAPY BASED ON AVAILABILITY)

**Equipment**
- PowerPoint projector
- Computer
- Seating in discussion group format
- ICU bed
- Gait belt
- Repositioning slides
- Mechanical aid for standing and raising patients (eg, Sara lift)
- Chair
- Walker

**Time**
2 hours (1 hour lecture/discussion, 1 hour physical therapy demonstration)

**Content Outline**
1. **Introduction: History of ICU care (5 minutes)**
   - Focus on keeping patient alive
   - Lack of concern with long-term effects of sophisticated technology
     - Drugs
     - Mechanical ventilators
     - Monitoring
     - Results
       - Dehumanization of patients
       - Increased healthcare costs
       - 45-50% of patients unable to return home on discharge
       - 49% of ICU patients working at 12 months
       - Persistent weakness and fatigue
       - Poor functional status related to foot drop and large joints

2. **The E of ABCDE: early mobility (5 minutes)**
   - Short-term adverse outcomes of immobility
     - Neurological
       - Delirium
     - Neuromuscular: muscle atrophy
     - Respiratory
     - Cardiovascular
     - Vascular
     - Gastrointestinal
     - Skin
     - Urological
     - Social
     - Psychological
   - Long-term effects on patients’ lives
     - Diminished quality of life
     - Significant functional status limitations
     - Psychological
       - PTSD
       - Depression
       - Anxiety

Continued
### III. Mobility protocol **(30 minutes)**

#### A. Goal
- a. 100% of eligible patients participate in program
- b. Reduce short term adverse effects of current ICU care-immobility
- c. Reduce long-term adverse effects of current ICU care-immobility

#### B. Defining mobility
- a. Physical therapy
- b. “Early” mobility
- c. Various levels of mobility
  - i. Turning
  - ii. Active and passive range-of-motion movements
  - iii. Dangling
  - iv. Sitting position
  - v. Standing
  - vi. Ambulation

#### C. Projected outcomes: decreases in
- a. Incidence of delirium
- b. Overall length of stay
- c. Ventilator days
- d. Infection rates
  - i. Ventilator-associated pneumonia
  - ii. Nosocomial infection markers

#### D. Frequently asked questions
- a. When is patient ready?
  - i. Critical thinking
  - ii. Nurse communication page: physical therapy notes
  - iii. Multidisciplinary round discussion
- b. Do we have enough staff to support this change?
  - i. Team work
  - ii. Culture of unit
- c. How do I prevent injuries?
  - i. Seek help
  - ii. Seek appropriate tools and equipment
  - iii. Pilot unit data from implementation of mobility protocol
    - 1. No falls
    - 2. No tube dislodgments
- d. How do we document?

#### E. Exclusion criteria
- a. Physician’s order for bed rest
- b. Severely unstable hemodynamic status (2 or more vasopressors)
- c. Neuromuscular blockade
- d. End-of-life care
- e. No exclusion is absolute

### IV. The mobility protocol implemented: a success story on pilot unit **(5 minutes)**

#### Questions/discussions **(15 minutes)**

#### V. Demonstration from physical therapists

- A. Assessing patient for mobility **(5 minutes)**
- B. Passive range of motion **(5 minutes)**
- C. Active range of motion **(3 minutes)**
- D. Sitting position/dangling **(15 minutes)**
- E. Standing **(10 minutes)**
  - a. Sara lift
  - b. Sky lift (ceiling lift system)
  - c. Walker
- F. Egress test **(5 minutes)**
- G. Ambulation **(5 minutes)**
- H. Chair **(5 minutes)**
  - i. Return demonstrations/nursing staff participation (remainder of class)

#### Teaching strategies
- PowerPoint lecture and open discussion
- Case study: ICU progressive mobility protocol
- Demonstration

Abbreviations: ICU, intensive care unit; MSICU, medical-surgical intensive care unit.
nurses attending chose to participate. Most of the participating nurses in the pretest-posttest analysis were 26 to 40 years old (59%), were female (78%), had a bachelor of science in nursing degree (56%), had 5 to 10 years of nursing experience (42%), and had less than 5 years of critical care nursing experience (37%; Table 3).

Knowledge
The pretest scores ranged from 25% to 88%, and the posttest scores ranged from 50% to 100%. The mean of the pretest scores was 61%. The posttest scores were significantly higher than the pretest scores \( t = 2.02; P < .001 \). The mean difference between the pretest and the posttest scores was 25 points (95% CI, 20-30).

Behavior
Both the 75 mobility events before the intervention and the 85 mobility events after the intervention were categorized as dangling, up to a chair, or ambulating. Before the educational intervention, 39% of the 75 potential mobility events resulted in some type of mobility activity (dangling, up to a chair, or ambulating). After the educational intervention, 60% of the 85 potential mobility events resulted in some type of mobility activity. The increase in overall mobility (defined as dangling, up to a chair, and ambulating) after the educational intervention was significant \( P = .04 \). Before the intervention, no dangling events were recorded; 36% of the potential mobility events resulted in up to a chair, and 8% resulted in ambulating. After the educational intervention, 13% of the mobility events resulted in dangling. 45% resulted in up to a chair, and 6% resulted in ambulating. The increase in dangling after the educational intervention was significant \( P = .01 \). No significant difference occurred in ambulating \( P = .34 \) or up-to-a-chair activities \( P = .20 \) after the educational intervention (Tables 4 and 5 and the Figure).

---

**Table 3** Pretest/posttest demographics as a percentage of the sample (n = 41)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>% (No. of nurses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td></td>
</tr>
<tr>
<td>&lt; 25</td>
<td>2 (1)</td>
</tr>
<tr>
<td>26-40</td>
<td>59 (24)</td>
</tr>
<tr>
<td>41-55</td>
<td>24 (10)</td>
</tr>
<tr>
<td>≥ 56</td>
<td>15 (6)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>22 (9)</td>
</tr>
<tr>
<td>Female</td>
<td>78 (32)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Associate degree in nursing</td>
<td>37 (15)</td>
</tr>
<tr>
<td>Bachelor’s in nursing</td>
<td>56 (23)</td>
</tr>
<tr>
<td>Master’s in nursing</td>
<td>5 (2)</td>
</tr>
<tr>
<td>Nursing experience, years</td>
<td></td>
</tr>
<tr>
<td>&lt; 5</td>
<td>17 (7)</td>
</tr>
<tr>
<td>5-10</td>
<td>42 (17)</td>
</tr>
<tr>
<td>11-20</td>
<td>15 (6)</td>
</tr>
<tr>
<td>&gt; 20</td>
<td>27 (11)</td>
</tr>
<tr>
<td>Critical care experience, years</td>
<td></td>
</tr>
<tr>
<td>&lt; 5</td>
<td>37 (15)</td>
</tr>
<tr>
<td>5-10</td>
<td>34 (14)</td>
</tr>
<tr>
<td>11-20</td>
<td>7 (3)</td>
</tr>
<tr>
<td>&gt; 20</td>
<td>22 (9)</td>
</tr>
</tbody>
</table>

**Table 4** Preeducational mobilization as a percentage of the sample (n = 75)

<table>
<thead>
<tr>
<th>Day</th>
<th>Total events</th>
<th>Dangling</th>
<th>Ambulating</th>
<th>Up to a chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (n = 8)</td>
<td>5 (4)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>5 (4)</td>
</tr>
<tr>
<td>2 (n = 10)</td>
<td>8 (6)</td>
<td>0 (0)</td>
<td>3 (2)</td>
<td>8 (6)</td>
</tr>
<tr>
<td>3 (n = 7)</td>
<td>4 (3)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>4 (3)</td>
</tr>
<tr>
<td>4 (n = 7)</td>
<td>4 (3)</td>
<td>0 (0)</td>
<td>4 (3)</td>
<td>3 (2)</td>
</tr>
<tr>
<td>5 (n = 8)</td>
<td>3 (2)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>3 (2)</td>
</tr>
<tr>
<td>6 (n = 7)</td>
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<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (1)</td>
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<tr>
<td>7 (n = 9)</td>
<td>3 (2)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>3 (2)</td>
</tr>
<tr>
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<td>7 (5)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>7 (5)</td>
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<tr>
<td>9 (n = 10)</td>
<td>4 (3)</td>
<td>0 (0)</td>
<td>1 (1)</td>
<td>3 (2)</td>
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</table>

**Table 5** Posteducational mobilization as a percentage of the sample (n = 85)

<table>
<thead>
<tr>
<th>Day</th>
<th>Total events</th>
<th>Dangling</th>
<th>Ambulating</th>
<th>Up to a chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (n = 7)</td>
<td>6 (5)</td>
<td>0 (0)</td>
<td>2 (2)</td>
<td>4 (3)</td>
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<tr>
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<td>1 (1)</td>
<td>0 (0)</td>
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<tr>
<td>3 (n = 9)</td>
<td>4 (3)</td>
<td>0 (0)</td>
<td>1 (1)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>4 (n = 11)</td>
<td>6 (5)</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>5 (4)</td>
</tr>
<tr>
<td>5 (n = 2)</td>
<td>11 (9)</td>
<td>2 (2)</td>
<td>0 (0)</td>
<td>8 (7)</td>
</tr>
<tr>
<td>6 (n = 12)</td>
<td>9 (8)</td>
<td>2 (2)</td>
<td>0 (0)</td>
<td>7 (6)</td>
</tr>
<tr>
<td>7 (n = 13)</td>
<td>9 (8)</td>
<td>4 (3)</td>
<td>1 (1)</td>
<td>7 (6)</td>
</tr>
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<td>8 (n = 6)</td>
<td>6 (5)</td>
<td>2 (2)</td>
<td>0 (0)</td>
<td>5 (4)</td>
</tr>
<tr>
<td>9 (n = 11)</td>
<td>8 (7)</td>
<td>0 (0)</td>
<td>1 (1)</td>
<td>7 (6)</td>
</tr>
</tbody>
</table>
Discussion

Our results suggest that the educational intervention was effective in increasing nurses’ knowledge about the dangers of immobility and the importance of mobility in ICU patients. The mean posttest scores increased by 25 points (95% CI, 20-30), suggesting that 95% of ICU nurses would score 20 to 30 points higher on the posttest after receiving this educational intervention. Although the intervention was effective in increasing the nurses’ knowledge, the overall goal of the education was to effectively implement mobility in the ICU. After the educational intervention, the number of patients on the unit engaged in mobilization activities increased significantly, suggesting that the education may have led to a behavioral change in the way nurses were mobilizing their patients. However, 1 goal of the mobilization protocol was that all patients who met inclusion criteria for mobilization receive some level of mobility intervention besides “turning.” This goal was not reached. Before the intervention, the mean percentage of patients involved in mobilization activities was 39%. After the intervention, the mean was 60%. Interestingly, the only specific mobility activity that increased was dangling. Dangling is often performed to evaluate whether a patient will be able to continue on to other mobility activities.47 Perhaps the increase in dangling can be attributed to the increased awareness of nurses of the need for mobility among ICU patients; the nurses may have increased efforts to mobilize patients they may not have been willing to mobilize before the education.

The lack of a significant increase in ambulating and getting up to a chair might be due to time constraints on nurses. About the same time the mobility protocol was implemented, other initiatives were taking place, including incorporation of the Confusion Assessment Method for the Intensive Care Unit to assess patients for delirium, the incorporation of a care bundle to prevent and treat delirium, and changes in the time sedation holidays were taking place. Nurses on the unit commonly said that they did not think they had the time or resources to mobilize their patients safely. Nurses may have decided not to progress patients past dangling (to ambulation or getting up to a chair); rather, they chose the activity that required the least amount of time (instead of the most appropriate mobility activity for the patient). In addition, nurses may have been afraid to engage patients in more activity because of a lack of experience in mobilizing critically ill patients, as indicated by the nurses’ increase in knowledge but no change in behavior. Additionally, some patients who were able to dangle may not have been appropriate candidates for ambulating or getting up to a chair.

Relationship to Other Evidence

Our findings are similar to those of Fitzgibbon42 in a study on staff education. She found an increase in staff members’ knowledge of “concepts of early mobility” and an increase in range-of-motion activities. Little research is available that specifically addresses the effects of staff education on mobility in the ICU.

Limitations

Several limitations of the survey tool might limit the validity of our results. The tool consisted solely of items at the low recognition-recall cognitive level rather than synthesis or application, and the tool was not tested for reliability or validity. Without reliability or
Although education may influence change for patients’ mobility in the ICU, leadership and coaching are necessary agents to ensure the successful implementation of a mobility program. In sum, the items in this brief test were not well developed or significantly reliable. Furthermore, the increase in the posttest scores might have been related to the phenomenon of testing (effects of taking a pretest on the performance on a posttest). Directly before the pretest, nurses were able to ask questions about mobilizing patients but did not receive any feedback after completion of the posttest. In order to best facilitate the nurses’ understanding of the education and a subsequent change in the way they mobilize their patients, feedback after the test might have been helpful. However, coaching and additional education have been ongoing on the unit.

Changes in mobility might have been related to factors other than the educational intervention. The mobility education was implemented directly before the mobility program was launched on the unit. Some of the changes in mobilization efforts may have been related to the implementation of the mobility protocol itself. Possibly some nurses began mobilizing more patients because a new protocol directed the nurses to do so. In addition, nurses might have begun mobilizing patients more often because the nurses noticed other nurses mobilizing patients.

Another limitation was that the educational intervention allowed for demonstration of mobility skills rather than actual physical practice. Adults tend to learn in the context of the task being taught6; although some nurses had the opportunity to participate in mobility activities in the simulated classroom setting, many did not. None of the nurses had the opportunity to gain experience with the mobility activities with actual patients during the educational intervention. This lack of practice and verification of correct performance in mobilizing real critical care patients may have contributed to an increase in dangling and in the decrease in ambulating patients after the implementation of the educational intervention. Without this experience and feedback, the nurses might not have mobilized patients optimally.

The education also addressed documentation of mobility. Some of the change in mobility may have actually been related to a change in the way nurses were recording their mobility efforts. If so, the change would only reflect a change in behavior in nurses’ documentation practices, not an increase in true mobility.

**Interpretation**

Education is an essential element of implementing a mobilization program in the ICU. Mobility education should be designed to help nurses overcome barriers and understand the risks of immobility and the advantages of mobilization of critically ill patients. Our results indicate that education can be an effective strategy to increase nurses’ knowledge about mobility and may change the way nurses mobilize their patients. This model of education could be used to facilitate the successful implementation of an ICU mobilization program.

**Conclusions**

The original educational intervention and protocol were implemented in 2012. Since the original implementation, several changes to the education and protocol have been made. The education used in this project continues to be used for new ICU nurses during orientation in this medical-surgical ICU and in 4 other ICUs in the hospital. The education is now presented to smaller groups and has been tailored for less experienced nurses. The hands-on demonstration part of the education is no longer presented in the classroom; new nurses participate in mobilizing patients with an experienced nurse during orientation of the new nurses.

One year after the mobility protocol had been implemented, 2 full-time employee positions were created to improve mobility of patients on the unit. Certified nursing assistants were hired to fill the roles of mobility technicians; the mobility technicians cover 2 medical-surgical ICUs and follow patients to step-down units to extend mobility beyond the ICUs. More research on this quality improvement project might provide insight into the cost-effectiveness of additional nursing staff specifically designated to patients’ mobility.

Mobility should be a nursing priority of care for critically ill patients. Designing mobility education to facilitate nurses’ understanding of the adverse effects of immobility and the beneficial effects of early mobility
and to help nurses overcome perceived barriers to mobility is important. Education can increase ICU nurses’ understanding of the overall importance of mobility and can motivate change in mobility efforts. Although education may influence change for patients’ mobility in the ICU, leadership and coaching are necessary agents to ensure the successful implementation of a mobility program. Peer coaching, an adjunct to staff development, has been defined as a mutually beneficial partnership between practitioners of similar experience who have participated in staff development training and have a desire to incorporate new skills and knowledge into practice.48,49 Esteban et al22 found an increase in the mean number of mobility events led by nursing staff after implementation of a “mobility champion,” a staff nurse interested in professional development and early mobility on the nurse’s unit. Additional research on the effects of leadership and coaching would provide valuable information to better guide the implementation of mobility protocols in ICUs. CCN

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Financial Disclosures
None reported.

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References


Facts

Nurses are often the key providers of mobility for patients who are critically ill. Barriers to mobility in the intensive care unit (ICU) include, but are not limited to, clinicians’ fear and lack of knowledge; competing priorities, with a lack of emphasis on patients’ mobility; current ICU culture of mobility; the limited view of how much mobility a critically ill patient is capable of; sedation and delirium; lack of staff and equipment; and risk of self-injury of patients. Staff education on these issues must be effective for successful mobility in the ICU.

• An educational intervention was planned for a medical-surgical ICU, where a new mobility protocol was being implemented. The aim of this project was to increase mobility of patients on the unit and to determine how providing education to ICU staff nurses about a progressive mobilization program affected their subsequent knowledge base and patient care practices.

• Mobility education should be designed to help nurses overcome barriers and understand the risks of immobility and the advantages of mobilization of critically ill patients.

• On the basis of research and because mobility of patients was not a part of the culture on the unit, the educational intervention was designed to address obstacles to mobility of critically ill patients, benefits of mobility in these patients, and how to mobilize critically ill patients.

• The educational sessions consisted of a didactic classroom presentation with a focus on evidence-based benefits of and barriers to mobility and adverse effects of immobility in critically ill patients.

• A physical therapist educator and a physical therapist demonstrated simulations of range-of-motion exercises, dangling, the Egress test (a simple screening tool to predict safety of transfer of bariatric patients), transferring to a chair, and use of assistive devices.

• The educational sessions were interactive, allowing the nurses to participate by presenting their own experiences, concerns, and questions and to acquire hands-on experience in the mobility demonstrations.

• After the educational intervention, the number of patients on the unit engaged in mobilization activities increased significantly, suggesting that the education may have led to a behavioral change in the way nurses were mobilizing their patients.

• Our results indicate that education can be an effective strategy to increase nurses’ knowledge about mobility and may change the way nurses mobilize their patients. This model of education could be used to facilitate the successful implementation of an ICU mobilization program.

• Although education may influence change for patients’ mobility in the ICU, leadership and coaching are necessary agents to ensure the successful implementation of a mobility program. Additional research on the effects of leadership and coaching would provide valuable information to better guide the implementation of mobility protocols in ICUs. CCN
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End-of-Life Care

Overcoming Barriers to Palliative Care Consultation

Kathleen Ouimet Perrin, RN, PhD, CCRN
Mary Kazanowski, PhD, APRN, ACHPN

Palliative care consultations for patients with life-threatening illnesses provide benefits for the patients and their families as well as for the health care team. Patients have better quality of life and live longer but cost the health care system less. Still, many patients are not offered the opportunity to receive a palliative care consultation. Barriers to palliative care consultation for patients in critical care units include misunderstandings about palliative care and not having agreed upon criteria for referral. Critical care nurses can assist in overcoming these barriers. (Critical Care Nurse. 2015;35[5]:44-52)

In 1995, the SUPPORT study\(^1\) revealed that health care providers had difficulty determining when critically ill patients were approaching the end of life. Because of this difficulty, many patients died in pain after life-prolonging procedures that the patients would not have wanted. More recently, Curtis et al\(^2\) concluded that health care providers still have difficulty determining when patients may be dying and are often unaware of or have difficulty in communicating about patients’ preferences for end-of-life care. Thus, patients still experience the use of unwanted life-sustaining therapies and poor quality of life at the end of life. Moreover, Zhang et al\(^3\) confirmed that patients who received any life-prolonging procedure in the patients’ last week of life or of a stay in the intensive care unit (ICU) had significantly worse quality of life than did patients who did not receive such care.

This article has been designated for CE credit. A closed-book, multiple-choice examination follows this article, which tests your knowledge of the following objectives:

1. Identify barriers to obtaining palliative care consultation within a critical care environment
2. Describe strategies to overcome barriers to obtaining palliative care consultation
3. Recognize the benefits of early initiation of palliative care consultation

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Palliative care is an approach that improves the quality of life of patients and their families facing the problem associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial, and spiritual.

Many patients in the United States die each year after use of unwanted therapies. In a study published in 2004, Angus et al found that 22% of deaths of hospitalized patients (about 540,000 patients) followed admission to an ICU. Nelson et al noted that although some progress has been made, the problem is increasing because of the number of older adults with chronic health problems that can cause life-threatening illnesses. In light of this information, one might think that critically ill patients would receive palliative care consultations early in the patients’ admission. The reality, however, is that “widespread adoption of palliative care services appears to be slow.”

The World Health Organization definition of palliative care is shown in the Sidebar. Palliative care was developed in response to the need for individuals with life-threatening illnesses to receive state-of-the-art management of signs and symptoms, to have improved communications with the health care team, and to alleviate some of the strain on the individuals’ caregivers. The care has evolved into a service that provides psychological, spiritual, goal-setting, and decision-making support to patients with life-threatening illnesses and the patients’ families. Unlike hospice care, palliative care is appropriate early in the course of illness, and patients can have concomitant treatment for their illness, including therapies intended to prolong life. Table 1 provides important evidence-based benefits of palliative care for patients in critical care units.

### Misunderstandings as a Barrier to Palliative Care Consultation

Despite the clear, established benefits of early initiation of palliative care for critically ill patients, palliative care is not being implemented until late in patients’ illnesses. One of the most common barriers to obtaining a palliative care consultation is misunderstandings about the care among health care providers and patients’ family members. The primary misconception is the idea that palliative care is appropriate solely for patients near death. Many health care providers, patients, and patients’ families do not recognize that palliative care should not be separate from standard care and that it can and should be incorporated into critical care. Health care providers often think that caring for a patient’s signs and symptoms in some way undermines the larger goal of trying to save the patient’s life. They may think that palliative care is not what critical care is about. Some physicians think that introducing palliative care means that they must “give up” trying to cure their patients, something that they are unwilling to do because their patients might die sooner.

### Authors

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### Table 1 Evidence-based benefits of palliative care consultation

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Definition</th>
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<tbody>
<tr>
<td>When the dying process is detected earlier, comfort-focused treatment</td>
<td>The dying process is detected earlier, comfort-focused treatment goals</td>
</tr>
<tr>
<td>are initiated sooner; when appropriate, patients are moved to lower</td>
<td>are initiated sooner; when appropriate, patients are moved to lower</td>
</tr>
<tr>
<td>intensity care sites</td>
<td>intensity care sites</td>
</tr>
<tr>
<td>Length of stay in the intensive care unit is decreased for adult</td>
<td>Length of stay in the intensive care unit is decreased for adult</td>
</tr>
<tr>
<td>patients</td>
<td>patients</td>
</tr>
<tr>
<td>Cost of care is reduced without an increase in mortality</td>
<td>Cost of care is reduced without an increase in mortality</td>
</tr>
<tr>
<td>because realistic goals are established and appropriate level of care</td>
<td>because realistic goals are established and appropriate level of care</td>
</tr>
<tr>
<td>is attained</td>
<td>is attained</td>
</tr>
<tr>
<td>Staff receive support in challenging and emotionally draining</td>
<td>Staff receive support in challenging and emotionally draining</td>
</tr>
<tr>
<td>or morally distressing situations involving patients and patients’</td>
<td>or morally distressing situations involving patients and patients’</td>
</tr>
<tr>
<td>families</td>
<td>families</td>
</tr>
<tr>
<td>Need for subsequent admissions to the intensive care unit is</td>
<td>Need for subsequent admissions to the intensive care unit is</td>
</tr>
<tr>
<td>reduced because treatment goals have been clarified</td>
<td>reduced because treatment goals have been clarified</td>
</tr>
<tr>
<td>Patients have continuity of care when they move from the intensive</td>
<td>Patients have continuity of care when they move from the intensive care</td>
</tr>
<tr>
<td>care unit to another environment because the palliative care team</td>
<td>care unit to another environment because the palliative care team</td>
</tr>
<tr>
<td>follows the patient</td>
<td>follows the patient</td>
</tr>
</tbody>
</table>

*a Based on information from Campbell et al.

**Table 1** Evidence-based benefits of palliative care consultation

When the dying process is detected earlier, comfort-focused treatment goals are initiated sooner; when appropriate, patients are moved to lower intensity care sites. Length of stay in the intensive care unit is decreased for adult patients. Cost of care is reduced without an increase in mortality because realistic goals are established and appropriate level of care is attained. Staff receive support in challenging and emotionally draining or morally distressing situations involving patients and patients’ families. Need for subsequent admissions to the intensive care unit is reduced because treatment goals have been clarified. Patients have continuity of care when they move from the intensive care unit to another environment because the palliative care team follows the patient.
physicians that they alone should provide total care to their patients,5,13 that they already provide good palliative care themselves,13 and a lack of knowledge among many health care providers about the extent and variety of palliative care services available at their institutions.13

These barriers can be overcome with education about and experience with palliative care. One way to overcome misinformation is with evidence. Approximately a quarter of patients die after critical care admission,6 so end-of-life care cannot be ignored and should be an important component of critical care. However, initiation of palliative care does not just improve end-of-life care. Festic et al13 found that palliative care with good management of signs and symptoms actually improves patient outcomes. Snow et al6 discovered that physicians who referred patients frequently for palliative care were aware that the options and the amount of time palliative care specialists brought to management of a patient’s signs and symptoms resulted in better patient outcomes. Currently, 67% of health care institutions have palliative care teams, so most hospitals do offer some services.6 However, the services provided vary from region to region and hospital to hospital.6 Nurses interested in palliative care can circulate accurate information about palliative care in general, but more importantly can make certain that information about palliative care at their specific institution is readily accessible in the critical care unit.

Difficulty Initiating a Palliative Care Discussion as a Barrier to Palliative Care

Providing knowledge about the necessity and efficacy of palliative care in critical care is only overcoming the first barrier. The second and perhaps more marked barrier to initiation of palliative care is the difficulty that some health care providers experience when attempting to introduce the idea of palliative care to patients and patients’ families. Even though physicians may state that they have experience in dealing with patients with life-threatening illnesses, the physicians can experience moderate anxiety when providing such care.15 This anxiety may make them uncomfortable or unwilling to broach the idea of a palliative care consultation with a patient or a patient’s family.11 Aslakson et al11 found that when surgeons attempted to open discussions about palliative care with patients, the discussions were often quick, inadequate, and ineffective.

A variety of strategies have been suggested to overcome the reluctance of health care providers to initiate discussions about palliative care. C. L. Mulkerin stated in a roundtable discussion5 that “critical care providers can be proud and protective of the work they are doing and hesitant to initiate a consultation.” Therefore, he recommended integrating palliative care consultation automatically into critical care. In order to accomplish this integration, Weissman and Meier16 advocate the use of evidence-based triggers for initiation of palliative care. The use of triggers, preferably refined as a checklist developed specifically for each critical care unit, provides an objective basis for determining the time to begin a conversation about palliative care.26,19 Waiting until a reluctant health care provider is ready to request consultation is no longer necessary. Using a list of standardized criteria or triggers for palliative care consultation can increase consultation rates from 41% to 82% and reduce 30 day rehospitalizations from 36% to 17%.20

Table 2 provides a list of general criteria for palliative care consultation for anyone with a life-threatening illness and a list of evidence-based triggers for critical care patients. Weissman and Meier16 state that the most important of these criteria is whether the health care provider thinks the patient will die in the next year. When a health care provider answers that question positively, 85% of the time the patient does die within a year and most likely would have benefitted from palliative care. Both of the lists are fairly general, and neither is meant to be adopted as a checklist. Instead, the Improving Palliative Care in the ICU Advisory Board recommends that each critical care unit use the criteria to develop a list of triggers specific for the unit.20

Cultural Issues as Barriers to Palliative Care Consultations

Another barrier to palliative care consultation is culture—both the culture of the unit and the culture of the patient and the patient’s family. The consultation needs to be customized to the particular ICU and sensitive to the culture of the critical care unit. According to Friedenberg et al,22 a technological imperative exists in some ICUs, leading to staff members’ unrealistic expectations about the results of care. The emphasis on using technology to rescue a patient each time a new complication
develops is more common in surgical ICUs, where the focus may be on treating everything and, rarely, if ever, acknowledging that a patient may die. In one study, a majority of surgeons thought they had contracted informally with patients preoperatively, explaining to the patients that the surgeons would decline to operate if the patients wanted to limit postoperative life-supporting treatments. Routine use of triggers for palliative care consultation might result in strained relationships between health care providers in the postoperative period, especially if the surgeons do not have an accurate understanding of palliative care.

A patient and the patient’s family may also have culturally based misconceptions about palliative care or they may not understand what is happening to the patient. Families may be confused and see the “small steps” the patient makes as real progress, and therefore develop false hope. They may be unwilling to acknowledge that the illness is life threatening and may not want to communicate with health care providers who mention that possibility. Or, a patient or the patient’s family may not be able to formulate questions because of a lack of knowledge (including medical terms and jargon), cultural misunderstandings, or the overwhelming number of professionals from various multidisciplinary teams who speak with them. These communication difficulties have been cited as reasons to avoid initiating palliative care consultations.

In truth, rather than being a barrier, culturally based misconceptions should actually be indications for consultation. O’Mahony et al studied requests for palliative care consultations in a culturally diverse, critically ill population of patients. The authors found that early involvement of the palliative care advanced practice nurse allowed for more discussion about the concerns of patients and the patients’ families and lessened misconceptions on the part of the families about the medical team’s intent to withdraw life-prolonging treatments. This early involvement allowed the health care team to focus on the needs of patients and patients’ families and provided patients and patients’ families time for closure. Patients’ families clearly benefited from this intervention, experiencing less posttraumatic stress after the hospitalization.

### Role of Critical Care Nurses in Overcoming Barriers to Palliative Care Consultations

Critical care nurses need to be involved in overcoming the barriers to palliative care consultation for their patients so that patients’ suffering is decreased and patient outcomes are enhanced. However, nurses also need to be involved because the nurses themselves experience high levels of stress related to end-of-life decision making. As many as 45% of nurses have considered leaving a position because of moral distress. Being involved in decision
making rather than merely enacting the results can limit nurses’ moral distress.

Approaches to palliative care decision making that rely on the involvement of nurses have been successful in advancing palliative care for critically ill patients. Examples include attendance of a palliative care nurse practitioner at daily multidisciplinary rounds to address the appropriateness of patients for palliative care consultation,23 daily pre-rounding with nurses to identify patients at risk for poor outcomes who might benefit from a consultation,24 and requiring consultation when specific hospital-identified criteria for palliative care consultation are met.18

A common thread identified in strategies that led to successful integration of palliative care into critical care was the presence of nurse or nurse practitioner champions. These nurses were generally well known and respected in the specific critical care environment and were compelling advocates for palliative care consultations. Nurses who were palliative care champions advocated for consultation based on specific criteria (triggers) and were engaged in regular meetings with staff during which they elicited feedback about the effects of the palliative care intervention. The exchange of information and concerns among health care providers and the involvement of primary care nurses were critical to the success of strategies that routinely integrated the consultation into critical care.

To overcome barriers to palliative care consultation, critical care nurses need to be champions for palliative care on the policy level of both the hospital and the unit and on the level of individual patients. On the policy level, nurses should ask to be included in the group that develops unit-specific criteria for critical care consultation. The advisory board of Improving Palliative Care in the ICU (ICU)20 recommends using published criteria (eg, those listed in Table 2) in conjunction with hospital-specific data (eg, mean ICU length of stay for patients who survive) to develop each unit-specific criterion. Mirel and Hartjes25 have described the process that nurse leaders used to develop a set of triggers for 1 unit.

Once the criteria have been identified, a decision must be made about how they will be used.20 Will they be displayed on the computerized record? If so, who will complete the documentation and who will view it? Or, as described for successful strategies earlier, will discussion about the palliative care criteria be part of daily patient care rounds so that all members of the care team can be involved in the discussion? Finally, when the criteria are met, does that mean that the patient is automatically referred to the palliative care team? If so, does the critical care team or the palliative care team make the initial overture about palliative care to the patient and the patient’s family? Nurses should be involved in making these decisions.

Nurses also need to be involved in determining and documenting the outcomes of palliative care consultations. In a round table discussion,5 K. Puntillo argued that focusing on the outcome of adequate management of signs and symptoms and emphasizing the wide variety of signs and symptoms that critically ill patients experience in addition to pain can help advance palliative care consultations. Palliative care consultants have more experience and additional strategies to deal with the physical signs and symptoms of fatigue, thirst, nausea, anxiety, depression, and delirium as well as the pain that critically ill patients experience. Critical care nurses can recognize when signs and symptoms persist and advocate for palliative care consultation. Nurses see not only when their patients are experiencing persistent pain or delirium but also when the patients are experiencing any of the myriad of other physical signs or symptoms or emotional and spiritual pain common in the critically ill. Reminders that these issues have not been sufficiently addressed during multidisciplinary rounds can help the health care providers realize that a patient and the patient’s family need more support than the critical care team can provide. Once a palliative care consultation has improved quality of life for a patient and/or the patient’s family, the improvement should be conveyed through documentation in the medical record and by reporting to the critical care team. Doing so may make the critical care team aware of the array of strategies that a palliative care consultation can bring to relief of signs and symptoms, thus increasing the likelihood of future consultations.5

Finally, nurses can work with the palliative care team to ensure that a consistent message is conveyed. Patients and their families recall feeling supported when they were told by palliative care specialists and nurses. We promise we will work with you to manage your signs and symptoms, and we will stay with you. We can set goals...
Mr Smith, a 75-year-old man, was admitted to the critical care unit because of respiratory failure associated with exacerbation of chronic obstructive pulmonary disease (COPD) and a history of systolic heart failure. His last documented ejection fraction was 15%. This admission is the patient’s third one related to COPD in the past 6 months. He is given intravenous diuretics, intravenous steroids, and nebulized bronchodilators and is started on bilevel positive airway pressure, but he remains tachypneic, with oxygen saturations hovering at 85%. He is a full-code, and his wife states that he “wants everything done.”

The nurse caring for Mr Smith recognizes that the COPD and congestive heart failure (CHF) are progressive and life-threatening diseases that at some point most likely will lead to his death. Intubation and mechanical ventilation may soon be necessary, and, indeed, he may recover from this event. But what will recovery look like? And what would Mr Smith like recovery to look like?

The nurse is concerned that Mr Smith and his wife may not understand all the implications of “doing everything” for a patient with advanced disease. The nurse suggests a palliative care consultation, but the pulmonologist says, “He’s not dying.”

The critical care nurse replies that palliative care consultations are not meant solely for patients near death. The consultations are also appropriate for patients with life-threatening illnesses, who may die during the next year. She mentions how a trigger system (which has indicated that Mr Smith is an appropriate patient for palliative care) helps identify patients who would benefit from these consultations, and she mentions her concerns that Mr Smith and his family may not understand the severity of his illness and may not understand what “doing everything” means. Last, she reminds the physician that this patient has had 3 hospital admissions in the preceding 6 months for COPD.

After being asked for a consultation, the palliative care provider and counselor meet with Mr Smith and his wife. Encouraging Mr and Mrs Smith to tell their story is the strategy the palliative care team uses to convey the team’s willingness to help as well as to learn about the couple’s values and beliefs and what is important to them. The team also assesses perceptions of Mr Smith and his wife about Mr Smith’s illness, the progression of COPD/CHF, and their emotional and cognitive ability to receive sensitive information. Mr Smith states that he has not been able to leave his home for several months because of shortness of breath and weakness, and he knows he is “getting sicker.” He says he is “tired of fighting” and just wants to “go home.” When Mrs Smith is asked what is most important to her, she replies “for my husband to live.” She breaks down and says she is “so afraid of losing him.”

Acknowledging Mrs Smith’s fear at this time is important because display of empathy by a health care provider can help patients work through their emotions so that they can begin to process information. With an appropriate pause and assessment of the ability of Mr and Mrs Smith to continue the discussion, the palliative provider might say, “I’m hearing that you want him to keep fighting (looking at Mrs Smith) and that you are getting tired of the fight (looking at Mr Smith).”

When Mr and Mrs Smith are ready, the team could discuss the progression of advanced COPD/CHF with them as well as different options for treatment based on the couple’s goals. A goal to live as long as possible (ie, quantity of life) would coincide with a plan including intubation and ventilation. A goal to focus on quality would look more like care at home, with a primary emphasis on managing Mr Smith’s signs and symptoms of shortness of breath and helping him remain at home. However, in both scenarios, the palliative care team would provide continuity of care as Mr Smith made transitions in his health care and would assist with management of his dyspnea and fatigue.

Patients’ decisions after palliative care consultations are not predictable. But research indicates that the consultations help patients maximize quality of life, improve management of signs and symptoms, and in some instances may help patients live longer. Palliative care also reduces costs to hospitals and health care systems.

Patients’ values and preferences into the plan of care as indicated in the Case Study. Table 3 summarizes barriers to critical care consultation and suggests some strategies that critical care nurses can use to overcome those barriers.
**Table 3** Barriers to palliative care consultation and strategies to overcome barriers

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misunderstandings</td>
<td>Nurses can educate other health care providers about what palliative care provides critically ill patients. They can implement principles of palliative care into critical care standards and curricula, emphasizing early discussion of goals of care with patients and families.</td>
</tr>
<tr>
<td>Palliative care undermines the focus of saving the patient’s life</td>
<td>Nurses can emphasize to families and other health care providers that the symptom management skills that palliative care specialists bring to care of a patient improves patients’ outcomes.12</td>
</tr>
<tr>
<td>A palliative care specialist is not needed to provide good palliative care</td>
<td>Nurses can emphasize to other health care providers that palliative care providers have more time and more options for symptom management to offer patients with life-threatening illnesses, a situation that improves the quality of care.23</td>
</tr>
<tr>
<td>Difficulties in initiation of palliative care consultations</td>
<td>Nurses can advocate for development and use of specific criteria (triggers) that require a palliative care consultation be obtained for patients.</td>
</tr>
<tr>
<td>Cultural and communication issues</td>
<td>Nurses need to ascertain if other health care providers understand what palliative care has to offer patients and to ask surgeons to explain any preoperative agreements the surgeons made with their patients about life-sustaining treatments.</td>
</tr>
<tr>
<td>Patients and their families may not understand when life-prolonging interventions are no longer capable of curing the patient</td>
<td>Nurses can work with other health care providers to ensure that a consistent message is provided to the patient and the patient’s family.</td>
</tr>
</tbody>
</table>

**Conclusion**

Barriers to palliative care consultation for critical care patients include misunderstandings about palliative care and a lack of agreed-upon criteria for referral to palliative care. Critical care nurses can help overcome these barriers by ensuring that other health care providers, patients, and patients’ families understand the services that palliative care provides and the benefits it brings to patients and families. These benefits include early initiation of comfort-focused treatment goals, decreased length of stay, reduction in cost of care without an increase in mortality, and continuity of care. Critical care nurses can also promote palliative care by working with other health care providers to develop unit-specific criteria for patient referral and by ensuring that appropriate patients receive referral. When nurses provide feedback to the critical care team about the benefits of palliative care and consistently advocate for it, palliative care is more likely to be integrated into critical care. When they can do all these things consistently, critical care nurses can become champions for palliative care. CCN

Financial Disclosures

None reported


**References**


CE Test  Test ID C1552: Overcoming Barriers to Consultation on Palliative Care

Learning objectives: 1. Identify barriers to obtaining palliative care consultation within a critical care environment 2. Describe strategies to overcome barriers to obtaining palliative care consultation 3. Recognize the benefits of early initiation of palliative care consultation

1. Which of the following is a barrier to obtaining palliative care consultation?
   a. The additional cost of the palliative care consult
   b. The lack of insurance coverage for the palliative care consult
   c. The misconception that palliative care is only for patients who are near death
   d. The requirement of needing an advanced directive with a designated health care agent

2. What percentage of health care institutions has palliative care teams currently?
   a. 25%  b. 48%  c. 67%  d. 88%

3. Which of the following statements best describes the difference between hospice care and palliative care?
   a. Hospice care provides support to families, whereas palliative care supports the patient.
   b. Palliative care can include therapies to prolong life, whereas hospice care does not.
   c. There is no difference between hospice care and palliative care except for the language that is used.
   d. Palliative care is most appropriate within the last few weeks of life, whereas hospice care is appropriate at any time during an illness.

4. What percentage of nurses has considered leaving a position because of moral distress?
   a. 18%  b. 24%  c. 45%  d. 62%

5. Recommendations from the Improving Palliative Care in the ICU Advisory Board include which of the following?
   a. Apply a universal checklist to determine if palliative care consultation is warranted.
   b. Automatic palliative care consultation for every critical admission that has a length of stay longer than 6 days.
   c. Required palliative care consultation for every patient who survives a cardiac arrest.
   d. Individual critical care units should develop a list of triggers for consultation that are specific to their unit.

6. Benefits of early palliative care consultation include which of the following?
   a. Increased engagement for bedside nurses
   b. Reduction in cost of care without increased mortality
   c. Decreased psychosocial stressors for the patient
   d. Improved patient compliance upon discharge from critical care

7. Which of the following was identified as a common thread to the successful integration of palliative care into critical care?
   a. Financial support from administrators
   b. The presence of nurse champions
   c. Involvement from a spiritual care team
   d. Physician-led initiatives to increase consultation

8. Which of the following is a cultural barrier to initiating a palliative care consult in the critical care unit?
   a. Many staff believes that palliative care consultation is unnecessary.
   b. Time limitations within the critical care unit culture prevent palliative care consultation.
   c. Unrealistic expectations of staff that they can rescue all patients with the use of advanced technology.
   d. Palliative care consultation is not aligned with treatment plan goals within critical care.

9. Which of the following is a culturally based barrier to palliative care consultation that is related to patients and families?
   a. Many cultures do not accept palliative care practices.
   b. Language barriers prevent effective communication of the treatment plan.
   c. Families may be unwilling to acknowledge that an illness is life threatening.
   d. Patients perceive that they will not be able to continue their religious practices with palliative care.

10. Nurse involvement in the palliative care decision-making process can lead to which of the following?
    a. Improved staff retention
    b. Decreased moral distress
    c. Increased employee engagement
    d. Reduced staff absentee rates

11. Which of the following statements best explains why documentation of palliative care consultation outcomes is important?
    a. To receive adequate reimbursement for services.
    b. To justify the need for a palliative care team within the critical care unit.
    c. To educate the critical care team to increase the likelihood of future consultations.
    d. To obtain support from administration to increase funding for palliative care nurses.

12. Advantages of using an evidenced-based checklist for palliative care consultation include which of the following?
    a. Having an objective basis for determining when the consult should occur
    b. Reducing health care provider anxiety about approaching families to discuss palliative care
    c. Conserving documentation time for critical care nurses
    d. Improving the mortality rate within the critical care unit

Test answers: Mark only one box for your answer to each question. You may photocopy this form.

1. a  2. a  3. a  4. a  5. a  6. a  7. a  8. a  9. a  10. a  11. a  12. a

Test ID: C1552: Overcoming Barriers to Consultation on Palliative Care
Form expires: October 1, 2018  Contact hours: 1.0   Pharma hours: 0.0   Fee: AACN members, $0; nonmembers, $10  Passing score: 9 correct (75%)
Synergy CERP Category B  Test writer: Jodi Berndt, Ph.D, RN, CCNR, PCNS, CNE

For faster processing, take this CE test online at www.ccnonline.org or mail this entire page to: AACN, 101 Columbia Aliso Viejo, CA 92656.

The American Association of Critical-Care Nurses is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center’s Commission on Accreditation. AACN has been approved as a provider of continuing education in nursing by the State Boards of Nursing of California (#01036) and Louisiana (#ABN12). AACN programming meets the standards for most other states requiring mandatory continuing education credit for relicensure.
Children born with a single functioning ventricle (inclusive of hypoplastic left heart syndrome) face a lifelong illness that requires multiple critical care admissions. Univentricular anatomy refers to any congenital cardiac malformation where one ventricle is hypoplastic or absent. These defects create complicated physiological states and require staged, palliative interventions that alter hemodynamics. Medical, surgical, and nursing interventions for single-ventricle circulation involve supporting adequate tissue oxygen delivery and optimizing the performance of the single functioning ventricle. This series of articles is a result of collaboration of advanced practice nurses affiliated with the Pediatric Cardiac Intensive Care Society. The goal of this series of articles is to describe various physiological states, medical and surgical management, and nursing care across the lifespan of patients with a single ventricle.

Terra Lafranchi, RN, MSN, NP-C
Patricia Lincoln, RN, MS, BC-GNS, CCRN

Largely thanks to advances in prenatal imaging and diagnosis, the field of fetal cardiology has grown markedly in the past 30 years. The result has been the global expansion of fetal cardiology programs and fetal care centers. This article details how the Advanced Fetal Care Center and fetal cardiology program at Boston Children’s Hospital (BCH) provide prenatal counseling and care for single-ventricle congenital heart disease (SVCHD). In this article, the term “patient” refers to the expectant mother.

Early detection of SVCHD has important implications for prenatal care. If the patient and family are provided comprehensive and in-depth fetal cardiology counseling and care, preparedness in many areas may be improved and available options may be influenced. The timing of referral for fetal echocardiography
Prenatal diagnosis may increase care options, improve clinical outcomes, and provide time to implement strategies to support families before delivery.

Prenatal Diagnosis of Congenital Heart Disease

Many pregnant women have a routine obstetric ultrasound examination at 18 to 20 weeks’ gestation that may allow prenatal diagnosis of congenital heart disease (CHD). Currently, rates of prenatal detection of CHD vary widely. In 2009, in a study involving 3 referral centers in Northern California, the rate of prenatal detection of SVCHD was 64%. In 2010, a large study revealed that, depending on the study site, the prenatal diagnosis rate for CHD with a single right ventricle was 59% to 85%.

Patients with public insurance and lower socioeconomic status are less likely to receive a prenatal diagnosis of critical CHD. Higher prenatal detection of CHD is associated with close proximity to a high-risk or university-based practice, which suggests that the clinician’s education and expertise are key. Similarly, recognition of complex CHD in the prenatal period is higher at tertiary care centers than at centers based in the community.

In a recent study, the prenatal detection rate for significant CHD was as high as 74.1% when views of cardiac outflow tracts were documented on prenatal ultrasound. Obstetric screening guidelines have improved, and in 2013, they were modified to include outflow tract imaging as a standard part of the evaluation. Advances such as this one enable early detection of SVCHD and expedite timely referral for fetal echocardiography and consultation.

Benefits of Prenatal Diagnosis

The benefits of prenatal diagnosis of SVCHD include an increase in options available to parents, such as seeking more information through education or testing, terminating or continuing the pregnancy, choosing their preferred delivery location, and involving the neonatal cardiac surgical center.

Prenatal diagnosis of hypoplastic left heart syndrome (HLHS) is associated with improved clinical status and survival. It allows patients to choose to deliver close to high-volume surgical centers, which decreases transport and presurgical mortality. In 2001, Mahle et al reported that prenatal diagnosis of HLHS is associated with improved preoperative management and fewer perioperative neurological events. This study also demonstrated that operative mortality and hospital stay in neonates with HLHS were not affected by prenatal diagnosis. However, in 2013, Landis et al reported that prenatal diagnosis of all CHD did not have an impact on preoperative or predischarge mortality.

Prenatal diagnosis of CHD has been associated with greater parental understanding of their child’s condition. This increased understanding may be related to the increased time available for education during multiple fetal care visits and parents’ receptiveness to education during the prenatal period, a time when parents are not focused on their critically ill infant or maternal postpartum health issues.

Prenatal diagnosis also allows parents time to move through 1 or more grief stages during pregnancy and eases the emotional toll associated with the diagnosis of SVCHD. A qualitative study involving mothers and fathers of infants with an antenatal diagnosis of CHD interviewed during pregnancy and after birth describe their antenatal decisions as their first parenting decisions. These families had time and opportunity to prepare for the events surrounding the birth, including choosing a birthing location, organizing child care and additional maternity/paternity leave, and familiarizing the mother with where her infant would receive care. Thus the parents could recuperate from delivery with an understanding of what was happening to their infant and why.
The Fetal Cardiology Team

Prenatal cardiology care of the fetus with SVCHD is complex and multifaceted, and excellent coordination of care and communication among a multitude of specialists and disciplines are essential. Currently, how fetal cardiology programs at different centers are structured varies widely. Fetal cardiology team members may include clinicians from the fetal care center, fetal and pediatric cardiology, cardiac intensive care, interventional cardiology, cardiac surgery, cardiac genetics, referring and local obstetric teams, maternal fetal medicine (high-risk obstetrics), neonatology, social work, and psychology along with other specialists.

At BCH, the fetal cardiology team includes a fetal cardiology nurse practitioner (FCNP), who performs prenatal evaluation, counseling, and education; coordinates and communicates cardiac triage and the delivery plan; and serves as a liaison between multidisciplinary care team members (within and outside of BCH). This role is enhanced by clinical expertise in longitudinal prenatal and postnatal cardiac care.

Fetal Cardiology Evaluation

Evaluation of the fetus with suspected SVCHD begins at the time of referral. Following review of all maternal health records (Table 1), the first clinical patient contact begins when the FCNP conducts a clinical history over the phone with the expectant mother. Clarification of parental knowledge of the reason for referral is important, as occasionally patients are referred for fetal echocardiograms and are not aware of a suspected diagnosis of CHD. During the phone intake, the expectant mother is informed regarding a potential diagnosis of heart disease and is told that a fetal echocardiogram will be used to provide a definitive diagnosis. Echocardiographic confirmation may also mean an alteration in diagnosis; therefore, the prognosis may be modified on the basis of the results. Extracardiac assessment is recommended.

Table 1 Assessment of maternal health records

<table>
<thead>
<tr>
<th>Components of maternal health records</th>
<th>Review to determine the following</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echo report</td>
<td>Type and severity of CHD</td>
</tr>
<tr>
<td></td>
<td>Reliability of diagnosis</td>
</tr>
<tr>
<td></td>
<td>Most appropriate site for delivery</td>
</tr>
<tr>
<td>Ultrasound report</td>
<td>Need for additional imaging or pediatric specialty consultation, if other anomalies or concerns are present (eg, 2 vessel cord, increased nuchal thickness, echogenic bowel, clenched hands, single kidney, cleft lip and palate, club feet, neural tube defect, growth problems, and hydrops fetalis)</td>
</tr>
<tr>
<td></td>
<td>Risk of increased morbidity or mortality with presence of extracardiac anomalies or evidence of fetal distress</td>
</tr>
<tr>
<td>Due date (EDC)</td>
<td>Gestational age and size and impact on cardiac imaging</td>
</tr>
<tr>
<td></td>
<td>Gestational age and impact on pregnancy decision making</td>
</tr>
<tr>
<td>Genetics</td>
<td>Presence of abnormal early screening or risk assessment</td>
</tr>
<tr>
<td></td>
<td>Presence of abnormal chromosomes or genetic markers (eg, chromosomes or markers for trisomy 21 [Down syndrome], trisomy 13 or 18, Turner syndrome, DiGeorge syndrome [22q11.2 deletion], or Noonan syndrome)</td>
</tr>
<tr>
<td></td>
<td>Family history of CHD, birth defects or other genetic problems</td>
</tr>
<tr>
<td>Obstetric history</td>
<td>Gravida and parity</td>
</tr>
<tr>
<td></td>
<td>History of infertility</td>
</tr>
<tr>
<td></td>
<td>History of assisted reproductive technology</td>
</tr>
<tr>
<td></td>
<td>History of prematurity</td>
</tr>
<tr>
<td></td>
<td>History of prenatal, postnatal, or childhood loss</td>
</tr>
<tr>
<td>Maternal medical and surgical history</td>
<td>Maternal health issues or medications that may affect pregnancy or delivery</td>
</tr>
<tr>
<td>Psychosocial history</td>
<td>Maternal and paternal psychosocial and mental health history that may affect coping or parenting</td>
</tr>
<tr>
<td></td>
<td>Ability to understand, cope, and care for a child with CHD</td>
</tr>
<tr>
<td></td>
<td>Level of education and occupation</td>
</tr>
<tr>
<td></td>
<td>Religious beliefs</td>
</tr>
</tbody>
</table>

Abbreviations: CHD, congenital heart disease; echo, echocardiography; EDC, estimated date of conception.
Reprinted from Lincoln et al, with kind permission from Springer Science and Business Media.
Patients should be offered genetic counseling, genetic testing, and a detailed fetal ultrasound anatomy survey for all fetuses with CHD. Magnetic resonance imaging of the fetus is available and also recommended in some centers.

Patients are asked if they are considering various pregnancy options. Every effort is made to meet with patients as quickly as possible, especially for those who are very anxious or considering termination of the pregnancy. Patients are reassured that they will be supported regardless of whether or not they decide to continue the pregnancy.

Parental and family attitudes and values may influence decision making, and team members must acknowledge this to ensure that the parents are provided information regarding all treatment options.

The day of a fetal cardiology evaluation begins with a fetal echocardiogram. This imaging is immediately followed by a private consultation led by the fetal cardiologist and the FCNP with the expectant family. The fetal cardiology team understands the devastating impact that a diagnosis of a SVCHD will have on the pregnant woman and her family. Knowledge of a fetal abnormality and the inherent health care implications may cause significant distress. Feelings of major loss with reactions similar to the stages of grief defined by Kubler-Ross have been described by families after a prenatal diagnosis of CHD.

Fetal Cardiology Consultation

Fetal counseling is an art that requires a gentle, yet honest approach. It takes practice to learn how to navigate the unique complexities. Fetal counseling is often abstract as the outcomes are difficult to predict until after birth. A large amount of information must be delivered at a time when family stress levels are very high. Overall situational awareness is required, and the flow of information must be individualized on the basis of the verbal, emotional, and physical responses from the patient and the patient’s family members. During counseling, time must be provided for pauses as patients and their families experience a variety of emotional responses ranging from sadness to shock and anger. This situation may be complicated by the need to undo misconceptions about CHD and may be further complicated by any underlying complex family dynamics and social issues.

There is also potential for discrepancy between what families are told and what they actually understand. Providing standardized written materials for later review at home may help minimize knowledge discrepancies. Specific standardized materials for SVCHD are provided at the consultation (Table 2). It may be helpful for patients to keep these tools with them during their pregnancy, delivery, and the neonatal period.

The direction of fetal cardiology counseling for SVCHD is often determined by the needs of the family. However, several key components should be included. These topics are discussed in the next sections and an overview is provided in Table 3.

The Diagnosis

As the consultation begins, the expectant family is provided with a description and illustration of the SVCHD and the possible staged surgical approach. Short- and long-term prognosis is discussed, and a framework

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Table 2  Types of standardized materials for consultation for fetal single-ventricle congenital heart disease (SVCHD)

<table>
<thead>
<tr>
<th>Type of materials</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>An Expectant Parent's Guide to Hypoplastic Left Heart Syndrome and Other Single Ventricle Congenital Heart Defects</strong>&lt;sup&gt;19&lt;/sup&gt;</td>
<td>A book for families with a prenatal diagnosis of SVCHD to refer to during pregnancy and after birth</td>
</tr>
<tr>
<td>Color heart diagrams</td>
<td>Comparative diagram showing normal heart and specific SVCHD side by side</td>
</tr>
<tr>
<td>Fetal cardiology consultation form</td>
<td>A form for simplified notes written by fetal cardiology nurse practitioner during consultation, which includes cardiac diagnosis and outcomes, potential surgical plan, and expected length of hospitalization after birth; this form also provides a fetal cardiology care checklist, recommendations for further fetal testing or imaging, recommendations regarding delivery location and other resource information</td>
</tr>
</tbody>
</table>

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Prenatal diagnosis is associated with greater parental understanding as a result of increased time for education during prenatal care visits.
is provided to help define the severity. Families are counseled that the fetal diagnosis is preliminary and that the details of the SVCHD will be confirmed after birth with an echocardiogram. Additional extracardiac anomalies or genetic syndromes may be discovered after birth, even if all other prenatal imaging and noninvasive or invasive genetic testing results were reported as normal.

### The Delivery

Mothers of infants with SVCHD are advised to transfer their care to a high-risk obstetrical or maternal fetal medicine physician. Whenever possible, delivery should occur at a tertiary care hospital adjacent to the neonatal cardiac surgical program, allowing smooth and timely transfer of the baby as well as ease of family visits. Prenatal diagnosis and a planned delivery location less than 10 minutes from a high-volume cardiac surgical center may improve outcomes for neonates with a diagnosis of HLHS. Interhospital transports may adversely affect the hemodynamic stability of neonates with CHD.

The obstetrical team usually determines the timing and mode of delivery. In most cases, vaginal delivery is preferred. Based on the SVCHD diagnosis, a cesarean section is not typically required; however, it may be indicated for an anticipated critically ill infant with an intact or restrictive atrial septum. Relocation around 36 to 37 weeks’ gestation is encouraged for all patients who live far from the neonatal cardiac surgical program. At our center, induction is generally planned at 39 weeks’ gestation and reserved only for unique medical circumstances before that time.

In one study, delivery of neonates with critical CHD before 39 or after 40 completed weeks was associated with increased mortality rates. Patients that delivered at 37 or 38 completed weeks were at increased risk for receiving more days of mechanical ventilation, which may be related to incomplete maturation of the lungs. Neonates with critical CHD have a brain that is structurally similar to 34 or 35 week premature babies, and that structure may predispose them to brain injury during postnatal cardiac intervention. Therefore the ideal age for delivery for these patients is at 39 to 40 weeks’ gestation.

For fetuses with HLHS and restrictive or intact atrial septum and abnormal pulmonary vein flow, specialized delivery room care and planning for possible urgent catheter or surgically based intervention to decompress the left atrium is recommended. All neonates with ductal-dependent CHD require initiation of prostaglandin therapy soon after birth to maintain duct patency; therefore, delivery at a center with a neonatologist and access to cardiology is recommended.

### The First Surgery

Details regarding the first surgical palliation, including information about the preoperative period and postoperative recovery are provided. The interstage risks and the outpatient home monitoring program that follows SVCHD babies between their stage 1 and stage 2 surgeries are discussed. Generous estimates are provided for the length of the initial hospitalization to allow for optimal family preparedness. Parents are advised to plan for a 1- to 2-month hospitalization for SVCHD, a time frame that may vary depending on the infant’s unique circumstances, and that may, in rare instances, last through the infant’s second stage of surgery.

### Cardiac Neurodevelopmental Issues

Families are counseled regarding cardiac neurodevelopmental outcomes specific to SVCHD, including an increased risk for developmental delays in various areas. Some children eventually meet their...
developmental milestones, while others require more support. The outcomes are difficult to predict prenatally. Proactive approaches for early detection and treatment include participating in a cardiac neurodevelopmental program, early intervention enrollment upon discharge, and empowering families to access information and community services to promote development.

Feeding and Growth Issues

Families are also counseled about potential issues related to preoperative and postoperative feeding and nutrition. Issues related to feeding and growth are anticipated family stressors. Alternative methods of nourishment are discussed, such as placement of a gastrostomy tube, which may be necessary if sufficient calories for growth cannot be consumed via breast or bottle. Family education includes a consultation with a lactation specialist to review the benefits of breastfeeding and breast milk. The lactation consultant helps the mother establish a plan to meet her preoperative and postoperative breastfeeding and pumping goals.

Quality of Life and Long-term Care

Quality-of-life components, including school, exercise, recreational and daily living activities as well as long-term prognosis are discussed. Many families focus more on their child’s potential to achieve major milestones (eg, college) than on surgical mortality. As their child grows older, the risk of possible additional complications increases. Over time, the single ventricle may begin to fail, requiring an increase in medications, hospitalizations, and possible heart transplant. Parents are informed that SVCHD is a chronic disease often necessitating additional unanticipated surgeries or interventions beyond a staged surgical approach that requires long-term care and follow-up with pediatric and adult CHD specialists. The exact lifespan for their child is difficult to predict prenatally, and our knowledge in this area is still limited.

Family Stressors

Stress related to financial burden, unexpected illness and hospitalizations, and extended time away from family and work pose particular challenges to the family caring for a child with SVCHD. In one study, families of children with CHD reported stress related to financial and emotional uncertainty, as well as unexpected changes in lifestyle. Unpredictable variables, including loss or decrease in income related to a job change, posed unanticipated financial burdens. Many unexpected out-of-pocket expenses (eg, food, lodging, parking, prescriptions, formula) are described. One parent reported that the stress was much greater because they were sent home with an infant with SVCHD that was not “fixed.” Many of the reported stressors began at the time of prenatal diagnosis, although prenatal diagnosis could provide time to implement strategies to help ease burdens before hospitalization.

Fetal cardiology consultations may be extensive and intensified by parental anxiety and grief surrounding the “loss of the idealized child,” and the potential for increased prenatal and postnatal morbidity and mortality. In a recent study, 40% of mothers who received a prenatal diagnosis of CHD exceeded clinical cutoff values for posttraumatic stress disorder. Higher levels of depression and anxiety were also reported. In a comparison of mothers of hospitalized babies with CHD with prenatal versus postnatal diagnosis, those that received a prenatal diagnosis were more depressed and those that received a postnatal diagnosis were more stressed. A potential cause for this may be that the postnatal group has had little time to prepare and the prenatal group may be at a more advanced stage of recovery from the loss of the imagined healthy child.

Pregnancy is normally a time that most couples report higher partner satisfaction; however, lower partner satisfaction was reported following the diagnosis of CHD. Parents may need counseling during the remainder of the pregnancy to help recover from the loss of the idealized child. Also, additional stress may be experienced if relocation is required for an extended period for delivery and care.

Expectant parents who receive a prenatal diagnosis of CHD have been identified as a population at risk. The prenatal period may be used to identify and offer support to parents at risk for depression and anxiety. The benefits of this may extend into the postnatal period and assist with the development of secure attachment between neonate and parent. Social work and psychological services should be actively involved with these families in the prenatal period to address the emotional and social challenges that are faced.

Fetal Cardiac Intervention

A select group of fetuses may be eligible for fetal cardiac intervention for the following CHDs: (1) aortic
stenosis with evolving HLHS, (2) HLHS with intact atrial septum, and (3) pulmonary atresia with intact ventricular septum and evolving hypoplastic right ventricle. Inclusion criteria are based on echocardiographic data, and patients should be referred at first signs of evolving SVCHD to a center that offers fetal cardiac intervention. Early referral maximizes the possibility for fetal cardiac intervention. Eligible families are counseled extensively over the phone and on-site about the potential risks and benefits of fetal cardiac intervention. The long and short-term outcome data are also reviewed in detail.

**Parent Tours of the Cardiac Intensive Care Unit**

Throughout the fetal cardiology consultation process, all families should be offered opportunities to meet staff and visit other areas of the cardiovascular program. This process assists in building trust with the team that will be caring for their infant.28 It is essential that expectant parents be familiar with the surroundings of where their infant will be cared for after birth since a few hours may elapse before the birthing parent is able to visit. To provide that reassurance, a tour of the cardiac intensive care unit (ICU) should be arranged for all families.

The cardiovascular program at BCH currently conducts more than 100 prenatal tours each year for parents of infants with CHD diagnosed in utero. The tours are provided by nurses from the cardiac ICU. The purpose of the tour is to assist families in preparing for a potentially tumultuous journey and to provide beneficial information, all of which adds to the quality of care provided.

A qualitative study29 described parental benefits of prenatal newborn ICU (NICU) tours as “(a) decreasing their fears, (b) inspiring hope for their newborn’s prognosis, (c) providing reassurance about care in the NICU, and (d) preparing them for their newborn’s NICU hospitalization.” Every participant in this study recommended that all parents with high-risk pregnancies receive a prenatal tour. Parents may have difficulty conceptualizing the practical aspects of a congenital malformation and are not prepared for the emotional stress that ensues. One possible path to acceptance of the implications of a prenatal CHD diagnosis is through visualization of the hospitalization process, which may be provided through a prenatal tour.30

Our center attempted to understand the experience of the prenatal cardiac ICU tour from the perspective of the parents of an infant with CHD. Twelve families were interviewed and asked to identify specific aspects of the experience in an effort to improve the design of the prenatal tour and optimize the experience from the parents’ perspective. Three major themes consistently emerged from the data collected: “New realities,” “Family concerns and uncertainties,” and the “Need for tangible information.” Throughout the major themes, the parents’ comments consistently related back to the topics of the patient’s appearance, time frames, and the cardiac ICU environment. The theme New realities appeared to be the trigger for parents to acknowledge and recognize what was going to happen to them and their baby. The theme Family concerns and uncertainties depicted the fears and worries that parents recognized they had, yet did not know how to inquire about. The third theme, Need for tangible information, demonstrated that parents desired as many specific details as possible. As in the NICU study, these participants also felt strongly that every family should have the experience of a prenatal tour.31

**Difficult Decisions**

Following the consultation, many patients benefit from meeting with a social worker. Additional discussions surrounding coping with a SVCHD prenatal diagnosis and how to make difficult decisions are enhanced when an experienced social worker is guiding these conversations. These decisions may include the choice to pursue genetic testing or additional imaging; termination of pregnancy, postnatal surgery, or comfort care; fetal cardiac intervention; delivery location; and surgical center.

One study revealed that parents describe learning about the prenatal diagnosis of CHD as one of their most difficult life experiences and it made them feel isolated.9 These parents reported that the experience was characterized by uncertainty, which made it difficult to change the image of the previously envisioned healthy baby.9 They described that while struggling to come to terms with the diagnosis, they also faced decisions regarding further testing, continuing the pregnancy, and treatment options.9 Many of these parents described these choices as their first parenting decisions, and some wanted to gain more information so that the decisions they made

Parents report feelings of major loss after prenatal diagnosis of CHD and are at risk for anxiety and depression.
would be in the best interest of their baby. The author of the study found the value that these parents put on their parenting role during pregnancy striking.

In a recent study at BCH, of 312 patients referred and prenatally diagnosed as bearing fetuses with SVCHD, 31% of patients elected for termination of pregnancy with similar rates of termination between those with a single right ventricle and those with a single left ventricle. Of the 199 patients who had the diagnosis made at less than 24 weeks’ gestation, 49% elected to terminate the pregnancy. Parents who have struggled with the decision to continue the pregnancy when diagnosed with CHD gathered more information, and for each decision, they reflected on the pros, cons, and the implications for themselves, their child, and their family. One couple reported that having to make the decision themselves was cruel, but once the decision was made there was a sense of relief. Other parents in the study reported that making the decision to continue or to terminate was not hard.

Multiple factors affect decision making. The presence of major extracardiac abnormalities may affect parental decision making regarding termination of pregnancy. Some parents reported that if there was confirmation of a chromosome abnormality, the decision to terminate might be easier, although for others it did not change their decision. In one study, parents who selected the Norwood surgical approach for HLHS felt that they were “taking action and fixing the problem” and that they moved from a feeling of “no hope to a feeling of hope.” Other parents reported that faith influenced their decision-making process and that the decision was in God’s hands.

How parents are approached regarding the option to terminate the pregnancy is important. A recent study involving parents whose baby received a prenatal diagnosis of HLHS revealed 4 important themes regarding physician discussion of pregnancy termination. Parents felt that physicians should (1) ask parents about their beliefs regarding termination and respect their beliefs; (2) show compassion and empathy and not pressure them to terminate; (3) provide more information including HLHS survival rates and support groups; and (4) not repeatedly mention termination if it is not an option for the family. Researchers in another study found the largest influences on decision making for or against termination were expected quality of life, parental moral/religious beliefs, and short- and long-term survival. When offered termination, one mother reported that she could intellectually understand the offer, but emotionally she could not. The mother suggested that medical professionals not assume anything, but ask a lot more questions before making a statement. Health care professionals should take more time to ask questions and understand each patient’s unique perspective and provide information and counseling that reflect an appreciation of different decision-making approaches and parenting beliefs.

**Conclusion**

Each center has a unique approach to prenatal counseling and care for SVCHD, which often includes a large multidisciplinary team. The BCH Advanced Fetal Care Center and fetal cardiology program’s model of care is presented here. An important component of our model is extensive prenatal counseling regarding diagnosis, prognosis, and the potential choices available. This model of care is enhanced when there is early detection of SVCHD to provide ample time for prenatal education and increase family members’ preparedness before the delivery. As the field of prenatal imaging and diagnosis continues to advance, it is our hope that all patients will receive comprehensive prenatal counseling and care for SVCHD.

Financial Disclosures
None reported.

**eLetters**

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**dotmore**


**References**


Critical Care in Critical Access Hospitals

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What began as a grant-funded demonstration project, as a means of bridging the gap in rural health care, has developed into a critical access hospital system comprising 1328 facilities across 45 states. A critical access hospital is not just a safety net for health care in a rural community. Such hospitals may also provide specialized services such as same-day surgery, infusion therapy, and intensive care. For hospitals located near the required minimum of 35 miles from a tertiary care center, management of critically ill patients may be a matter of stabilization and transfer. Critical access hospitals in more rural areas are often much farther from tertiary care; some of these hospitals are situated within frontier areas of the United States. This article describes the development of critical access hospitals, provision of care and services, challenges to critical care in critical access hospitals, and suggestions to address gaps in research and collaborative care. (Critical Care Nurse. 2015;35[5]:62-67)

Critical care encompasses the care of patients whose conditions are life threatening. These patients may first come to any hospital or clinic, including rural facilities. The Registered Nurse Population, which summarizes findings from the March 2004 National Sample Survey of Registered Nurses, described critical care nurses as working in intensive care units (ICUs), pediatric ICUs, neonatal ICUs, cardiac care units, cardiac catheterization laboratories, telemetry units, progressive care units, emergency departments, and recovery rooms. The study does not indicate that critical care nurses also work in rural hospitals, caring for critically ill or injured patients who initially come to these rural facilities; the recently updated study does not address intensive care.

As of June 30, 2013, there were 1332 critical access hospitals (CAHs) in the United States. This number means that CAHs comprise more than one-quarter of the community hospitals in our nation. Although resources, including nurses, physicians, and equipment, differ at these facilities, many are able to care for critically ill patients through the use of technology and collaboration with tertiary centers. Registered nurses staffing these rural facilities are required to be expert generalists, with the ability to move seamlessly between patients. For example, in a given shift, these nurses may care for an acutely ill child, a postoperative adult, a laboring mom, and a trauma victim.

This article is the first in a recurring column for Critical Care Nurse exploring provision of critical care in rural settings. In this article, readers will be introduced to the challenges of delivering critical care nursing in rural settings. The nature of nursing in CAHs and in urban acute care settings is compared,
strategies for collaboration between rural and urban nurses caring for critically ill and injured patients are described, and future directions for research are provided.

Rural Health and Rural Challenges

Nineteen percent of the total US population (ie, 59 million people) live in rural areas. These nonmetropolitan areas, some with fewer than 2500 people, are often home to more wildlife than people and conjure idyllic images of healthy living, clean water, fresh air, blue skies, and wide-open spaces. Although many rural communities live up to this image, there are problems in paradise. When compared with urban dwellers in the United States, more rural persons live in poverty, lack health insurance, have complex activity limitations, and self-report fair or poor health and serious psychological distress. The number of rural persons living with complex chronic illness is growing. Nearly one-half of rural residents have at least 1 major chronic illness. With limited human and fiscal resources, great distances between health care providers, and poor—or absent—public transportation, accessing health care is a challenge.

Some rural counties lack a practicing physician; in others, the sole provider is a physician’s assistant or an advanced practice registered nurse (APRN). Where a physician is on staff at a CAH, the physician is not always on site; instead, a registered nurse may be the first to perform triage and begin treatment, until the physician or midlevel provider arrives.

The Critical Access Hospital

The Balanced Budget Act of 1997 included the Medicare Rural Hospital Flexibility Program (FLEX), which was intended to support rural health care. The FLEX program allowed licensed acute-care rural hospitals nationwide to apply to become CAHs if they met specific criteria. The advantages to CAH status include access to FLEX Program grant money, cost-based reimbursement, and access to capital improvement costs. For some hospitals, CAH designation has made the difference between closing the doors and continuing to serve the community. These hospitals have to meet certain criteria, including being located in a rural area, more than 35 miles from another hospital, at least 15 miles from another hospital if in mountainous terrain or over secondary roads, or state certified as a necessary provider of health care services to area residents. CAHs must provide 24-hour emergency services, with medical staff either on site or on call and available on site within 30 minutes. If a physician is not on site 24/7, the facility must post public notice of this, stating that a registered nurse would render treatment until the physician or midlevel provider arrives.

Nearly one-half of rural residents have at least 1 major chronic illness.

Comparison of Care Between Critical Access and Urban Facilities

CAHs are different from urban hospitals for a number of reasons, including the fact that in rural communities, a single hospital may be the only source of health care in a large geographic area. These rural hospitals, perhaps owing to their geographic area, the community’s expectations, and the need for expanded revenue sources, have expanded their scope of specialized services, which has led to the development of rural ICUs within the CAH. Even before the inception of the CAH, researchers recognized that rural hospitals were providing care for specialized patients. The researchers suggested that these facilities could do so, depending on training and interests of local personnel, the ability to maintain performance standards despite a small patient volume, and the extent of support resources and financial stability.

Although strategic initiatives aimed at optimizing patients’ outcomes and financial performance in urban and rural CAHs may be similar, there are contextual
differences in terms of the resources available at the urban and rural settings.\textsuperscript{16-19} Research in rural hospitals internationally has indicated that rural nurses are less likely to manage patients in deteriorating condition effectively when compared with their counterparts working in metropolitan hospitals.\textsuperscript{20} The lack of exposure to high-acuity patients may lead to deriskilling of nursing staff in these areas because of the infrequency of acute deterioration events.\textsuperscript{21} Nationally, in Quality of Care and Patient Outcomes in Critical Access Rural Hospitals,\textsuperscript{19} data for 2008 to 2009 from 4800 hospitals serving Medicare beneficiaries were reviewed, and CAHs were reported to be less likely than their other hospitals to provide care that met quality standards. More recently, Shultis et al\textsuperscript{22} reported rural-urban disparities in stroke care, noting that two-thirds of rural facilities lacked the necessary personnel, one-third lacked necessary neuroimaging equipment, and one-fourth were functioning without a written protocol for emergency department stroke care or for use of tissue plasminogen activator. Although there are more than just CAHs located in rural areas (eg, prospective payment systems hospitals, which are typically larger and operate from a different reimbursement method than CAHs), CAHs are most certainly included in descriptions of rural hospitals.

Trauma patients are often critically injured and require specialized monitoring upon inpatient admission. Naturally, these patients may come first to rural facilities—including CAHs. Although larger facilities are verified by the American College of Surgeons (ACS) as trauma I, II, or III centers, the CAH may fall under a state designation, labeling the hospital as a level IV or level V trauma center. Using the state of Montana as an example, there are 2 separate laws regarding designation as a trauma facility: 1 for facilities not verified by the ACS\textsuperscript{23} and 1 for facilities verified by the ACS.\textsuperscript{24} In Montana and states with similar laws, the hospital staff must submit an application to the state documenting their capacities and go through a site review to receive their trauma IV and V designation.

Not surprisingly, there are many more non-ACS centers (level IV and V) than ACS centers in rural states. The ramifications of this include less-than-rigorous verification of the presence of resources to care for critically injured patients. For example, the ACS provides standards that the physician must be current in advanced trauma life support certification, be available and within 20 minutes of the facility, and must have experience in resuscitation and care of trauma patients, and that the facility must conform to the requisites for the availability of resuscitation and life support equipment for all ages of patients. This is not necessarily true for CAHs that are verified as level IV or V trauma centers. State codes provide standards that must be met by the level IV and V trauma centers, and although the state codes are clear about physicians’ roles, they do not specify nurses’ roles. The reality in the rural CAHs is that nurses are often the first to see and treat trauma patients until the physician or midlevel provider arrives. Medicare Conditions of Participation specify that the coverage could be a doctor of medicine or osteopathy, a physician assistant, a nurse practitioner, or a clinical nurse specialist, with training or experience in emergency care.\textsuperscript{25} In certain very limited circumstances, the coverage could be provided temporarily by a registered nurse.

The Nature of Nursing in CAHs

Larger and smaller rural hospitals differ with regard to hospital characteristics, including accreditation and quality improvement initiatives, and characteristics of nurses, such as sheer numbers of registered nurses, opportunities for professional development, and staffing.\textsuperscript{25-27} As an example, the CAH is required to have an emergency department and inpatient units (many of which include a 2- to 4-bed ICU). To ensure adequate staffing, nurses assigned to these areas must be expert generalists, as they must handle a multitude of widely varied duties,\textsuperscript{25,27,28} such as floating between inpatient, outpatient, and clinics, depending on the patient census. In fact, nurses in smaller rural hospitals may work in 3 or more departments in a single shift, going from the emergency department to the operating room and to the general care area to provide care for a variety of patients including adults, children, and pregnant women in labor.\textsuperscript{28} Thus, staffing templates used by larger, urban facilities are not useful because of the fluctuations in patient acuity and available support from ancillary personnel and peers.\textsuperscript{27,29}

Research has indicated that having more baccalaureate-prepared nurses on staff is associated with better outcomes for patients.\textsuperscript{30,31} Yet, a challenge for rural hospitals...
is that they tend to have fewer baccalaureate-prepared nurses and more nurses with an associate degree in nursing. No research has been done to assess the numbers of nurses in critical access hospitals who hold specialty certifications. It can be surmised that because these facilities lack the specialty patient volumes, and therefore direct care hours in critical care, fewer of their nurses are able to attain such certification. Because CAHs have, in many cases, a compromised base scale for resources, even with their CAH status, the ability to provide professional development and educational opportunities for rural nurses is adversely affected.

**Review of Strategies for Collaboration**

The financial viability resulting from cost-based reimbursement for CAHs has now enabled these hospitals to keep pace with the rapid changes in health care, thereby better meeting the changing needs of the populations they serve. Many CAHs now offer a mix of services. Where they once mainly provided inpatient care, many now provide specialty care (including intensive care), rehabilitation, hospice care, senior services, and other outpatient services.

Although the CAH may not have the same technological resources in the ICU as its urban counterpart, the nurse to patient ratio, not technology, could arguably be the defining characteristic of intensive care in CAHs.

Some research has indicated the provision of critical care in CAHs is problematic and associated with poor outcomes for patients. One example of strategic efforts to improve patient outcomes is seen in the state of Kansas. The Kansas Critical Care Collaborative (KCCC) surveyed CAHs throughout their state, finding one-third of the responding hospitals had a critical care unit, and 2 had physicians with critical care board certification. One-half of the CAHs had ventilators, but only 12% had standard mechanical ventilation sedation protocols. All of the hospitals in the survey were lacking in terms of full compliance with sepsis protocols. The KCCC developed what they termed the “rural sepsis bundle,” which provided suggestions for work-around strategies in the absence of the ability to comply with specified testing and interventions—something that is a reality for CAHs. For example, lactate testing may be a barrier for a CAH, because of the cost and required equipment. An arterial blood gas reading may be much more available. A bicarbonate level of 18 mmol/L or less shown by arterial blood gas analysis, or a serum total carbon dioxide level of less than 20 mmol/L with an unexplained increase in the anion gap, should trigger aggressive measures that would be comparable to the measures used when the lactate level exceeds 4 mmol/L. Some CAHs may lack the staffing and expertise to leverage interventions specific to treatment of septic shock, such as central venous pressure monitoring, so the rural sepsis bundle recommends rapid delivery of crystalloid fluid to all hypotensive patients in order to screen for septic shock and thus indications for vasopressors. Patients refractory to fluid bolus challenges require central venous access and continuous monitoring. Depending on experience and staffing, these patients may better be treated at a larger medical facility.

The KCCC developed a series of webinars and conducted outreach to rural hospitals to disseminate information about the rural sepsis bundle. Work-around strategies for standards of care such as the sepsis bundle provide evidence-based guidelines appropriate for CAHs. The Midwest Critical Care Collaborative, which includes Kansas, Missouri, and Nebraska, has extended the work by the KCCC. Their slogan, “We will share selflessly and steal shamelessly to make things happen for our patients” is reflected in the provision of sample orders, screening tools, and educational presentations on their website for public use at www.mwcritcare.org/shared-quality-improvement-files.

Although telemedicine has long been suggested as a useful technology for support in long-distance clinical health care, including virtual ICUs, broader research on the topic indicates that this intervention does not necessarily reduce mortality. Hawkins reported that in Denver, Colorado, a virtual ICU staffed by a certified critical care nurse (CCRN) provides 24/7 coverage to assist with facilitation of transfers of critical care patients, procedural and clinical nursing resources, and immediate specialty service critical care consultations. The patients in this area are rural veterans who may stay in their home facility or may be transferred to Denver for high-level critical care. Carrying a dedicated cell phone, the nurse is able to respond to calls from any participating facility (including Veterans Affairs hospitals in Grand...
Junction, Colorado; Cheyenne, Wyoming; Sheridan, Wyoming; and Helena, Montana). The group has evaluated the outcomes of the virtual ICU by diagnostic coding to determine a cost saving of more than $2 million. They have also found a decrease in costly transports; however, there is no mention of a reduced mortality rate in comparison to those patients treated face to face at an urban facility.

Another report by the New England Health Care Institute, Critical Care, Critical Choices: The Case for Tel-ICUs in Intensive Care,28 details the results of a demonstration project in Massachusetts. The researchers analyzed 2 metrics, ICU mortality and ICU length of stay. For the participating hospitals, many of which were indeed rural, but none of which had CAH designation, there was a decrease in patient mortality of up to 20%; length of stay was reduced—in some cases as much as 30%. It can be argued that when comparing a more populated and metropolitan state like Massachusetts to a mostly rural state like Montana, or North Dakota, there would be major differences in terms of mere distance to tertiary care.

Zawada et al39 reported statewide implementation of a tele-ICU in South Dakota. Nine CAHs were involved in the study, and although the researchers reported overall reduced mortality, the small numbers of patients admitted to the ICUs in CAHs precluded full analysis of mortality and length of stay.

In a meta-analysis and systematic review of the impact of ICU telemedicine on patients’ outcomes, Young et al40 found that this type of coverage is associated with lower ICU mortality and length of stay, but not with overall lower in-hospital mortality or length of stay in the hospital. Although the authors do not specifically denote if the hospitals using telemedicine in the meta-analysis were CAHs, it can be surmised, from their analysis of specialty care intensivists on staff, that these were larger hospitals with more than 25 beds. In addition to that, their description of the types of ICUs did not include “rural” or “CAH.” One of the most disturbing findings of the analysis was the lack of independent research; that is, several of the studies analyzed were published by authors associated with tele-ICU vendors.

Despite the acknowledgment of significant geographical and resource disparities, a disproportionately insignificant effort has been made to systematically compare rural and urban critical care services, including emergency care. The publications described here, related to acute and critical care in CAHs, indicate that (1) research is lacking overall; (2) existing research indicates that efforts to use telemedicine have not been in the most rural or remote areas of the United States, rather these efforts have taken place in rural states, but within health care systems that are not, by definition, CAHs because they are facilities with more than 25 beds; (3) although telemedicine is indicated as one method for reducing ICU mortality, more research that is independent of tele-ICU vendors is needed; (4) more research regarding patients’ outcomes related to collaborative efforts, such as that exemplified by the Midwest Critical Care Collaborative, should be considered; and (5) research into admission and referral of critically ill patients in CAHs, as well as triage and assessment decision making of the nurses caring for critically ill patients in those facilities, is needed to increase the transparency of the practice of our nations’ CAHs. The last item listed is crucial to beginning conversations between smaller CAHs and tertiary care centers to improve care of the critically ill in rural areas.

Conclusions

There are gaps in the literature regarding research into the provision of critical care in CAHs. Likewise, little is known about collaborative efforts between tertiary care centers and CAHs. In both rural and urban settings, experienced critical care nurses have an opportunity to facilitate improved outcomes for patients receiving acute, progressive, and critical care in rural CAHs through research efforts and through development of relationships with colleagues at other facilities in their areas.

Financial Disclosures
None reported.

eLetters

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References
The Devil Is in the Details

Occasionally I am contacted by a nurse who has not passed a certification test. Such nurses request advice as to how they can be successful on their second attempt. My first response is “Tell me how you prepared for the exam.” I have been surprised at the number of times their answer is “Oh, I have X numbers of years of experience—that was my preparation.” When I ask if they looked at the test plan, did practice questions, or attended a review course, the answers are frequently no, no, and no. The American Association of Critical-Care Nurses (AACN) publishes resource materials to help nurses prepare, the most important of which is the test plan. Not looking at the test plan before sitting for an examination is like leaving to go somewhere you have never been with an address but no directions, no map, and no global positioning system (GPS). You need to know what is on the test, consider what you might need to learn or review, and do that mental preparation before taking a certification test. The devil is in the details! These seemingly simple steps can increase knowledge, confidence, and success.

Contributors

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Adult CCRN Practice Questions

1. A nurse measures a gastric residual volume of 400 mL on a patient receiving enteral nutrition. The most appropriate intervention would be to

A. Reduce enteral nutrition volume by half and maintain the head of the bed (HOB) >30°
B. Stop enteral feeding and notify the provider immediately
C. Continue at current rate and recheck gastric residual volume in 4 hours
D. Withhold enteral nutrition for 2 hours and restart at half the rate

Gastrointestinal (GI) is part of GI, Renal, Heme, Endocrine, and Integument, which is 20% of the CCRN test plan.

2. While providing oral care for an intubated patient with severe sepsis, the nurse observes significant bleeding of the patient’s oral mucosa and oozing at the insertion site of the central catheter. These findings would lead the nurse to suspect

A. Von Willebrand disease
B. Protein C deficiency
C. Heparin-induced thrombocytopenia
D. Disseminated intravascular coagulation (DIC)

Hematology is part of GI, Renal, Heme, Endocrine, and Integument, which is 20% of the CCRN test plan.
3. Twenty hours after transphenoidal pituitary surgery, the patient complains of thirst, has had urinary outputs of 370 mL and 425 mL for the past 2 hours and an intravenous (IV) intake of 150 mL/h. Urine osmolality is 175 mOsm/kg with a specific gravity of 1.002. These assessment findings suggest the patient has
A. Diabetes insipidus
B. Hyperglycemic hyperosmolar nonketotic coma (HHNK)
C. Syndrome of inappropriate antidiuretic hormone secretion (SIADH)
D. Diabetic ketoacidosis (DKA)

Endocrine is part of GI, Renal, Heme, Endocrine, and Integument, which is 20% of the CCRN test plan.

4. A 100-kg patient has been receiving aggressive volume resuscitation and a vasoactive infusion was just started to treat shock. The urinary output and assessment finding indicating adequate organ perfusion is
A. 20 mL/h with cool peripheries
B. 30 mL/h with new-onset confusion
C. 40 mL/h with mottled knees
D. 50 mL/h with capillary refill less than 2 seconds

Multi-system, which is 14% of the CCRN test plan.

5. A patient with severe adult respiratory distress syndrome (ARDS) receiving a neuromuscular blockade has a train-of-4 pattern of 2 finger twitches out of 4 stimulations. The nurse should
A. Immediately stop the neuromuscular blocking agent
B. Keep the neuromuscular blocking agent at the same dosage
C. Double the dosage of neuromuscular blocking agent
D. Reduce the dosage of neuromuscular blocking agent by half

Pulmonary, which is 17% of the CCRN test plan.

Correct Answers and Rationales for Adult CCRN Practice Questions
1. Correct Answer: C
Rationale
Historically, high gastric residual volumes represent a concern associated with increased risk of aspiration.

Research has demonstrated that gastric residual volumes less than 500 mL do not increase the risk of aspiration if no signs of intolerance (gastric distention, nausea, vomiting) are present. Malnutrition due to unnecessary interruptions of enteral feeding (A, B, and D) is common in critical care and should be avoided. Automatic cessation of enteral nutrition should not be considered until a second high gastric residual volume is demonstrated at least 4 hours after the first.

Sources

2. Correct Answer: D
Rationale
DIC is a complex coagulopathy where microclots develop, resulting in both bleeding and thrombosis. DIC is frequently triggered by sepsis and trauma, and manifests as excessive bleeding from the oral mucosa and intravenous sites. Von Willebrand disease (A) is a hereditary bleeding disease in which patients have a deficiency of Von Willebrand factor, which is necessary to stabilize factor VIII. Protein C deficiency (B) is a procoagulant state and leads to the development of clotting, not bleeding. Heparin-induced thrombocytopenia (C) is an immune-mediated reaction to heparin that decreases platelet counts, leading to paradoxical clotting.

Source

3. Correct Answer: A
Rationale
Diabetes insipidus and SIADH are endocrine disorders in which there is too much release (SIADH) or too little release (diabetes insipidus) of antidiuretic hormone (ADH) due to a problem in the hypothalamus or the posterior lobe of the pituitary gland. In diabetes insipidus there is excessive thirst and large amounts of dilute urine. In SIADH (C), there is fluid retention and decreased urine output, along with increased urine osmolality and specific gravity. HHNK (B) and DKA (D) are diabetic hyperglycemic emergencies that result in large urine outputs from hyperglycemia with normal urine osmolality.
4. Correct Answer: D
Rationale
Evidence of adequate end-organ perfusion includes urine output greater than 0.5 mL/kg per hour, no alteration in mental status, and skin warm and pink with capillary refill less than 2 seconds. Because this patient weighs 100 kg, the patient would need to have at least 50 mL/h of urine output.

5. Correct Answer: B
Rationale
The goal of neuromuscular blockade is to elicit 2 twitches out of 4 stimulations. This indicates that 80% of the neuromuscular junctions are blocked. Stopping the neuromuscular blockade (A) is not appropriate if the patient is receiving high-frequency oscillatory ventilation. Doubling (C) or reducing (D) the neuromuscular blocking agent is not appropriate because the patient would receive too little or too much of the paralytic agent.

Pediatric CCRN Practice Questions
1. On postoperative day (POD) 6 after placement of a Blalock-Taussig (BT) shunt, an infant is receiving a heparin infusion for prophylactic anticoagulation. The platelet count has decreased from 202 x 10^3/μL to 77 x 10^3/μL in the past 48 hours. A serotonin release assay (SRA) has been ordered. The next immediate step in management is to
   A. Trend platelet counts daily
   B. Discontinue all heparin
   C. Measure prothrombin time (PT) and partial thromboplastin time (PTT), fibrinogen, and D-dimer
   D. Initiate bleeding precautions

2. The heart rate alarm sounds on a 3-month-old who is in a narrow complex tachycardia at 235 beats per minute. The patient is awake and alert looking at you, has palpable pulses, cool extremities, and capillary refill time of 2 to 3 seconds. The first intervention should be
   A. Administer adenosine (0.01 mg/kg) in a peripheral IV catheter closest to the heart
   B. Infuse a normal saline bolus of 5 mL/kg
   C. Prepare for synchronized cardioversion with 0.5 J/kg
   D. Induce a vagal response by placing ice on the face or taking a rectal temperature

3. A 7-year-old is admitted in septic shock. The child is intubated and has received 60 mL/kg normal saline. The nurse should prioritize the administration of antibiotics
   A. Within 1 hour of presentation
   B. Within 2 hours of presentation
   C. As soon as a central catheter has been placed
   D. Once preliminary results of blood culture have returned

4. A 6-year-old patient admitted after uncomplicated closure of a ventricular septal defect (VSD) is intubated with 2 chest tubes in place. The assessment data are as follows:

<table>
<thead>
<tr>
<th>Vital signs</th>
<th>At admission</th>
<th>2 Hours later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate, beats per minute</td>
<td>95</td>
<td>148</td>
</tr>
<tr>
<td>Blood pressure, mm Hg</td>
<td>104/52</td>
<td>82/65</td>
</tr>
<tr>
<td>Central venous pressure, mm Hg</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Chest tube output, mL/kg per hour</td>
<td>1</td>
<td>0.2</td>
</tr>
</tbody>
</table>

The nurse should suspect
   A. Low-cardiac-output syndrome
   B. A malfunctioning arterial catheter
   C. Fluid overload
   D. Cardiac tamponade

Test plan topic: Hematologic, 4% of the pediatric CCRN questions

Test plan topic: Cardiovascular, 15% of the pediatric CCRN questions
5. A 12-year-old comes to the emergency department with polyuria, polydipsia, and a 10-pound (4.5 kg) weight loss in the past 2 weeks. Laboratory findings are consistent with diabetic ketoacidosis (DKA). A 20 mL/kg bolus of normal saline and an insulin infusion have been initiated at 0.1 U/kg per hour. The goal is to decrease the blood glucose level by

A. 150-200 mg/dL every hour
B. 80-100 mg/dL every hour
C. 50 mg/dL every hour
D. 25 mg/dL every hour

Test plan topic: Endocrine, 4% of the pediatric CCRN questions

Correct Answers and Rationales for Pediatric CCRN Practice Questions

1. Correct Answer: B
Rationale
Heparin-induced thrombocytopenia (HIT) is an antibody-mediated adverse effect related to the administration of heparin that causes both thrombocytopenia and thrombosis. When HIT is suspected, management interventions should be initiated while awaiting confirmation with laboratory tests: immediate discontinuation of all heparin (B), including low-molecular-weight heparin, and flushes of both arterial and central catheters. Once all heparin has been discontinued, the stimulus for the antibody production is gone, and the platelet count should recover without any further intervention. An alternative anticoagulant might be necessary to treat thrombosis development, and a direct thrombin inhibitor should be used. Daily platelet counts will be done (A) to identify when platelet destruction has ceased. PT/PTT, fibrinogen, and D-dimer (C) are the laboratory tests typically ordered as part of a DIC screening. Although bleeding (D) is more commonly seen with a thrombocytopenia, in HIT, there is a paradoxical clotting.

Source

2. Correct Answer: D
Rationale
In a narrow-complex sustained ventricular tachycardia (SVT) with a pulse, the next step is to determine hemodynamic stability. The infant is alert with palpable pulses and capillary refill time within normal limits, and is in stable condition. Vagal maneuvers are the appropriate first maneuver. If vagal maneuvers are unsuccessful or the patient’s condition deteriorates, it would then be appropriate to prepare for the next intervention, administration of adenosine (A). If the dysrhythmia is refractory to all of these interventions, synchronized cardioversion (C) would then be warranted. There is nothing in the assessment that suggests this patient is hypovolemic, so giving a bolus of normal saline (B) is not indicated.

Source

3. Correct Answer: A
Rationale
There is a measurable increase in mortality for each hour that antibiotic administration is delayed. After the initial resuscitation, which includes administration of oxygen and fluids, the administration of empiric antibiotics within 1 hour is the next recommendation. Ideally, a blood culture should be obtained before the administration of antibiotics; however, the inability to obtain a blood culture should never delay administration of antibiotics.

Source

4. Correct Answer: D
Rationale
Cardiac tamponade is a complication for any congenital heart disease repair in which blood accumulates within the pericardial sac (effusion) and compresses the heart, thereby inhibiting its ability to fill and subsequently eject. Assessment findings typically include acute cessation of chest tube output, tachycardia, hypotension with narrow pulse pressure, high central venous pressure (CVP), muffled heart sounds, and distended neck veins. Low-cardiac-output syndrome (A) occurs approximately 8 to 12 hours after cardiopulmonary bypass (CPB) due to the body’s stress response to CPB and cardiac dysfunction after surgery. The patient will exhibit hypotension, low urine output, and low CVP. Accuracy of all hemodynamic monitoring (B) should be validated before documenting the pressures. Although the CVP and heart rate...
are increasing, consistent with fluid overload (C), the blood pressure and chest tube drainage are going down.

Source

5. Correct Answer: B
Rationale
In DKA, the hyperglycemic and subsequently hyperosmolar state has been achieved and tolerated over a period of time, causing intracellular fluid to shift into the extracellular space, which causes cell shrinkage. Therefore the patient will be dehydrated because of the fluid losses from nausea, vomiting, and polyuria. Fluid resuscitation and insulin infusion are the immediate treatments. As the serum level of glucose slowly decreases, the serum osmolarity decreases as well. If this is corrected too quickly, the extracellular fluid shifts intracellularly, therefore causing cerebral edema. Evidence-based practice guidelines have established that the glucose level can be decreased safely at a rate of 80 to 100 mg/dL per hour.

Source

AACN Certcorp publishes a study bibliography that identifies the sources from which items are validated. The document may be found in the AACN Certification exam handbook. The contributor of each question written for this column has listed the source used in developing each item. CCN
Q

Please elaborate on why bicarbonate is not used unless the pH is 7.2 or less. Many nurses, particularly cardiovascular nurses, have difficulty understanding this when the patient’s blood pressure is low and the patient is acidic with large negative base excesses. Please explain the physiological basis for the decision and clarify why “it doesn’t work” or “it is not beneficial.”

A

Myra F. Ellis, RN, MSN, CCRN-CSC, replies:

Bicarbonate therapy is sometimes prescribed to treat acute metabolic acidosis, an acid-base disorder that is characterized by a primary decrease in the concentration of bicarbonate ions (HCO₃⁻), a compensatory decrease in the partial pressure of carbon dioxide (PaCO₂), and a decrease in serum pH.¹ Acidosis is considered severe when the pH is less than 7.20. Assuming an appropriate ventilatory response, this blood pH would be associated with a serum HCO₃⁻ concentration of less than 10 mEq/L.² Two general mechanisms cause metabolic acidosis: a true HCO₃⁻ deficit (such as renal or gastrointestinal losses) or a net addition of strong acids (such as toxins, diabetic ketoacidosis, or lactic acid production).¹,³ Bicarbonate replacement is beneficial for patients with true bicarbonate deficits, but not in patients with metabolic acidosis caused by an increase in acid production.¹,³

Most experts currently recommend reserving bicarbonate replacement for patients with severe acidemia (pH < 7.1) and serum HCO₃⁻ of 6 mEq/L or less because of the potential harms associated with its use.²–⁶ The Surviving Sepsis Campaign recently published recommendations against the treatment of acidosis in patients with pH exceeding 7.15 even for the purpose of improving hemodynamic status.⁷ Although bicarbonate may increase the pH, the available evidence supports its use only in cases of severe acidosis.

The pathologic effects of severe metabolic acidosis are well documented and affect multiple systems. Severe acidosis causes relaxation of vascular smooth muscle (vasodilation) and vasoconstriction. Severe acidosis causes decreases in both blood pressure and cardiac output as a result of decreased myocardial contractility. In addition, acidemia decreases the binding of noradrenaline to its receptors and is associated with hyporesponsiveness to endogenous and infused catecholamines.²–⁵ Patients in severe acidosis have a predisposition to cardiac arrhythmias such as ventricular fibrillation, which can contribute to sudden death.²,⁵ Acidosis adversely affects cell functions such as enzymatic reactions, generation of adenosine triphosphate, fatty acid biosynthesis, and bone formation and restoration.³ Patients are more susceptible to infection because of the suppressed immune response and leukocyte function.²

It seems logical that if acidosis causes multiple cellular dysfunctions, correcting pH with alkaline
therapy would be beneficial. The most common therapy is administration of bicarbonate, but its use is controversial. The controversy is related to the potential harmful effects associated with bicarbonate administration that limit its effectiveness in the clinical setting.

Bicarbonate buffers hydrogen ions by reacting to form carbonic acid (H₂CO₃), which is converted to carbon dioxide and water (HCO₃⁻ + H⁺ → H₂CO₃ → CO₂ + H₂O). In order for this reaction to continue, the carbon dioxide and water must be removed from the tissue bed and the body by circulation and respiration. Bicarbonate therapy can only result in an increase in pH if ventilation is adequate to remove carbon dioxide. Even when ventilation is adequate, the P⁰CO₂ is likely to increase at the cellular level because carbon dioxide diffuses across cell membranes readily, resulting in worsening intracellular acidosis.

Other side effects of bicarbonate therapy are potassium shifts resulting in hypokalemia, ionized calcium shifts resulting in hypocalcemia, volume expansion and hypernatremia (with sodium bicarbonate), acidosis of cerebrospinal fluid, hypoxia due to left shift of the oxyhemoglobin curve (which increases the affinity of hemoglobin for oxygen), rebound alkalosis, and prolongation of the QTc interval. Despite the pathologic conditions present in metabolic acidosis, bicarbonate therapy does not improve cellular or hemodynamic functions and is associated with an increase in mortality.

Two randomized controlled trials and retrospective studies have failed to find the benefit of bicarbonate therapy in critically ill patients with lactic acidosis and a pH exceeding 7.1. The lack of benefit is most likely related to 2 adverse effects that occur with bicarbonate administration: intracellular acidification due to the accumulation of carbon dioxide after bicarbonate administration and a pH-dependent decrease in ionized calcium that decreases contractility. The potential harmful effects of sodium bicarbonate therapy are listed in the Table.

Lactic acidosis may develop in cardiac surgery patients owing to inadequate delivery of oxygen to tissues to meet metabolic demand. The effects of the acidosis make it tempting to try to improve the acidosis with administration of bicarbonate, but the effects of treatment are the same as in other critically ill patients. No studies have indicated that there is any benefit to administration of bicarbonate in cardiac surgery patients. As in all critically ill patients, the primary aim of therapy should be to reverse the cause of metabolic acidosis. Therapy should be directed at improving oxygen delivery and reducing demand, thereby decreasing acid production. In patients who are receiving mechanical ventilation, increasing the minute volume may be a useful strategy to improve pH if it can be done without causing high airway pressure. In cases of severe acidosis (pH < 7.1), administration of bicarbonate may temporarily arrest the decrease in pH while other treatments are given.

Administration of bicarbonate therapy in acidosis should be reserved for situations where the benefit is clear. Treatments should be directed at eliminating the cause and supporting ventilation and oxygen delivery to tissues. Most experts agree that use of bicarbonate should be reserved for critically ill patients with acute and severe metabolic acidosis (pH < 7.1 and HCO₃⁻ < 6 mEq/L).

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A Community of Exceptional Nurses
In Our Unit

Against All Odds: Preventing Pressure Ulcers in High-Risk Cardiac Surgery Patients

Danielle Nicole Cooper, RN, BSN, CCRN-CSC
Sarah Layton Jones, RN, BSN, CCRN
Linda Ann Currie, RN, MSN, ACNS-BC, CCRN-CSC

The Virginia Commonwealth University Medical Center (VCUMC) is a quaternary urban academic medical center located in Richmond, Virginia. Our 865-bed facility is the only level I verified adult and pediatric trauma center in Richmond, hosting a state-of-the-art critical care tower, where our 14-bed cardiac surgery intensive care unit (CSICU) resides. We provide intensive care nursing for adult and geriatric patients who require surgical treatment of cardiac, thoracic, and vascular conditions. Our mechanical circulatory assist program serves as a referral center for patients in the region who require advanced cardiac and respiratory life support interventions. Patients with such complex problems are often transported to us by the VCUMC mobile intensive care unit (ICU) team.

Patients in the CSICU are at high risk for development of hospital-acquired pressure ulcers as a result of their extensive cardiopulmonary bypass times, hemodynamic instability, and vasopressor requirements. Additionally, many cardiac surgery patients are difficult to turn because they have delayed sternal closures and large amounts of blood being rerouted outside of the body for cardiac and pulmonary support. Although our unit has routinely managed these high-risk patients aggressively, medical device–related pressure ulcers were increasing in frequency. The CSICU nursing staff implemented preventative measures to decrease rates of all hospital-acquired pressure ulcers, with a goal of 0 preventable pressure ulcers.

Pressure Ulcer Prevalence Data and Education

Midway through 2011, VCUMC progressed from quarterly to monthly pressure ulcer surveys, revealing opportunities for improvement. Several months into the surveys, it was evident that our reactive approach to pressure ulcer management was no longer providing patients with optimal outcomes. Two CSICU bedside nurses serve as representatives on the organization’s Champions of Skin Integrity (CSI) team, which consists of unit representatives who disseminate best practices in pressure ulcer prevention. They collaborated with the hospital’s wound ostomy continence team and empowered Daniels Nicole Cooper, RN, BSN, CCRN-CSC
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Against All Odds: Preventing Pressure Ulcers in High-Risk Cardiac Surgery Patients

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their peers to effect change through development of a proactive approach to pressure ulcer prevention.

Developing this proactive culture began with augmentation of current knowledge. The CSICU’s CSI team provided small-group education for staff, covering the content of the hospital’s pressure ulcer prevention program. This content included reviewing current pressure ulcer rates, causes of pressure ulcer formation, and Braden scoring. Pressure ulcer prevention topics such as proper turning and positioning, device-related pressure ulcers, nutrition, and moisture-associated skin damage were included. Our care partners participated in this education and also attended a 4-hour specialized class on pressure ulcer prevention hosted by the organizational wound care team. Education was translated into bedside practice with return demonstration of proper turning and pressure-offloading techniques.

The members of the CSI team, in collaboration with our unit’s nurse clinician, implemented proactive daily bedside rounding, evaluating practice and providing real-time education. During proactive rounds, the CSI and bedside nurse collaboratively visualize the patient to ensure that all pressure points are relieved and discuss risk factors, anticipating potential problems.

To identify pressure ulcers accurately and treat them properly, communication between patient care areas is imperative. The CSICU’s CSI team members correspond with the champions in the cardiac surgery progressive care unit to communicate findings and subsequent interventions via e-mail before a patient is transferred. Existing pressure ulcers are discussed daily during intershift safety huddles. Monthly prevalence survey results are posted on the unit to promote awareness and foster accountability.

**Pathophysiology of Pressure Ulcers**

Prevention of pressure ulcers is heavily reliant upon redistribution of pressure and shear along with microclimate management. Pressure ulcers develop when tissue damage occurs, either from ischemia induced by capillary occlusion, reperfusion injury, accumulated metabolites from impaired lymphatic drainage, or prolonged deformation of the tissues from shear. Risk factors for decubitus ulcers include mechanical ventilation, immobility, use of vasopressors, multiple comorbid conditions, spinal cord injury, severe illness, increased length of hospital stay, impaired nutrition, older age, low body mass index, diabetes, and renal insufficiency.2,3

Medical device–related pressure ulcers are injuries associated with therapeutic or diagnostic devices. These pressure ulcers are most frequently found in ICUs, where continuous and invasive monitoring is essential. It is recommended that pressure redistributive dressings be placed around medical devices. The applied dressings should be inspected and repositioned every shift, to ensure that pressure relief is successfully maintained.4

**Use of Prophylactic Dressings**

Our unit participated in a research study approved by the institutional review board that used prophylactic sacral dressings for prevention of pressure ulcers. Patients were randomly assigned to a standard of care group that used the current bundle for prevention used in the ICU, or to an intervention group consisting of the same standards of care, with the addition of a prophylactic sacral dressing both during the operation and in the ICU (Mepilex Sacrum, Mölnlycke Healthcare).

The results (8 pressure ulcers in the standard care group, 1 in the intervention group) led to a change in practice not only in the unit, but in the hospital as a whole, and now globally. Since the results were published in early 2012,5 2 randomized controlled trials, multiple peer-reviewed manuscripts, and more than 70 clinical posters have been completed validating results of that study, including the cost-effectiveness of this intervention.6-10 All patients in the CSICU have a prophylactic sacral dressing for their entire hospital stay. Application of the dressing is initiated preoperatively and continues through their progressive care recovery. Nurses inspect under the dressing daily and as needed to assess for new pressure ulcer development and optimal dressing placement for pressure reduction.
Occasionally patients return from the operating room with delayed sternal closure or “open chest.” Delayed sternal closure is used to manage reperfusion myocardial edema, hemodynamic instability, refractory bleeding, and malignant arrhythmias. This approach facilitates surgical reentry for bleeding control, clot evacuation, and cardiac massage. Slowikowski and Funk state that being “too unstable to turn” is a major indicator for pressure ulcer development. Labeling a patient “too unstable to turn” perpetuates the notion that turning will result in hemodynamic instability. According to Winslow and colleagues, changes in heart rate and mixed venous oxygen saturation following lateral turning of intensive care patients is transient and expected, and most patients return to baseline within 5 minutes of completion of the repositioning.

Vollman suggests that failing to turn patients in the early days after cardiac surgery can cause less adaptability to gravitational changes from turning; thus the body may become hemodynamically stable, solely dependent on the supine position. In critically ill patients who are already compromised from poor vascular circulation and low cardiovascular reserve, turning patients who can recover within 10 minutes after being repositioned, despite having a delayed sternal closure, can prevent development of hospital-associated pressure ulcers.

Following a grand rounds presentation on suspected deep tissue injury, an internationally recognized expert in pressure ulcer prevention and member of the National Pressure Ulcer Advisory Panel visited the CSICU on walking rounds. The consultant was immediately intrigued with our use of prophylactic dressings, as well as the unit’s culture and approach to repositioning hemodynamically unstable patients, which she witnessed when a patient with an open chest undergoing extracorporeal membrane oxygenation (ECMO) was being turned. She remarked that our low rates of pressure ulcers, compared with other CSICUs she had visited, may be related to the aggressive bedside management of postoperative patients to include turning all patients, especially those with open chests and those undergoing ECMO. To minimize hemodynamic changes, CSICU nurses elicit the help of several colleagues to monitor the patient, manage equipment, and monitor patients’ responses, while turning the patient very slowly. Parameters such as life-threatening arrhythmias, refractory hypotension, acute hemorrhage, or the inability to recover within 10 minutes of turning were used to classify patients as “too unstable to turn.” If a patient meets the definition for “too unstable to turn,” our nurses reassess at least every 8 hours to determine whether frequent turning (every 2 hours) may resume.

To prevent supine dependency, a number of weight distribution measures are implemented; for example, slow incremental turning (starting at 10° and increasing by 10° increments as tolerated), shifting hips every 30 minutes, and use of air redistribution mattress modes. A description of our techniques for turning high-risk ICU patients and consensus recommendations from a panel of critical care–certified clinicians has been published. Efforts to protect other pressure points require equal attention during times of hemodynamic instability. Fluidized positioners are used to protect the occiput, repositioning the head at regular intervals. Standard pillows are positioned to float heels and elbows. In cachectic patients, soft silicone dressings (Mepilex Border, Mölnlycke Healthcare) should be placed prophylactically to protect elbows. An extended-frame bed should be considered for tall patients whose feet consistently rest against the footboard, as they are at high risk for pressure ulcers developing on the soles of the feet.

Cardiac Assist Devices

A unique challenge specific to cardiac surgery patients is prevention of pressure ulcers related to cardiac assist devices. Patients being supported with ECMO or Centrimag (Thoratec Corporation) are often cannulated through the internal jugular vein, requiring a polyurethane foam dressing to be placed between the cannula tubing and the ear to prevent supine dependency.
relieve pressure. Likewise, cannulation tubing placed in the groin requires the same pressure-offloading techniques when metal clamps are used for stabilization against the lower extremities. Placement of these prophylactic dressings immediately after cannulation is imperative for preventing such ulcers.

Drivelines associated with mechanical circulatory assist devices, such as HeartMate II (Thoratec Corporation), HeartWare (HeartWare Inc), and the Syncardia Total Artificial Heart, place patients at risk for both pressure ulcers and subsequent infection. To prevent the development of pressure ulcers related to the driveline for a left ventricular assist device, the driveline must be stabilized to the patient’s skin with a tubing anchor. Stabilization promotes skin adherence to the driveline while suspending it above the skin, preventing erosion and tunneling, while providing pressure relief to the surrounding tissue. Skin is assessed under the anchor every 5 days, with anchor replacement as needed. The Total Artificial Heart has 2 larger driveline exit sites, making them more challenging to stabilize. Wrapping the driveline with gauze and securing with tape prevents twisting and skin irritation.

**Tracheostomy**

Nursing standards of care related to tracheostomy management and pressure ulcer prevention are often impeded by surgical techniques. Providers often use sutures to secure the tracheostomy phalange to the patient’s neck, with the intention of preventing potential dislodgment of the tracheostomy tube. However, sutures make it difficult for nurses to relieve pressure by preventing adequate barrier placement between the tracheostomy plate and the skin. This is especially a problem following fluid resuscitation or in patients with fluid volume overload. The combination of direct pressure on the skin, with potential additive effects of tracheal secretions, creates pressure ulcers that are often accompanied by maceration at the suture sites.12

An exhaustive literature search was conducted to ensure that eliminating tracheostomy phalange sutures would not compromise patients’ airways. A multi-institutional analysis of tracheostomy complications revealed no difference in rates of accidental decannulation based on the presence or absence of outer phalange sutures.15 Most publications related to tracheostomy procedures indicate that differences in suture placement practices are related to provider preference as opposed to evidence.15-18 Most of our tracheostomy procedures are bedside percutaneous placements, performed by our interventional pulmonology team. We engaged in collaborative discussion regarding the lack of evidence to support the use of sutures to secure tracheostomy phalanges for airway protection. The discussion resulted in the decision to change practice. Sutures are no longer routinely used to secure bedside percutaneous tracheostomy phalanges. Velcro (hook and loop fastener) tracheostomy holders continue to be used for safe airway securement for all tracheostomy patients. Reducing the use of sutures with routine percutaneous tracheostomy patients has allowed our nurses to deliver pressure-relief interventions.

Our interventions for the prevention of medical device–related pressure ulcers in respiratory devices include the collaborative development of educational modules created by the wound ostomy and continence team and the respiratory therapy department as annual competencies, which specify repositioning of devices and the use of prophylactic thin foams (Mepilex Lite, Mölnlycke Healthcare LLC), which have been described in published reports.3,16 These efforts have resulted in our ability to nearly eradicate these injuries.

**Surgical Bra**

A rare, yet equally troublesome pressure ulcer occurred in the CSICU with the use of a postsurgical compression brassiere, which is reserved for female cardiac surgery patients who are larger in both chest circumference and breast size. Published reports19-21 are focused on the use of these garments for stabilization of the sternum, improved approximation of sternal wounds, and comfort. The Women’s Recovery from Sternotomy-Extension Study determined that female patients experience postoperative pain for up to a year after their cardiac surgery, and a larger chest circumference is a risk factor.20 The postsurgical brassiere offered at
our hospital was not constructed to accommodate forward breast expansion. The fabric did not stretch, and most importantly, the edges were abrasive, minimally elastic, and constrictive. A patient who required the use of this post-operative brassiere had pressure ulcers develop above and below the breast and on the left lateral aspect of her rib cage along the bra line. The ulcer was painful and difficult to heal.

Frustrated with this pressure ulcer, our CSICU’s CSI team investigated alternative products in collaboration with the plastic surgery team. Multiple products were evaluated, and the Carefix Mary Bra (Tytex, Inc) was selected for a trial. This product was ranked favorably by both our nurses and our patients. The Carefix Mary Bra is constructed of a soft, flexible fabric with built-in compression areas and soft, flexible edges that do not cut into patients’ skin. Since implementation of this product, we have not experienced any pressure ulcers related to the use of postoperative surgical brassieres.

Without a proper supportive garment, the failure to separate the skin fold under the breast may lead to more cutaneous complications. Moisture, friction, and pathogenic organisms have been described to cause a form of breakdown referred to as intertriginous dermatitis—a form of moisture-associated skin damage. Therefore, care must be taken to cleanse the skin properly with a pH-balanced foaming cleanser, while drying the skin well and avoiding placing inappropriate moisture management devices (eg, sheets, towels, washcloths, or gauze) between the folds. Proper support of the breasts in addition to appropriate moisture and antimicrobial wicking products (Interdry AG, Coloplast) are used to prevent these injuries.

**Endotracheal Tubes**

Endotracheal tube (ETT) mucosal injuries comprised the majority of our device-related pressure ulcers, prompting the CSI team to add surveillance of ETT repositioning to their daily rounds. Best-practice recommendations for ETT management include ETT rotation every 24 hours when tape is being used as the securement method. The barrier to maintaining this best practice was the absence of a date being written on the ETT tape. The Hollister Anchor Fast Oral ETT Holder (Hollister Inc) was introduced as an additional securement device option. This device requires staff to rotate the ETT every 2 hours and change the device every 3 days. When applied properly, the device alleviates oral mucosal pressure points. Retraining and surveillance of ETT rotation frequency and timing nearly resolved this problem.

**Feeding Tubes and Heel-Offloading Devices**

Although we did not initiate formal practice changes for off-loading pressure from feeding tubes or patients’ heels, the education and increased focus on pressure ulcer prevention in general resulted in a decrease in pressure ulcers related to feeding tubes to 0 for the past 14 months. Our nurses continue to rotate nasogastric tubes every 24 hours to prevent mucosal injuries. Repositioning requires the nurse to inspect, remove and reapply, and note the date and time on the securement adhesive tape.

We participated in the trial of a feeding tube securement device that secured to the patient’s cheek. However, the product was not strong enough to hold the feeding tubes in place. Cloth tape continues to be the securement method of choice in the CSICU. Heels continue to be floated, using pillows placed vertically underneath the lower extremities. Prevalon boots (Sage Products) are our method of choice when heel pressure cannot be properly offloaded with pillows because of edema or leg circumference.

**Results**

The journey to improved outcomes began in 2012, with a total of 28 pressure ulcers attributed to our unit over the course of 12 surveys (Figure 1). Twelve of these pressure ulcers were related to medical devices (Figure 2).

In 2013, our total pressure ulcer rate decreased by 56%, with an 83% decrease in medical device–related pressure ulcers and a 27% decrease in pressure ulcers that were not related to medical devices (see Table). This reduction is particularly noteworthy because the acuity of the patients had increased (see Table).

Our reduction in pressure ulcers provided substantial cost savings. According to the Agency for Healthcare Research and Quality, the cost of treating a stage II
Table 1  Sustained decrease in prevalence of pressure ulcers in relation to level of patient acuity in the cardiac surgery intensive care unit.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of pressure ulcers</th>
<th>No. of patients cannulated with ECMO</th>
<th>No. of patients implanted with MCADb</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>23 12 11</td>
<td>34</td>
<td>42</td>
</tr>
<tr>
<td>2013</td>
<td>10 2 8</td>
<td>42</td>
<td>46</td>
</tr>
<tr>
<td>Change from 2012 to 2013</td>
<td>56% 83% 27%</td>
<td>24%</td>
<td>10%</td>
</tr>
<tr>
<td>2013</td>
<td>10 2 8</td>
<td>42</td>
<td>46</td>
</tr>
<tr>
<td>2014</td>
<td>6 2 4</td>
<td>46</td>
<td>38</td>
</tr>
<tr>
<td>Change from 2013 to 2014</td>
<td>40% Maintained</td>
<td>50%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Abbreviations: ECMO, extracorporeal membrane oxygenation; MCAD, mechanical circulatory assist device; MDRPU, medical device–related pressure ulcer. 

a Unresolved pressure ulcers are accounted for only once.

b Total artificial heart, HeartMate II, or HeartWare.
pressure ulcer is estimated at $7000.\textsuperscript{18} The cost savings from 2012 to 2013 (at $7000 per ulcer) was $84,000, $70,000 for medical device–related pressure ulcers and $14,000 for pressure ulcers not related to medical devices.

**Conclusion**

The CSICU’s theory that pressure ulcer surveillance is not a once-a-month event has been the cornerstone of professional practice related to the reduction of the number of pressure ulcers in our unit. Peer-to-peer feedback promotes a culture of shared governance and accountability, improving quality measures and patients’ outcomes. A proactive approach, practice surveillance, evidence-based practice, new products, and hypervigilance of all staff are instrumental in maintaining such low rates. **CCN**

**Acknowledgments**

The authors recognize the entire nursing team from the cardiac surgery intensive care unit and the Virginia Commonwealth University Medical Center’s wound care team for their steadfast commitment to providing outstanding, proactive care to our cardiac surgery patients. We thank Christopher Tod Brindle for his generous assistance in the review of this manuscript.

**Financial Disclosures**

None reported.

**References**

In this book, Dr Gawande addresses that it is not about our “success” in the battle against disease; rather it is about what the patient and family believe is important. This concept carries difficult lessons as we care for patients, as well as our own friends and family members. We are all mortal in the end.

The book is written as a history, with stories of patients, friends, and family members who are experiencing end-of-life decisions. These stories are case studies of the “how to” and, equally important, the “how not to.” We meet older adults who need to decide about their living as they become more dependent on others. Dr Gawande explains why we have both nursing homes and assisted living facilities, and he includes conversations with people who have different ideas about how older adulthood, living, and dying can be.

He also brings us along on his journey as a practitioner, learning that posing options for patients does not help them with the big decisions. We must also ask about the meaning they ascribe to quantity and quality and the concepts of palliative care and hospice in defining a “good day.” Our care then becomes focused on helping patients and families be successful in having good days now rather than striving to have potential good days in the future, after treatment has concluded. His stories are not just about the elderly; he includes patients in their 20s, 40s, 60s, and beyond.

Dr Gawande offers a very intimate portrait of his experience with his father, also a surgeon, and his last years. Knowing all the pathophysiology, treatment options, and interventions does not create easy decisions. It is about the tradeoffs; what are patients willing to give up now for a possible future and what is truly important to them in achieving that good day.

This is a book about outcomes from the perspective of patients and families. It is a book about hope that we in health care learn that success, like pain, is what the patients and families say it is rather than what we perceive it to be. “Endings matter,” he says, “not just for the person but, perhaps even more, for the ones left behind.”

As health care practitioners we have been left behind in many of our patients’ stories. Many times we think of our days as successes and failures, but helping our patients, friends, and families have good days rather than many days helps us redefine success in real terms.

Dr Gawande is a storyteller, bringing the reader along on an exploration of a difficult topic. We are all human beings and potential patients facing our own mortality.
The Nurse’s Reality Shift: Using History to Transform the Future
Neal-Boylan L.

Neal-Boylan uses the recent history of nursing to describe “how we got here” and as a springboard to help define the potential future of nursing. Her survey of nurses provides insight into what we are doing right, as well as what we are doing wrong. Respondents provide a framework that she uses to define current issues in nursing and to propose solutions for continued change to help nursing contribute to optimal outcomes for patients, families, and health care.

Critical Thinking Tactics for Nurses: Achieving the IOM Competencies, 3rd edition

This textbook teaches the concepts of critical thinking in a manner that helps the reader develop a critical thinking process. There are tables of content, exercises in critical thinking, and case studies throughout the book. The authors use the 5 core Institute of Medicine competencies—patient-centered care, interdisciplinary team work, evidence-based practice, informatics, and quality improvement—to frame the content and bring relevance to the learning.

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New Products

Suspension system for safe and efficient intrahospital transport

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Surgical rubber sleeve provides waterproof protection

The DRYPro Waterproof Body Protector is a high-quality surgical rubber sleeve that fits over casts, bandages, ostomies, peripherally inserted central catheters, and prosthetics. The patented vacuum seal ensures that a cast or bandage will remain dry, even when submerged in water. Using the latex-free DRYPro Waterproof PICC protector when showering or swimming helps keep bacteria and other contaminants away from the vein the PICC is inserted in. The PICC cover is tan colored and open on both ends to keep the patient’s hands free. The protector can be trimmed to fit anyone.

For more information, visit www.drycorp.com.
Education Directory

Colorado
Denver
CRN and PCCN Certification Review Course
Date: November 18-20, 2015. Place: University of Colorado Hospital, Bruce Schroffel Auditorium, Denver, CO. Sponsor: Denver Chapter of AACN. Keynote Speaker: Carol Rauen. Contact: Shannon Johnson Bortolotto. E-mail: shannon.bortolotto@uchealth.org. Fee: Early bird $195 through 9/1/15; $225 after 9/1/15; $125 per day

Kentucky
Louisville
2015 Critical Care Symposium
Date: November 30, 2015. Place: Baptist Hospital East Education Center. Address: 4000 Kresge Way, Louisville, KY 40207. Sponsor: Greater Louisville Chapter of AACN. Keynote Speaker: Michael Ackerman. Contact: Marlot Wigginton. E-mail: mawigg@gmail.com. Fee: Members, $80; nonmembers, $75; student (prelicensure), $25; manager’s special (local hospitals only), $50. Credits: 7 CEUs

Louisiana
New Orleans
Pediatric Critical Care Nursing

Oregon
Portland
42nd Annual Critical Care Fall Symposium
Date: November 9-10, 2015. Place: Vancouver Hilton, Vancouver, WA. Sponsor: Greater Portland Chapter of AACN. Keynote Speakers: Karen McQuillan, Clareen Wiencek, Dr Ken Christopher, Elizabeth Bridges, Dr Sean Townsend. Contact: Lori Ritter. E-mail: criticalcarefallsymposium@gmail.com. Credits: TBD

Pennsylvania
King of Prussia
2015 TRENDS in Critical Care Nursing Conference
Date: October 6-9, 2015. Place: Valley Forge Event Center. Address: 1160 First Avenue, King of Prussia, PA 19406. Sponsor: Southeastern Pennsylvania (SePA) Chapter of AACN. Keynote Speakers: Claren Wiencek, Tracy Carlino, Charles Kunkle, Al Rundio. Contact: Patricia Nichols. E-mail: sepaeducation@sepa-aacn.org. Credits: Up to 34.5 CEUs

Texas
Dallas
Advanced Critical Care & Emergency Nursing
Date: November 1-4, 2015. Place: Hilton Dallas Lincoln Centre. Sponsor: Contemporary Forums. Contact: Kristine Mulholand. Address: 3478 Buskirk Ave, #242, Pleasant Hill, CA 94523. Phone: (800) 377-7707. Fax: (925) 828-1950. E-mail: info@cforums.com. Website: contemporaryforum.com. Credits: 16 CEUs

Dallas
CCRN/PCCN Review Course
Date: October 29-30, 2015. Place: Texas Health Presbyterian Hospital of Dallas, Fogelson Forum. Sponsor: Dallas County Chapter of AACN. Keynote Speaker: Julie Miller. Contact: Katherine Wright. Phone: (972) 998-9521. E-mail: dallasaacn@yahoo.com. Fee: $100. Credit: 14 CEUs

Washington
Lynnwood
Currents in Critical and Progressive Care
Date: October 6-7, 2015. Place: Lynnwood, WA. Sponsor: Mountain to Sound Chapter of AACN. Keynote Speakers: Karen McQuillen, Debbie Brinker, Mary ByLone. Contact: Collyn West. E-mail: education@mtsaacn.org.

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I Am a Critical Care Nurse

Candice Coco, RN, BSN, CCRN, is a staff nurse in the intensive care unit at CHRISTUS St. Frances Cabrini Hospital in Alexandria, Louisiana.

Why did you become a nurse?
I was inspired to become a nurse after seeing my father recover from a motor vehicle accident. He was in the intensive care unit (ICU) for several days. His nurse was amazing. She was so knowledgeable and kind, and she helped our family through a tough time. She inspired me to become a nurse so that I could help people in their most crucial time of need.

What about your job as a nurse makes you happy?
Being a critical care nurse is so exciting. In this environment you have to be ready for anything. Challenges come at you every day, from helping your patients out of bed for the first time to holding their hand as they take their last breath. As a critical care nurse, I know I have the knowledge, ability, and passion to overcome all these challenges and learn from them.

Tell us about an extraordinary experience you’ve had as a critical care nurse.
My most memorable experience was caring for a patient who recovered from open heart surgery, cardiac arrest with more than 1 hour of cardiopulmonary resuscitation (CPR), and an open chest wound for 7 days. This patient overcame our biggest doubts. As her nurse, I cared for her and helped her family through a very difficult time. The patient transferred out of ICU, and now she is home with her family.

What are the challenges you encounter and how do you overcome them?
One of the biggest challenges in our unit is the acuity level of our patients. Many patients have had open heart surgery, which means we care for complex patients with Swan-Ganz catheters, intra-aortic balloon pumps, and new oscillator ventilators. Caring for these high-risk patients and managing their equipment present many challenges, but we have a fantastic team of nurses, nurse practitioners, physician assistants, and intensivists who support and educate each other.

What has your journey as a nurse been like?
My journey started on a medical-surgical unit where I had an overwhelming workload. I had many discouraging days, but I pulled through. I learned time management, organization, and prioritization. After 1 year I accepted a position in the intensive care unit. I learned and accomplished many skills. I enjoy critical care so much that I’ve enrolled in the Acute Care Nurse Practitioner program at the University of South Alabama.

At the end of a busy day, how do you find balance in your life?
I work with a great team of critical care nurses. We laugh and cry together and we learn from each other. Also I surround myself with friends and family. I enjoy gardening, crochet, cycling, and reading in my spare time.

What would we be surprised to know about you?
I’m a deer hunter. I enjoy rifle hunting, archery, and skeet shooting.

How has AACN played a role in your career?
AACN has played a major role in my career. I earned my CCRN certification in 2013. We created a local AACN chapter here in our community. Together we raise money and help local charities. For example, we provided CPR training to members of our community.

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I Am a Critical Care Nurse features the extraordinary in a critical care nurse’s ordinary experiences. To be featured in this department, contact Critical Care Nurse via e-mail at ccn@aacn.org.
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