

## RESEARCH ORAL PRESENTATIONS

*Research Oral Abstract Award Winner*

### **The Ramsay Scale: Limited Interrater Reliability**

*Olson D, Lynn M, Thoyre S, Graffagnino C. University of North Carolina at Chapel Hill, NC.*

**Purpose:** To test the interrater reliability of the Ramsay scale (RS) in a heterogeneous group of critical care nurses. **Background/Significance:** Despite the lack of instrument development over the past 32 years, the RS has become entrenched as the cornerstone of sedation assessment. **Methods:** IRB approval was obtained for both phases of this study. Phase 1 consisted of producing a series of short sedation assessment videos that were scored by a panel of experts. Nurse-subject recruitment began after 100% agreement was reached on 6 videos that represented the 6 levels of Ramsay. Block randomization assigned nurses to score a video using each of 3 different sedation scales (RS, Sedation-Agitation Scale, and Global Sedation Assessment Scale) on 3 different days following standardized education on each scale. **Results:** 241 nurses from 7 CCUs consented to the study, with 231 nurses scoring the video using each of the 3 sedation scales. Recruited nurses worked day shifts (116), night shifts (67), or rotated shifts (58). Mean days between viewing videos was 9 (range 1-45 days). The overall interrater reliability of RS scores was low ( $\kappa = .27$ ). The agreement is greater ( $\kappa = .56$ ) when Ramsay levels 2, 3, 4, and 5 were collapsed. **Conclusions:** Because the RS is arguably the foundation of subjective sedation assessment, the implications of this study are profound. When used by critical care nurses the RS was not sufficiently reliable in describing sedation levels. Because the greatest percentage of agreement of Ramsay scores is at the extremes of sedation (the Ramsay scale poorly differentiates the various depths of sedation), this study provides reason to question the use of the RS in clinical practice and as a standard by which the validity of other sedation tools are assessed. Further reliability assessments are indicated before drawing conclusions regarding the use of this scale.

### **Autonomic Nervous System Function During Deep and Light Sedation in Mechanically Ventilated Adults**

*Unoki T, Grap M, Sessler C, Best A, Wetzel P, Hamilton A, Mellott K, Munro C, Virginia Commonwealth University Schools of Nursing and Medicine, Va.*

**Purpose:** To describe the effect of level of sedation on heart rate variability (HRV) as a marker of autonomic nervous system (ANS) function in mechanically ventilated patients. **Background/Significance:** Cardiac disease is associated with ANS dysfunction in critically ill patients. Although most critically ill patients receive sedation for a variety of reasons, effects of depth of sedation on ANS function is unknown. HRV is a measure of ANS function. The ratio of low-frequency to high-frequency power (LF/HF) reflects balance within the ANS, and rMSSD (root mean square of successive difference of RR interval) and pRR50 (% of differences of successive RR intervals differing > 50 msec) estimate HF variations and reflect parasympathetic nervous system (PNS) function. **Methods:** This study is part of a larger study in which sedation level was measured continuously up to 24 hours. We selected data as secondary analysis of HRV. Fifteen patients with mechanical ventilation (79% female; mean age 45 years, mean APACHE II 28.4) were studied. RR interval was measured with ECG. Sedation level was defined using the Patient State Index (PSI; processed EEG) as deep (<60) and light sedation (>80). We selected consistent HR interval data

of 5 to 10 minutes from each sedation level. **Results:** PSI during light and deep sedation was  $79.7 \pm 7.0$  and  $45.3 \pm 9.4$ , respectively. rMSSD and pRR50 were significantly lower during deep sedation compared with light sedation (rMSSD,  $35.7 \pm 36.5$  vs  $15.0 \pm 15.6$ ,  $P = .007$ ; pRR50,  $7.1 \pm 13.0$  vs  $\pm 1.2 \pm 3.3$ ,  $P = .046$ ). LF/HF was comparable between the sedation levels. **Conclusions:** Our finding suggests that deep sedation may depress PNS function. SNS function dominates in the patients with deep sedation compared to light sedation. Deep sedation might be a risk factor of cardiovascular complications, especially in patients at risk for these complications. **Sponsored by:** Baxter Healthcare.

### **Impact of Implementing a New Pain Assessment Tool for Nonverbal Patients in a Trauma Neurosurgical Critical Care Unit**

*Canzian S, Topolovec-Vranic J, Innis J, White-McFarlan A, Baker A, St Michael's Hospital, International.*

**Purpose:** To evaluate the effect of implementing a new pain assessment tool in a trauma/neurosurgical ICU. Outcome measures were patient and staff satisfaction, frequency of pain documentation, and amount of analgesia administered. **Background/Significance:** Accurate pain assessment and management in nonverbal or cognitively impaired patients is challenging. No widely accepted assessment tool is available for pain assessment in nonverbal patients. A formalized assessment tool may aid in pain management, increasing patients' and staff members' satisfaction with pain management, and provide a measurement tool for future research projects. **Methods:** Retrospective chart reviews and staff and patient satisfaction questionnaires were used before and after implementation of the Critical Care Pain Rating Scale (CCPRS), which is composed of 3 separate rating scales (Numerical Pain Rating Scale, Wong Faces Pain Scale, and Adult Nonverbal Pain Scale) developed for this study. The CCPRS can be used with conscious, verbal patients as well as sedated and/or intubated patients. The questionnaire responses, frequency of pain documentation, and amount of pain medication given were compared before and after implementation using *t* tests. **Results:** Most staff members ranked the tool as easy to use. Implementation of the tool also increased staff confidence in assessing pain in nonverbal sedated patients and increased the frequency of pain assessment documentation. Patients reported decreased retrospective pain ratings and a decrease in the amount of time required to receive pain medication. **Conclusions:** The CCPRS is a comprehensive pain assessment tool that can be used with conscious verbal patients as well as sedated and/or intubated patients. Implementation of the CCPRS in a critical care setting improved pain management, frequency of documentation, and patient and staff satisfaction scores.

### **Content Validity of the Cognitively Impaired Adult Pain Assessment Tool**

*Berry L, Morrissey B, McNeese State University, La.*

**Purpose:** To begin the process of tool validation by comparing the newly developed Cognitively Impaired Adult (CIA) pain assessment tool with the valid and reliable Numeric Rating Scale (NRS) in a pilot study. **Background/Significance:** The CIA pain assessment tool was developed by the researchers to provide a simple and consistent method for nurses to identify, evaluate, and document acute surgical or procedural pain in adults who have difficulty verbalizing the presence and intensity of pain. The NRS and CIA assessment tools are graded on a scale of 0

to 10. **Methods:** The postanesthesia care unit (PACU) in a small southwestern Louisiana hospital (where both investigators are employed) was chosen as the site for the study. RNs working in the PACU were trained to use both tools. Interrater reliability was set at 90% for the selection of RNs to assist with data collection. Thirty cognitively intact patients were used to compare the tools. Participants were tested following an invasive procedure. A nurse-assigned CIA score and a patient self-reported NRS score were collected for each participant. **Results:** The ANOVA was significant at  $P < .001$ . A paired  $t$  test also was significant ( $P = .124$ ). Mean CIA score was 3.4 (SD 3.191). The mean score for the NRS in the same patients was 4.133 (SD 3.598). Correlation between the CIA and the NRS was high at 0.91. The CIA was found to have good interrater agreement, established at 90% for the scores obtained in the subset of 10 patients. **Conclusions:** This pilot study demonstrates that the CIA pain assessment tool has a high correlation with the valid and reliable NRS tool. The CIA is easy to apply and takes about 10 minutes to train nurses to use. Further research is needed to support the validity, reliability, and clinical utility of the CIA pain assessment tool.

#### Adaptation in Adults Living at Home With Left Ventricular Assist Devices (LVADs)

Williams J, Woods S, Bridges E, Motzer S, Ledoux D, University of Washington School of Nursing, Wash.

**Purpose:** To assess adaptation in adults living at home with LVADs. **Background/Significance:** LVADs have been used in patients awaiting heart transplantation and in those with end-stage heart failure who are not candidates for heart transplantation. Quality of life has been shown to improve after LVAD implantation (Rose et al, 2001), but few studies have described how persons with LVAD adapt to the device. No studies could be found that explored adaptation specifically in the home. **Methods:** Using a qualitative approach, English-speaking persons aged more than 18 years residing in Washington, currently implanted with LVAD, and living at home were interviewed. The 2 interviews obtained within the 2-month study period were tape recorded and transcribed. Downe-Wamboldt's (1992) methods for content analysis were used. **Results:** Two adults (aged 39 and 56 years) with idiopathic dilated cardiomyopathy, implanted with HeartMate II LVAD (Thoratec Corporation, 2005), awaiting transplantation were interviewed. Four main categories were identified: (1) adapting to physical changes, (2) psychosocial adaptation, (3) strengths useful for adaptation, and (4) words of wisdom. Sternal pain, showering, exit-site maintenance, loss of appetite, sleep problems, driving, and energy levels were subcategories identified under (1). Initial apprehension and loss of independence were subcategories under (2). Internal motivation, God, and family were areas identified under (3). Subjects' advice for persons with LVAD was mentioned under (4). **Conclusions:** Time, hope, perseverance, and supportive relationships were common themes seen with adaptation to the LVAD. The 2 case studies were useful for understanding how persons with LVAD adapt to life at home. Generalizability is limited, but findings may be useful in laying groundwork for future investigators.

Research Oral Abstract Award Winner

#### Relationship Between Serum Glucose and Outcomes in Patients With Subarachnoid Hemorrhage

Hravnak M, Crago E, Hricik A, Horowitz M, University of Pittsburgh, Pa.

**Purpose:** This study examined elevated serum glucose prevalence in patients immediately after aneurysmal subarachnoid hemorrhage (SAH-A), and its relationship to patient outcomes. **Background/Significance:** Elevated glucose has been related to

poor outcomes in some critically ill populations, but has not been fully studied in SAH-A patients. **Methods:** This prospective longitudinal study recruited 244 SAH-A patients (mean age  $54 \pm 12$  years) with a Fisher Grade of 2 and/or a Hunt-Hess category of 3 admitted to the NICU. Admission serum glucose (A-GLU) levels were obtained. Outcomes included mortality, and patients' perceptions of functional recovery measured by the Glasgow Outcome Scale (GOS) and functional disability by the Modified Rankin Scale (MRS) at 3 and 6 months. Descriptive,  $\chi^2$ , and Student  $t$  tests were performed (SPSS v. 12.0). **Results:** A-GLU was elevated commonly in SAH-A patients without prior diabetes ( $n=228$ , A-GLU mean, 154 mg/dL  $\pm$  49) and those with diabetes ( $n=16$ , A-GLU mean, 202 mg/dL  $\pm$  59). A-GLU was not significantly related to age ( $P = .858$ ), sex ( $P = .278$ ), or race ( $P = .555$ ). A significant relationship existed between A-GLU and SAH severity by Hunt-Hess category ( $P = .004$ ) but not bleed severity on computerized tomography by Fisher Grade ( $P = .257$ ). More patients who died (55%) had A-GLU values  $>160$  mg/dL than those who lived (29%,  $P = .056$ ). Elevated A-GLU was associated with poorer postdischarge outcome by both the GOS (3-month  $P = .004$ , 6-month  $P = .024$ ) and MRS (3-month  $P = .001$ , 6-month  $P = .011$ ). **Conclusions:** Elevated admission glucose levels are common after SAH-A in a young population without diabetes and are associated with severity of SAH symptoms and poorer outcomes at 3 and 6 months. It is not clear whether elevated A-GLU is a marker for severity of neurologic injury, a cause of poorer outcomes, or both. Vigilant glucose monitoring in this complex patient population is important for optimal care, and the reasons for causation and impact require further study. **Sponsored by:** The National Institutes of Health (NHLBI R01HL074316).

Research Oral Abstract Award Winner

#### Critical Care Nurses' Perceptions of Intensive Insulin Therapy

Fraser D, Robley L, Dunn A, Petefish J, Vandenberg J, Casteel L, Drain M, Shiluli P, Wellstar Health System and Kennesaw State University, Ga.

**Purpose:** To evaluate critical care nurses' perceptions of intensive insulin therapy (IIT) 16 months after protocol implementation. **Background/Significance:** Research has shown that IIT significantly reduces morbidity and mortality. Several studies have described the development and implementation of nurse-titrated protocols. Few studies, however, included the nurses' perspectives on how IIT affected their practice. **Methods:** This descriptive correlational study recruited 144 critical care nurses (92.1% female) from 3 hospitals in an integrated community health system. The mean age of the nurses was 39.9 years (SD 9.8) and the mean years practicing in critical care was 10.1 years (SD 9.2), with a range from 2 months to 34 years. An investigator-developed questionnaire (Cronbach's  $\alpha$  .94) with a Likert scale format was used. Descriptive and inferential statistical analyses were conducted using SPSS, version 13. **Results:** Nurses were knowledgeable about the research on IIT ( $M = 3.97$ , SD .52) and certified nurses were more likely to report higher knowledge levels ( $r = .268$ ,  $P = .001$ ) than were noncertified nurses. Nurses perceived that the educational initiative was helpful in preparing to implement IIT ( $M = 3.90$ , SD .54) and felt the protocol was moderately easy to use ( $M = 3.19$ ; SD .60). Nurses were moderately positive about outcomes related to IIT ( $M = 3.45$ , SD .69). Nurses who rated the educational initiative as helpful were more likely to be knowledgeable about research on IIT ( $r = .439$ ,  $P \leq .001$ ), easily incorporate IIT into practice ( $r = .554$ ,  $P \leq .001$ ), and report positive outcomes related to IIT ( $r = .421$ ,  $P \leq .001$ ). **Conclusions:** A comprehensive educational program is crucial for the successful implementation of IIT and should include review of the evidence supporting

the change in practice, the rationale for changing practice, ample opportunity to practice the new process, and reported outcomes from the change in practice.

#### **Clinically Significant Error in ICU Glucometer Testing From Hematocrit Effect Can Be Easily Corrected**

*Mann E, Pidcoke H, Wade C, Salinas J, Michalek J, Holcomb J, Wolf S, US Army Institute of Surgical Research, Tex.*

**Purpose:** Hematocrit effect, the influence of nonoptimal hematocrit on the accuracy of glucose analyzers, poses a safety risk to patients when tight glucose control is desired. We investigated glucometer error in our ICU and developed a reliable method for correction of hematocrit effect. **Background/Significance:** Recent major clinical trials by Van den Berghe et al (2001) and Hebert et al (1999) have changed practice in the ICU. The combination of tight glucose management and restrictive blood transfusion policies has created a situation that was not anticipated when the widespread use of point-of-care glucose testing became the standard of care. Using devices in the ICU that were originally intended for home use by hyperglycemic diabetics with normal hematocrit levels has proven problematic. **Methods:** 211 paired blood samples were prospectively collected and simultaneously tested with bedside glucometers (LifeScan SureStepFlexx™, Lifescan Inc, Milpitas, Calif) and laboratory serum analyzers. Serum versus glucometer results were plotted and regression analysis used to develop a mathematical correction factor subsequently validated with an additional 527 prospectively collected samples time-matched with grey top (sodium fluoride) lab specimens. **Results:** Glucometers overestimated blood glucose levels by 30% (SD 14%); the average hematocrit for the patients analyzed was 23% (SD 5%). The corrected glucometer values for the validation samples were on average within 2% (SD 6.5%) of reported lab values. The average hematocrit in validation samples was 23% (SD 5%). This correction factor is now applied to all bedside glucose values for patients with a hematocrit less than 35%. Our nurses titrate insulin infusions based on the corrected glucose value. **Conclusions:** There is a reliable and efficient method for accurately correcting for the hematocrit effect experienced with the LifeScan SureStepFlexx™ glucose analyzer.

#### **Psychometric Testing of an Instrument to Assess Critical Care Nurses' Level of Comfort in Withdrawing Life Support**

*Kierol-Andrews L, University of Connecticut, Conn.*

**Purpose:** To develop, evaluate, and refine an instrument to measure critical care nurses' level of comfort in performing the activities necessary to withdraw life support in adult critical care settings. **Background/Significance:** Currently 50% to 90% of deaths in CCUs are preceded by withholding or withdrawing life support. This is a change in the trajectory of dying and death and has been cited as a major stressor to critical care nurses. The Critical Care Nurses' Comfort in Withdrawing Life Support (CCN-CIWLS) instrument was developed to assess this issue of transitioning to comfort-oriented end-of-life care. **Methods:** This methodologic study recruited 429 CCNs who actively practice in adult settings and had withdrawn life support within the last year. A panel of 7 expert critical care and hospice nurses assessed content validity. Participants rated their level of comfort on a 5-point Likert scale. Reliability and validity of the instrument was assessed by an exploratory factor analysis (EFA) and internal consistency measurements. Temporal stability of the CCN-CIWLS was assessed via test-retesting of 43 participants. **Results:** The EFA revealed a 9-factor solution that explained 68% of the variance. Cronbach's  $\alpha$  calculated for the total instrument was .95. The subscale alphas were as follows: Communication, .94; Withdrawal Procedures, .91; Human

Connection, .88; CCNs' Psychological Self-Care Activities, .84. Temporal stability analysis revealed a strong positive correlation ( $r = .63$ ;  $P < .001$ ) between testings. The participants reported being most comfortable with performing withdrawal procedures, followed by promoting human connections, communication activities, and their own psychological self-care. **Conclusions:** This study provided evidence to support the reliability and validity of the CCN-CIWLS instrument for use in assessment, intervention, and outcome research. **Sponsored by:** University of Connecticut and Sigma Theta Tau Upsilon Chapter-At-Large.

#### **Withdrawal of Life-Sustaining Therapy: Healthcare Provider Perspectives**

*Wiegand D, University of Maryland School of Nursing, Md.*

**Purpose:** To describe the experience of healthcare providers participating in the process of withdrawal of life-sustaining therapy (LST). **Background/Significance:** Although withdrawal of LST occurs commonly in critical care, little is known about the experience from a healthcare provider's perspective. **Methods:** Using a phenomenological perspective for inquiry, this study sought to answer the question, What do healthcare providers experience during the process of withdrawal of LST? Audiotaped interviews were conducted with 5 critical care nurses and 5 physicians from 2 hospitals. An inductive approach to data analysis was used to discover units of meaning, clusters, and categories. Methodological rigor was established. **Results:** Commonalities between the critical care nurses' and physicians' perspectives included the importance of developing trust between healthcare providers and families, changing the focus of care to the family, and promoting a peaceful environment for death. Critical care nurses stressed the importance of promotion of patients' comfort, identified ethical dilemmas common during withdrawal of LST, and described healthcare provider coping after withdrawal of LST. Physicians identified cultural issues related to withdrawal of LST and described conflict within families and between family members and healthcare providers during the withdrawal of LST process. **Conclusions:** Critical care nurses and physicians are key healthcare providers who care for patients in situations in which LST is withdrawn. They assist family members of critically ill patients who often make decisions regarding the continuation of LST or its withdrawal. Understanding the perspectives of healthcare providers involved in the withdrawal of LST process may help other healthcare providers who are striving to provide quality care to the dying and their families.

#### **Sleep Quality and Noise Disturbances in a Cardiac/Trauma Step-Down Unit**

*Hedges C, Albano J, Meridian Health, Jersey Shore University Medical Center, NJ.*

**Purpose:** To examine nighttime noise disturbances in a progressive care unit (PCU) and their relationship to sleep quality and to describe patients' preferred sleep-promoting behaviors. **Background/Significance:** Sleep disturbances are common among critically ill hospitalized patients, resulting in decrements in physical and emotional well-being. Correlates of disturbed sleep are multifaceted; research has shown that sleep is disrupted due to environmental disturbances, interruptions to provide care, pain, sleep disorders, unfamiliar setting, and inability to adhere to normal bedtime habits. Noise is one of the disturbances frequently reported by patients, and researchers have described excessive sound peak levels in intensive and intermediate care units. **Methods:** This was a descriptive, correlational study with data collection occurring over 1 night in a PCU. Ninety-one participants completed Topf's Disturbances Due to Hospital Noise Survey, the

Richards-Campbell Sleep Questionnaire, and a bedtime care survey. **Results:** Patients reported low overall noise scores on a 24- to 120-point scale ( $M=31.9$ ,  $SD 8.41$ ), and poor sleep quality (0-50 scale;  $M=20.8$ ,  $SD 12.6$ ). However, poor sleep was significantly related to perceived disturbance due to noise ( $r=.348$ ,  $P=.001$ ). The most frequently reported noise disturbances were sounds from other patients (coughing, gagging, snoring), alarms on equipment, loud talking in the hallway, and TVs. Patients' most frequent preferred sleep hygiene activities included turning off lights, washing face and brushing teeth, smoothing linens, and finding a position of comfort. **Conclusions:** Although noise is only one factor that disturbs patients' sleep, nurses can improve outcomes by designing care to decrease noise. Interventions also can be designed to closely mimic patients' usual and preferred bedtime routines to promote sleep. **Sponsored by:** AACN Clinical Inquiry Grant.

### Perceptions of Intensive Care Nurses on Conventional Versus Alternative Measures to Restraints: An Exploratory Pilot Study

Mijares A, Reyes C, Robinson A, Isip H, Coleman B, Cedars-Sinai Medical Center, Calif.

**Purpose:** To explore nurses' perception of the use of conventional restraints and alternative interventions (eg, Freedom Splints) as it relates to total patient restraint. **Background/Significance:** Conventional physical restraints (CR) can greatly increase the risk of injury in an ICU patient population. A prevailing trend among hospitals, supported by the Joint Commission on Healthcare Organizations, is the use of alternative interventions (AI) to CR. A nurse's perception of the use of CR or AI will influence the decision to use one or the other. As part of our effort to increase the use of alternative methods as a first-line intervention to support patient safety, we implemented the use of the Freedom Splints (FS). **Methods:** This is an exploratory pilot study conducted in a medical ICU of a large university-affiliated hospital. A 12-item survey using a 4-point Likert scale measurement was adapted from the Perception of Restraint Use Questionnaire. Fifty ICU nurses were surveyed between March and May 2006. Data were analyzed using percentages. **Results:** We found a 52% decrease in CR use: from 2362 hours (September 2004) to 1250 hours (December 2005). In surveying staff regarding perceptions of CR and FS use, we found that 74% of nurses reported that they "never like restraining their patients." A total of 78% surveyed indicated that use of CR "interferes with [their] patient's rights and autonomy," and 80% reported that it is "important for patients to be restrained only when patient or staff safety may be compromised." Over the preceding year, the nurses also reported increased use of FS vs CR (96% vs 84%). **Conclusions:** Although nurses perceive restraints as a necessary intervention for patient and staff safety, their use is negatively perceived. As a result, after the FS was introduced as an alternative intervention, the collective restraint hours considerably decreased.

Research Oral Abstract Award Winner

### Improving Extubation Rates With Daily Spontaneous Breathing Trials

Sona C, Schallom L, Cracchiolo L, Buckles M, Song F, Schuerer D, Coopersmith C, Buchman P, Robertson T, Barnes Jewish Hospital, Mo.

**Purpose:** As part of a collaborative multicenter project, daily spontaneous breathing trials (SBTs) were implemented in our 24-bed surgical/trauma unit in a university-affiliated medical center. The purpose was to study SBT compliance, sedation and pain scores prior to the trial, posttrial patient response, and extubation and reintubation rates in our unit. **Background/Significance:** Despite evidence that performing daily SBTs is

best practice, unit compliance is low nationwide. **Methods:** All patients meeting safety screen criteria underwent a daily 30-minute breathing trial between 4:30 AM and 6:30 AM coordinated between respiratory therapy and nursing. Following a nurse-driven protocol, sedation was weaned to a Ramsay score of 3 before patients were placed on the trial. Pain and sedation scores, SBT results, and extubation and reintubation rates were tracked prospectively for 12 months. **Results:** From July 2005 to June 2006, 3048 SBTs were performed on patients receiving mechanical ventilation by endotracheal tube. Extubation rates increased from 38% to 50% over the study period ( $P=.012$ ). The reintubation rate was stable at 7% over the same period. Ramsay sedation scores were  $>3$  in 17% of patients at protocol implementation, with a 38% extubation rate. Ramsay scores were  $>3$  during only 1 month during the study period, which correlated with lower extubation rates. With nurse education, titration of sedation prior to the SBT to the goal Ramsay score of  $<3$  improved. Improvement in sedation weaning resulted in an improvement in extubation rates. **Conclusions:** A multi-professional approach to daily SBT with adherence to a nurse-driven sedation protocol during the trial improved extubation rates in our unit without increasing reintubation rate.

### Weaning Patients From Mechanical Ventilation: Current Practice Frazier S, Kelly S, University of Kentucky, Ky.

**Purpose:** To characterize current practices related to weaning patients from mechanical ventilation. **Background/Significance:** Mechanical ventilation is the most common intervention used in critical care. Evidence-based guidelines were published to optimize patient care outcomes, but there are no reports that systematically describe current practice. **Methods:** A convenience sample of critical care nurses ( $n=793$ ) from AACN completed the Mechanical Ventilation Survey. Most respondents were white (78%) females (88%) aged  $46 \pm 9$  years, employed in a community hospital (74%), and had  $17 \pm 9$  years of critical care experience. **Results:** Participants reported that nearly one third of patients ( $30 \pm 19\%$ ) experienced difficulty during weaning and that the weaning process composed roughly 12% of total ventilator time. No evidence-based guidelines had been adopted universally. Although a multidisciplinary team approach is recommended, only 40% of participants reported always using this approach. Just 26% of participants reported using a standardized weaning protocol. Most (58%) always or frequently used specific criteria to determine readiness to wean; commonly cited criteria included mental status,  $PaO_2 >60$  mm Hg,  $PaO_2/FiO_2$ , negative inspiratory force, and heart rate. Commonly used weaning modes included pressure support and continuous positive airway pressure. Specific criteria used to end a weaning trial included vital signs,  $SpO_2$ ,  $PaO_2$ , presence of diaphoresis, anxiety, dyspnea, or increase in work of breathing. Most participants (61%) believed family and significant others influenced the length of time a patient receives ventilation and the length of time to successfully wean from ventilation. **Conclusions:** Evidence-based guidelines for weaning from ventilation have not been universally adopted. Use of evidence-based guidelines is necessary for optimal patient outcomes. **Sponsored by:** University of Kentucky Small Grant Award.

### Therapeutic Hypothermia Feasibility in a Critical, ST-Elevation Myocardial Infarction, Postcardiac Arrest Population

Rush P, Unger B, Endelstein K, Parham W, Hokanson J, Page D, Boisjolie C, Mooney M, Abbott Northwestern Hospital/Minneapolis Heart Institute, Minn.

**Purpose:** To develop a coordinated method of providing care to unresponsive, postcardiac arrest, ST-elevation myocardial infarction (STEMI) patients. This includes initiating timely

percutaneous coronary intervention (PCI) and induced mild hypothermia. **Background/Significance:** Roughly 163 221 sudden cardiac arrests occur in the United States annually, with a 6.4% overall survival rate. Direct PCI is the preferred method of reperfusion for STEMI. Mild hypothermia is emerging as the treatment of choice for anoxic encephalopathy following cardiac arrest. Neurological damage following cardiac arrest due to reduced blood flow remains one of the major issues following cardiac arrest. Studies of patients who suffered a ventricular fibrillation cardiac arrest have shown that inducing mild hypothermia improves neurological function and reduces mortality. Determining best practices to accomplish PCI and hypothermia is paramount in the development of effective treatment protocols. **Methods:** Ten consecutive patients admitted via the ED who experienced a cardiac arrest with STEMI and were unresponsive after return of spontaneous circulation (ROSC) were cooled to a core temperature of 33°C for 24 hours. Patient outcomes included time to initiation of induced hypothermia, time to reaching core temperature of 33°C, hospital disposition, functional status (Rankin score), and return to work. **Results:** Six of 10 STEMI patients survived with favorable neurological outcomes, and 5 of 6 had a Rankin score of 1 (no significant disability despite symptoms; able to carry out all usual duties and activities) with a return to independent living at home. All 5 previous workers returned to work. Average intervention times were as follows: arrival to cooling, 134 minutes; ROSC and cooling, 193 minutes; core temperature of 33°C achieved, 173 minutes. **Conclusions:** Induced hypothermia is a feasible, effective treatment for complex, postarrest critical patients with STEMI needing emergent PCI.

#### A Stringent Oral Care Protocol and Its Effect on VAP in a Medical Intensive Care Unit

McLellan B, Kravutske M, Halash C, Patten S, Colpaert N, Phillips L, Price N, Digiovine B, Henry Ford Health Hospital, Mich.

**Purpose:** To examine the relationship of a stringent oral hygiene protocol and ventilator-associated pneumonia (VAP) rates with orally intubated mechanically ventilated adult patients in a medical CCU. **Background/Significance:** VAP is the second most common nosocomial infection affecting the critically ill and is the leading cause of morbidity in the ICU (attributable to a nosocomial infection). Oropharyngeal colonization, either present on admission or acquired during hospital stay, has been identified as an independent risk factor for the development of VAP. The literature suggests that dental plaque may play a role as a reservoir for nosocomial colonization. One of the best known interventions for removing plaque is brushing teeth. **Methods:** This was an interventional study with a retrospective comparison of VAP rates; it included all orally intubated, mechanically ventilated adult patients admitted to our 44-bed ICU. A stringent oral care regime was instituted that included a cleansing of the oral cavity every 2 hours and brushing teeth every 12 hours. The nursing staff received education on the benefits of oral care, then implemented the regime. Measures include VAP rates (which were collected based on CDC guidelines) and biweekly audits for protocol adherence. **Results:** Overall protocol adherence was 70%, with q 2 hour oral care (64% compliance in the first half of the study and 83% compliance in the second half) and 47% adherence with brushing of the teeth. VAP rate prior to initiation of this protocol was 2.6 (below the national rate of 2.8/1000 ventilator days). We experienced a small increase of VAP in the first half of the study (3.3) and a notable improvement in the second half (1.8), which equates to a 54% reduction of VAP. **Conclusions:** As compliance increases with a stringent oral hygiene regime among mechanically ventilated patients in the ICU, a reduction in the incidence of VAP occurs.

## RESEARCH ABSTRACTS

#### A Safety Profile for the Surviving Sepsis Campaign Initiative

Pyle K, Hewett M, Lepman D, Pierson G, Hoag Memorial Hospital Presbyterian, Calif.

**Purpose:** A study was conducted to assess the safety of the Surviving Sepsis Campaign (SSC). **Background/Significance:** SSC guidelines were adopted in 2005. A comprehensive quality data set was collected in a nonacademic, nontrauma, 510-bed community hospital. **Methods:** Data were analyzed from the Cerner Project IMPACT database. Retrospective data collection was performed in 2004 (n = 121) and compared with 2005 (n = 112). Complications not related to procedures and comorbid conditions were tracked as well as returns to critical care and readmissions. A 2-tailed test was performed for each measure. The dramatic resource use and quality improvements we experienced already have been demonstrated in the literature; therefore, they are not published here. **Results:** Improvements were noted with the following: atrial fibrillation/flutter requiring interventions decreased from 14% to 5.4% (P = 0.04), decubitus skin ulcers decreased from 3.3% to 0% (NS), cardiogenic pulmonary edema/congestive heart failure decreased from 1.7% to 0% (NS), venothromboembolisms declined from 1.7% to 0% (NS), heparin-induced thrombocytopenia decreased from 3.3% to 0% (NS), GI ileuses were reduced from 11.6% to 0.9% (P < .05), VAP was reduced from 8.9% to 0% (P = .01), acute pancreatitis reduced from 3.3% to 1.8% (NS), sustained VT fell from 0.8% to 0% (NS), multiple admissions fell from 5.2% to 1.8% (NS), and the number of readmissions fell from 5 to 3 (NS). Caution is noted with the following areas: GI bleeding increased from 2.5% to 4.5% (NS), intracranial hemorrhages increased from 0% to 0.9% (NS), MI increased from 0% to 1.8% (NS), Foley-associated UTIs increased from 2.5% to 4.5% (NS), and cerebrovascular accidents increased from 0% to 1.8% (NS). **Conclusions:** With a systematic approach, the SSC may be instituted as a safe and effective method with minimum untoward events.

#### Accuracy of Glucose Point-of-Care Testing: Fingertick or Arterial Catheter Blood?

Lacara T, Domagtoy C, Lickliter D, Quattrocchi K, Snipes L, Kuszaj J, Prasnikaar M, Rex Healthcare, NC.

**Purpose:** This study examined the agreement between 2 sources of blood for glucose testing (arterial versus fingertick) analyzed with a point-of-care (POC) testing device and laboratory glucose analysis in critically ill patients. **Background/Significance:** Blood for POC testing is often obtained from a variety of sources: fingertick, arterial, and central venous catheters. The variability in glucose values between these different sources is not known. **Methods:** A method-comparison study design was used to examine the agreement between 2 sources of blood for POC glucose testing (fingertick and arterial catheter) and the laboratory method for glucose determination. Bias, precision, and root mean square differences (RMSD) were then calculated to quantify the differences between the POC and laboratory methods for glucose measurement. Multiple regression (MR) analysis was used to determine if serum CO<sub>2</sub>, mean arterial pressure (MAP), and/or hematocrit significantly contributed to the difference in bias and precision for the 2 POC testing methods. The level of significance was set at .05. **Results:** Forty-two subjects were evaluated. Laboratory analyzed glucose values ranged from 58 to 265 mg/dL. Differences and limits of agreement for the laboratory and 2 POC blood values were 1.0 ± 12.3, with RMSD of 12.23 for the fingertick POC and laboratory glucose values and -0.1 ± 11.0 with RMSD of 10.9 for the arterial POC and laboratory glucose values. MR analysis found only

hematocrit and serum CO<sub>2</sub> levels to be significant contributors to difference scores between the laboratory and arterial POC analysis methods ( $F_{3,38} = 7.96, P = .0003$ ). **Conclusions:** The study found that glucose POC testing with a fingerstick sample was less accurate than such testing with samples obtained from an arterial catheter. In addition, at hematocrit and serum CO<sub>2</sub> levels below normal ranges, arterial POC glucose testing tended to overestimate laboratory glucose values.

#### Accuracy of Thermodilution Cardiac Index Determination Using 2 Injectates Only

Burns K, Demlow K, Fernandez M, George S, Head A, Martin B, Mast J, Pfanner D, Wheeler J, Wise C, Saint Thomas Health System, Tenn.

**Purpose:** To determine whether a significant difference in cardiac index (CI) measurement occurred when average CI values were based on 2 rather than 3 CI injectates in patients with low CI. **Background/Significance:** Most hemodynamic monitoring references recommend a minimum of 3 injectates that are within 10% of a median or mean value prior to averaging the values for thermodilution CI determinations. This recommendation does not appear to be based on research findings. **Methods:** An experimental design was used to compare average CI values obtained with 2 and 3 injectates that were within 10% of a mean CI value. Inclusion criteria included CI <2.5 and physiologic stability for 15 minutes prior to the start of data collection. CI measurements were obtained at each of 4 sequential backrest positions (0°, 15°, 30°, 0°) with 10 mL injectate volumes. A minimum of 3 and a maximum of 5 injectates were used for each CI determination until 3 injectates were within 10% of the mean of the series. CI was then calculated with the 3 indices. A second CI was calculated using the first 2 indices of the series. Data were analyzed with ANOVA and Scheffe's multiple comparison test, with significance level set at  $P < .05$ . **Results:** Fifty-eight CI values were determined in 15 subjects with low CI using both 3 and 2 injectates for the calculation of the average CI. Average ( $\pm$  SD) CI values were  $2.39 \pm .40$  and  $2.39 \pm .40$  for calculations determined with 3 and 2 injectates, respectively. Differences between the 3 and 2 injectates for calculation in the 4 backrest elevations ranged from 0.02 to -0.02. No significant differences were found between the 2 methods (2 versus 3 injectates) in the 4 backrest positions ( $P > .05$ ). **Conclusions:** This study found the determination of CI using 2 injectates within 10% of the mean CI was not statistically different from using 3 injectates for CI determination in patients with low CI. **Sponsored by:** Nursing Innovation Fund, Saint Thomas Foundation.

#### Activity in Critically Ill Individuals With Acute Pulmonary Dysfunction Receiving Narcotic and Sedative Medication

Ferguson J, LDS Hospital, Utah.

**Purpose:** To determine if a variance in activity level was associated with age, gender, severity of illness, or the administration of sedative or narcotics in individuals admitted to a respiratory ICU. **Background/Significance:** Patients receiving mechanical ventilation with concomitant narcotic and sedative administration rarely sustain activity levels sufficient to prevent consequences associated with inactivity while mechanically ventilated. **Methods:** Retrospective secondary data analysis of 111 critically ill adult patients requiring mechanical ventilation. A logistic regression was used to predict whether a relationship existed between age, gender, acuity of illness, administered intravenous /parenteral morphine and lorazepam medications, and activity level obtained 24 and 48 hours following admission to the respiratory ICU. **Results:** Of the 111 critically ill patients requiring mechanical ventilation, 60% were able to sit in a chair or ambulate 24

hours after admission; this value rose to 77% 48 hours after admission. Illness severity was the only variable associated with predicting activity level attainment; an increase in illness severity posed nearly a 7-fold increase ( $OR = 6.87, P = .01$ ) in the likelihood that patients would be unable either to sit in a chair or ambulate within the first 24 hours following admission. Forty-eight hours after admission, illness severity continued to strongly predict whether an individual was able to become active ( $OR = 5.67, P = .02$ ). Age, gender, and administration of sedative or narcotics failed to reach statistical significance ( $P < .05$ ) in predicting activity level attainment 24 and 48 hours following respiratory ICU admission. **Conclusions:** This study offers information previously unknown regarding activity in critically ill individuals requiring mechanical ventilation. Results from this study suggest that patients requiring mechanical ventilation in an ICU can achieve significant levels of activity.

#### Ahh to Sleep ... Perchance to Dream in a Medical Intensive Care Unit

McLellan B, Hufstader R, Jallad J, Kravutske M, Megel L, Halash C, Patten S, Colpaert N, Phillips L, Price N, Carroll C, Henry Ford Hospital, Mich.

**Purpose:** To determine if changing routine lab draws from midnight to the early evening hours enhances patients' perceived nighttime sleep in the medical ICU. **Background/Significance:** We are well aware of the negative impact of the hospital environment on the ICU patient's sleep. Yet we continue to assert routine care interventions in the middle of the night, disturbing those most in need of restful healing. Routine interventions on stable patients by the critical care provider can occur as frequently as every 15 minutes and, on average, take place every 2 to 4 hours. Observational sleep studies do not accurately reflect the quality of sleep of the ICU patient. The gold standard of sleep measurement is an EEG, but that method is costly and impractical as a measure in the ICU. Sleep questionnaires looking at recall have varying reliability with medicated ICU patients. **Methods:** An observation study examining the effect of drawing routine labs in the evening as opposed to midnight. A convenience sample of 40 pre- and postintervention patients who were admitted to a medical ICU who (1) had a Glasgow Coma Scale of more than 10, (2) had an MAAS between 2 and 4, and (3) were able to answer questions about their perceived quality of sleep and their level of daytime wakefulness. **Results:** The average age of the participants was 58 years, with both sexes being equally represented. GI bleeding was the most commonly occurring admitting diagnosis; average length of stay was 3.84 days. The control group perceived less frequent awakenings (3.625 per night) and perceived that they slept 30 minutes less than did the interventional group. The interventional group had a 4% higher rating of the quality of the previous night's sleep, a 10% higher rating of restfulness, and a 14% higher level of daytime sleepiness. **Conclusions:** By altering the times that basic care activities are provided, nurses can minimize the interruption of an ICU patient's nighttime sleep and increase the quantity and quality of his or her healing sleep.

#### Are Racial Disparities Evident in the Level of Care at the End of Life?

Johnson R, Bride W, Granger C, Granger B, Duke University Health System, NC.

**Purpose:** To identify racial differences in the level of end of care at time of death in our ICU. **Background/Significance:** Reports over the last decade have shown racial disparities in the use of evidence-based cardiovascular care, particularly in the use of more aggressive interventional approaches. Blacks

reportedly receive less aggressive evidence-based care and fewer interventional procedures compared to whites. We were interested in the extent to which such differences occurred in care at the end of life. **Methods:** Demographics were recorded for 1125 patients who died over the previous 8 years in a 16-bed ICU. Patients were divided into 3 categories: full code (FC), DNR, and active withdrawal (AW) of life support. **Results:** Mean age at the time of death was 67 years (median 68), with 63% of deaths occurring in patients >65 years of age. The predominant diagnosis at time of death for all patients was cardiac, with 36% of blacks and 40% of whites having a primary diagnosis of MI. Of the 1125 patients represented in the sample, 25% were black (n=285) and 68% (n=760) were white. Of patients who were FC, 37% (n=116) were black and 63% (n=199) were white. Within the black subgroup most patients were FC at the time of death (42%, n=116). Within the white subgroup most were DNR at the time of death (43%, n=323). By comparison, blacks were more likely to be FC and whites were more likely to be DNR at the time of death ( $P < .0001$ ). Conversely, whites were more likely to be actively withdrawn from life support (79.5% of AW were white, n=232) compared to blacks (20.5% of AW were black, n=60). **Conclusions:** Examination of our clinical practice patterns at the end of life is complex; most patient deaths occur in a manner chosen by the patient and/or family members. This analysis suggests, however, that blacks resist AW and DNR status more frequently than do whites.

#### Can Communication Norms be Transformed?

Clark K, Bowles M, University of Virginia Health System, Va.

**Purpose:** To evaluate the impact of staff education and skill building on effective communication in a critical care environment. **Background/Significance:** Skilled communication, as described in the Healthy Work Environment Standards, is essential to a collaborative, collegial, and comfortable work setting. Our unit wished to evaluate its existing communication patterns and subsequently to improve them. To do so we designed initiatives that focused on creating a milieu of open and honest communication and used a survey to evaluate our progress. **Methods:** Staff members of a surgical trauma burn ICU were surveyed before and after communication interventions (18 months). Examples of the interventions included teaching "communication in the moment," discussion at meetings, and walking rounds by leadership to model the norms. A valid and reliable survey tool designed to evaluate staff perceptions of the quality of unit communication and collaboration was adapted for use with the approval of the author (Stephen Shortell). **Results:** Improvement was noted in 4 out of 5 survey categories. "Staff-to-staff relationships" increased by 27%, "staff-to-physician relationships" by 8%, "general relationships and communications" by 20%, and the "ability to manage disagreements between staff and physicians" by 13%. There was a 3% decline in the category "managing disagreements between staff members." **Conclusions:** This study demonstrated improvement in and satisfaction with most categories tested following targeted communication interventions. The decline in satisfaction in the category "management of disagreements between staff" may be a result of increased staff awareness of the behaviors required for effective communication. It is possible to actively change communication patterns in a critical care environment using a focused initiative.

#### Cardiovascular Dysfunction During Ventilator Weaning

Frazier S, Stone K, Moser D, University of Kentucky, Lexington, Ky, and The Ohio State University, Columbus, Ohio.

**Purpose:** To describe and compare measures of cardiovascular function during mechanical ventilation and the initial contin-

uous positive airway pressure (CPAP) weaning trial in a group of medical ICU patients. **Background/Significance:** Cardiovascular instability is one proposed mechanism for ventilator weaning failure. A comprehensive examination of cardiovascular function will provide a thorough understanding of the complex cardiovascular responses to mechanical ventilation and weaning. **Methods:** In this descriptive comparative study, medical ICU patients (n=43) were studied 48 hours after initiation of ventilation and during the initial CPAP weaning trial. Measures of hemodynamics (cardiac output [CO], mean arterial pressure [MAP]), myocardial perfusion (ST segment, CK-MB, troponin I), cardiac rhythm, and autonomic function (heart rate variability [HRV]), plasma catecholamines) were made at these times. **Results:** Significant differences were found in cardiovascular function between patients who successfully completed the initial CPAP trial and those who failed. Successful patients demonstrated increased CO in response to CPAP without alteration in HR or MAP. Patients who failed had increased MAP, but CO and HR were unchanged. ST segment deviation during ventilation increased the likelihood of trial failure by 60%; those who failed had triple the number of supraventricular events per hour during CPAP. Patients who failed the trial had significantly lower HRV during ventilation and responded to CPAP with elevations in norepinephrine. Successful patients reduced norepinephrine with CPAP. **Conclusions:** Cardiovascular dysfunction was common in patients who failed the initial CPAP weaning trial. Systematic evaluation of cardiovascular function and appropriate intervention to promote optimal function may increase the likelihood of weaning success. **Sponsored by:** NINR1 R15 NR05059 and the Agilent Technologies-AACN Research Grant.

#### Comparison of ICU Patients' Needs and Nurses' Perceived Needs of Their Patients

Tsai S, Hu S, Li Y, Chen L, Chang Gung Institute of Technology, Chang Gung Memorial Hospital International.

**Purpose:** To compare ICU patients' needs and nurses' perceived needs of their patients. **Background/Significance:** Evidence-based nursing care has been strongly emphasized. The match between patients' needs and nurses' perceived needs of their patients is key to quality care and worthy of investigation. **Methods:** The cross-sectional study consisted of 132 pairs of medical ICU patients and nurses from 3 hospitals in Taiwan. Each nurse filled out the questionnaire once. Instruments included a demographic data sheet and ICU Patients' Needs Questionnaires (a patient version and a nurse version). The questionnaire included 52 questions on a 5-point Likert scale. Each question contained 2 dimensions: importance and satisfaction of needs. Descriptive and *t* test statistics were performed using SPSS 12.0. **Results:** Ages for the patients ranged from 20 to 90 years ( $M = 58.41$ ;  $SD 16.39$ ). There were 87 (65.9%) male and 45 (34.1%) female patients. Ages for the nurses ranged from 20 to 40 years ( $M = 27.14$ ,  $SD 3.61$ ). The scores on the degree of importance of the needs between the patients and the nurses were not significantly different. The patients graded higher satisfaction scores than did nurses ( $t = -3.97$ ;  $df = 262$ ;  $P < .01$ ). There was a significant difference between the needs of the patients and the degrees of satisfaction ( $t = 4.73$ ;  $df = 131$ ;  $P < .001$ ). The patients identified cleanness of the body as the most important need. They are most satisfied with the professional care skills of the healthcare team. **Conclusions:** The discrepancy between the patients' needs and the nurses' perceived needs of their patients is a barrier to quality care; it is important to identify the discrepancies. Patients in this study all were awake and alert; therefore, the results cannot be generalized to other ICU patients. **Sponsored by:** Chang Gung Institute of Technology (93111011).

### Critical Communication: Issues of Reporting and Documenting Details of Family Conferences

Kasuya T, Whitney J, Wong S, Harborview Medical Center, Wash.

**Purpose:** A staff survey was completed to identify problems around documenting and reporting discussions during family conferences. **Background/Significance:** Decisions about code status, care transition, and end of life generally are made during formal family conferences. Accurate dissemination of information to all members of the care team is problematic, often leading to confusion and delays. **Methods:** Over a 3-month period, nurses in the SICU and CICU and palliative care team members completed a survey after participating in family conferences. Data were collected through a 10-question survey focusing on documentation and verbal reporting aspects of details from the conferences. Questions were either narrative or used a Likert-type scale with the response range from 0 to 10, with 0 being the lowest. **Results:** Findings from the survey showed low ratings of documentation of family conference discussions. Adequacy of nurse documentation was  $3.9 \pm 3.4$  and adequacy of documentation by physicians was  $1.8 \pm 2.5$ . Important topic areas included outcomes and family views. Despite poor rating of documentation, verbal communications among clinicians before and after conferences were rated fairly highly. Rating of nurse shift report was  $5.7 \pm 2.6$ . Physician/nurse communication before the conferences was  $5.5 \pm 3.2$ ; afterward it was  $6.2 \pm 6.3$ . Participants identified the following issues that need to be clarified before conferences: the clinician's opinion about the patient's prognosis, the recommended care plan, and the family's level of understanding. Most respondents mentioned the importance of revising and following up on the care plan after the family conference. **Conclusions:** This study showed that the details of family conferences were poorly documented, though the conferences themselves are fairly well reported. However, it is unclear how accurately family conference discussion topics are passed on verbally. It is important to establish a format to document critical details of family conference discussions.

### Effect of Oral Care Interventions on Dental Plaque in Mechanically Ventilated ICU Adults

Munro C, Grap M, Sessler C, McClish D, Virginia Commonwealth University, Va.

**Purpose:** We conducted a randomized controlled clinical trial to test the effects of toothbrushing and chlorhexidine (CHX) on reducing dental plaque in mechanically ventilated adults in the ICU. **Background/Significance:** Because oral care interventions may reduce the risk of development of ventilator-associated pneumonia (VAP), CDC guidelines recommend comprehensive oral care for intubated patients. However, few data are available to guide practice. CHX has been found to be effective in cardiac surgery subjects, but randomized clinical trials of toothbrushing in the ICU have not been reported. **Methods:** All intubated patients in medical, surgical/trauma, and neuroscience ICUs at a large urban university hospital were screened ( $n = 4603$ ). Exclusion criteria were as follows: intubated more than 24 hours, edentulous, or diagnosis of pneumonia at the time of intubation. A total of 547 subjects were randomly assigned to 1 of 4 groups: toothbrushing 3 times daily, 0.12% CHX oral swab twice daily, combination (both toothbrushing and CHX), or control (usual care). Study personnel provided oral care interventions; plaque assessors blinded to subject group assignment scored dental plaque using a standardized scale. Subjects remained in the study for a maximum of 7 days. Mixed models statistical analysis was performed. **Results:** A total of 249 subjects remained in the study for day 3 analysis. Subjects were 61% male, with a mean

age of 47.9 years and mean APACHE III score of 77. Mixed models ANOVA showed a significant effect on plaque of the toothbrushing intervention ( $P = .0411$ ), but no effect of the CHX intervention ( $P = .9397$ ) and no interaction effect between toothbrushing and CHX. **Conclusions:** Toothbrushing was effective in reducing dental plaque. Our data did not demonstrate plaque reduction with CHX. **Sponsored by:** NIH R01NR07652.

### Efficacy of the Providence Saint Vincent Medical Center Intensive Care Unit

Schmedel W, Shearer A, McGrath R, Ferger C, Johnson C, Providence Saint Vincent Medical Center, Ore.

**Purpose:** To determine the efficacy of this particular insulin infusion protocol measured by the amount of time euglycemia (80 to 110 mg/dL) is reached and to what extent the critical care patients remain euglycemic during a 48-hour period. **Background/Significance:** Several studies have demonstrated the physiological need to have "tight" blood glucose control in critical care patients ever since the study by Van der Berghe et al was published. **Methods:** Seventy-eight patients were enrolled into the study after an insulin infusion was started. Demographic data as well as serial blood glucose levels and the insulin infusion rate were recorded for 48 hours after initiation of the insulin infusion. **Results:** Average time to reach euglycemia was 8.8 hours; the average percentage of time the patient remained euglycemic was 52%, with an average glucose of 113 mg/dL. Patients with a BMI of  $<30$  reached euglycemia in 7.6 hours, whereas patients with a BMI  $\geq 30$  reached euglycemia in 11 hours ( $P < .05$ ). Patients with a BMI  $<30$  used an average amount of insulin of 3.1 units per hour, while patients with a BMI  $\geq 30$  used an average amount of insulin of 4 units per hour ( $P < .05$ ). **Conclusions:** The insulin infusion protocol used for this study was effective in safety as well as rapidly obtaining euglycemia (80 to 110 mg/dL). Patients with a BMI  $\geq 30$  should have a more aggressive caveat to the insulin infusion protocol.

### Evaluation of 3 Pain Assessment Tools for Use With Critically Ill Adult Patients

Hall D, University of Kentucky Hospital, Ky.

**Purpose:** To determine which of 3 standard pain assessment tools are useful for RNs to evaluate pain in cognitively and communicatively impaired critically ill patients. **Background/Significance:** RNs are the primary administrators of medication and hands-on patient care within hospitals. Pain assessment of critical care patients by RNs is often inconsistent and subjective, resulting in ineffective pain management, poorer patient outcomes, decreased patient satisfaction, and increased hospital length of stay. **Methods:** 100 adult patients admitted to any CCU at the University of Kentucky Hospital were assessed for pain during routine patient turning ( $M = 52.7$  years,  $SD = 15.3$  years). Data were collected using 3 uni-dimensional pain assessment tools in random order: the Visual Analog Scale (VAS), the Present Pain Intensity Subscale (PPI) of the McGill Pain Questionnaire (MPQ), and the Checklist of Nonverbal Pain Indicators (CNPI). **Results:** The VAS predicted 35% of the variance in the CNPI scale for all GCS scores ( $F_{1,55} = 31.76$ ,  $P = 0.0$ ; adjusted  $R^2 = .35$ ), 43% of the variance for patients with a GCS  $>12$  ( $F_{1,36} = 26.7$ ,  $P = 0.0$ ; adjusted  $R^2 = .43$ ) and 28% of the variance for GCS scores of 9 to 11 ( $F_{1,14} = 5.34$ ,  $P < .05$ ; adjusted  $R^2 = .28$ ). The CNPI predicted 44% of the variance in the PPI scale for patients with a GCS  $>12$  ( $F_{6,33} = 6.19$ ,  $P = 0.0$ ; adjusted  $R^2 = .44$ ), and 47% of the variance for GCS scores 9 to 11 ( $F_{5,16} = 2.85$ ,  $P = .05$ ; adjusted  $R^2 = .47$ ). The CNPI was the only tool that could be used in all patients in the sample. **Conclusions:** The

VAS, though effective in measuring pain for patients with a GCS >12, is not as effective in measuring pain in patients with a GCS <12. The CNPI, while not using direct input from the patient, provides information predictive of pain for patients with GCS scores of <11 and is useful in assessing the adult ICU patient population.

#### **Factors Associated With Percutaneous Coronary Intervention (PCI) Access Complications**

*Hoke L, Ratcliffe S, Kimmel S, Kolansky D, Hospital of the University of Pennsylvania, Pa.*

**Purpose:** To determine what method for sheath removal produces the fewest complications and what factors are associated with access site complications. **Background/Significance:** Complex antiplatelet and antithrombotic regimens used in conjunction with percutaneous coronary intervention (PCI) may increase the risk of vascular complications. This study investigated concurrent factors associated with access site complications for patients undergoing PCI. **Methods:** This prospective cohort study enrolled 413 patients during a prospective 7-month period. Intervention variables studied included pharmacologic agents, method, and duration of sheath removal procedure. Outcome variables included hematoma formation, bleeding occurrence, pseudoaneurysm prevalence, incidence of arteriovenous (AV) fistula formation, and thrombosis. **Results:** Of the 413 patients, 68 (16.5%) had a complication. There were a total of 64 (15.5%) hematomas with 35 (8.5%) 1 to 5 cm and 29 (7.0%) >5 cm, 6 occurrences of bleeding (1.5%), 4 patients with AV fistula (1%), and 3 pseudoaneurysms (.7%). No significant differences were found for complications using manual, C-clamp, or arterial vascular closure device. Patients who had higher systolic blood pressure (135 vs 129;  $df=410$ ,  $P=.025$ ) or were older (66 vs 63,  $df=411$ ,  $P=.016$ ), were significantly more likely to have complications. **Conclusions:** This study found that clinically significant major complications were low. Arterial vascular closure devices, mechanical C-clamp, and manual compression all provide low and comparable complication risks following sheath removal in the era of antiplatelet and antithrombotic therapies. Older patients and patients with elevated BP should have their groin closely monitored and observed for vascular complications. **Sponsored by:** Southeastern Pennsylvania Chapter of AACN and Sigma Theta Tau Xi Chapter, University of Pennsylvania School of Nursing.

#### **Identification of the Needs of Family Members of Critically Ill Neuro Patients**

*Prachar T, Ford G, Kringle D, Mohammed V, Moss B, Terry S, Thomas A, Mahanes D, University of Virginia Health System, Va.*

**Purpose:** To identify the needs of family members of critically ill neuroscience patients and rank them in order of importance. **Background/Significance:** Numerous studies examine the needs of family members of critically ill patients, but few specifically address the families of critically ill neuroscience patients. Insight into family needs improves the healthcare team's ability to provide family-centered care. **Methods:** A modified version of the Critical Care Family Needs Inventory (CCFNI, Molter, 1979) was given to 119 family members aged 18 years or older who spoke and understood English, were physically present in the ICU, and were family members of a patient who had been in the neurological ICU for 24 to 72 hours. Additional data collected were items related to perception of the patient's prognosis, communication with doctors and nurses, and type of admission. Descriptive statistics were used to calculate a mean score for each needs statement on the CCFNI and to rank those needs from most to least important. **Results:** Data from 111 participants were analyzed. Seventy-two

percent reported the admission as emergent. Of the 51 needs statements, 35 received a mean score above 3.0. The top 10 needs reported were as follows: to have questions answered honestly, to be assured that the best care was being given to the patient, to know specific facts regarding the patient's progress, to know the expected outcome, to know that the patient's pain is being addressed, to know exactly what is being done for the patient, to be notified about changes in the patient's condition, to receive an update regarding the patient at least once a day, to know how the patient is being treated medically, and to feel that the hospital personnel care about the patient. **Conclusions:** Most needs statements were rated as important or very important, with receiving timely information regarding the patient's care and condition rated among the highest.

#### **Impact of an 8-Hour Educational Intervention for Development of Nurse Preceptors and Retention of Orientees**

*Sandau K, Hammer L, Cheng LG, Gaillard P, Mann J, Bethel University/Abbott Northwestern Hospital, Minn.*

**Purpose:** To examine the impact of a new mandatory 8-hour workshop for nurse preceptors. **Background/Significance:** Nurse vacancy rates in US critical care units approach 20%; costs for one nurse's orientation may reach \$67 000. Preceptors are expected to provide successful education, socialization, and role modeling, yet may not receive education on how to be effective. Past studies stress the importance of socialization, learning styles, and critical thinking. Few studies test hospital-wide education for impact on preceptors. Even fewer examine the relationship between preceptor education and retention of orientees. **Methods:** Researchers used a quasi-experimental design with an investigator-designed survey to test self-report of pre- to post- preceptor confidence and comfort in specific roles. A correlational design then was used to compare retention rates for orientees (those employed >1 year on the same unit in which they were oriented) for 1 year prior versus 1 year after the educational intervention. It was hypothesized that preceptor scores and orientee retention would be improved. **Results:** At 3 to 6 months, paired  $t$  tests demonstrated that preceptors ( $n=116$ ) reported continued significantly improved results for confidence or comfort in all 5 of the following areas: ability to precept a new nurse ( $P<.01$ ), ability to actively coach critical thinking ( $P<.001$ ), ability to work with an orientee with a different personality or learning style ( $P<.001$ ), ability to work with an orientee with a different ethnic background ( $P<.05$ ), and ability to provide both positive and constructive feedback to an orientee ( $P<.01$ ). One year after the intervention, the proportion of new nurses (125/132) retained was significantly greater than the year prior (82/94) ( $\chi^2$ ,  $P<.05$ ). **Conclusions:** This study provides supporting evidence for a preceptor workshop in preparing experienced nurses to precept new nurses in critical care, as measured by both self-reported development of preceptors and retention of orientees. **Sponsored by:** Minnesota Nurses Association Foundation Clinical Practice Project Grant in Memory of Linda Knauff With Additional Support From Allina Health Systems.

#### **Incidence and Factors Related to Nursing Activities for Rebleeding of Aneurysmal Subarachnoid Hemorrhage**

*Unoki T, Kimura C, Hisamatsu M, Yamamoto K, Virginia Commonwealth University School of Nursing, Va.*

**Purpose:** To describe factors related to nursing activities inducing rebleeding in patients with subarachnoid hemorrhage (SAH) in a hospital setting. **Background/Significance:** Prevention of rebleeding is a major concern in the management of patients who have not received surgical or endovascular interventions. Although it has been suggested that environmental stimuli

including nursing activities (eg, vital checks, transfer, turning, and bathing) are related to rebleeding, there is no published article that examines this topic. **Methods:** We conducted retrospective chart review in 2 Japanese tertiary care teaching hospitals (July 2003 to April 2005 and September 2004 to February 2005). Patients aged 17 years and older with GCS >7 and diagnosed with aneurysmal SAH were reviewed. Data were collected for the period between hospital arrival and aneurysm treatment by surgical and/or endovascular interventions. Patients diagnosed with rebleeding were reviewed. Vital signs and level of consciousness were compared between patients with and without rebleeding. Data collection focused on nursing activities around rebleeding occurrences. **Results:** Rebleeding occurred in 7 (10.3%) of 67 patients. No differences were found in age, systolic blood pressure, heart rate and consciousness level at hospital arrival, or Fisher grade between patients with and without rebleeding. In 4 of 7 patients, rebleeding occurred within 4 hours after reaching the hospital. In all patients who suffered from rebleeding in this early phase, the rebleeding occurred immediately after transfer (ie, stretcher in ambulance to bed in ED and in CT room); one patient experienced rebleeding during angiography. There was no case in which rebleeding was considered to be related to nursing activities except transfer. **Conclusions:** Patient transfer may be associated with rebleeding, and careful transfer in patients with SAH may prevent rebleeding, especially during the early phase.

#### **Keeping Patients Safe in the Coronary Care Unit: An Invisible Nursing Role in Recovering Medical Errors**

*Moore M, Snyderman C, Dykes P, Rothschild J, Hurley A, Brigham and Women's Hospital, Mass.*

**Purpose:** To examine the process by which nurses recovered medical errors and to obtain item statements for a survey to quantify nurses' contributions to patient safety. **Background/Significance:** As frontline caregivers, nurses are uniquely positioned to protect patients from medical errors. **Methods:** We explored this social process in 2 coronary care units (CCUs) by following grounded theory methods and using the NVivo software package to facilitate coding, analysis, organization, and classification of text segments. We elicited stories from 18 CCU nurses who described patient care experiences having to do with "near-miss events" (the initial term used). **Results:** Coded transcripts yielded more than 1000 data bits of detailed accounts of involvement in near-miss events, thought processes and actions surrounding the events, communication strategies used, feelings, outcomes, reflection about the event and consequences, and the environment/context in which the near miss occurred. A 3-stage model illustrates the antecedents (nurse knowledge/expertise and context), processes/actions (critical thinking, advocacy, and correction), and outcomes (near-miss recovery, adverse event status, and feelings). The 25 different types of recovered medical errors included misdiagnosis; unnecessary delay or not ordering tests, therapeutic interventions, or necessary prophylaxis; using incorrect technique; missing coexisting health problems; interpreting clinical signs incorrectly; and medication and fluid concentration errors. The survey is posted on the Internet (<http://www.surveymonkey.com/s.asp?u=6022225754>). **Conclusions:** Nurses play a pivotal role in patient safety. Understanding the social process associated with successful recovery of medical errors can lead to improved teamwork and care, be applied to other areas in which nurses are in a position to recover medical errors, and provide content and teaching examples for preparing the next generation of nurses. **Sponsored by:** Risk Management Foundation Healthcare Safety Research Institute, Cambridge, and the Hahnemann Hospital Foundation, Boston, Mass.

#### **Management of Pain in Cardiac Surgery ICU Patients: Have We Improved Over Time?**

*Gelinas C, Fillion L, Viens C, Puntillo K, McGill University International.*

**Purpose:** This study described pain experience of cardiac surgery ICU patients. **Background/Significance:** Research has highlighted the underassessment and undertreatment of pain in critically ill patients. Because pain is a symptom, patients' experiences must be well understood so the pain can be assessed and treated properly. **Methods:** A descriptive design was used. Ninety-three cardiac surgery patients were interviewed using a questionnaire about their pain experience while they were in the ICU after they had been transferred to the surgery unit. Descriptive statistics were calculated. **Results:** Some patients (n = 21) were not able to recall their pain experience at the ICU. Another 72 cardiac surgery patients participated. Patients were interviewed 1 to 2 days after transfer from the ICU to the surgery unit (average length of ICU stay, 2 days). Seventy-two patients (77.4%) recalled having pain; 61 (65.6%) recalled being intubated. Moving, coughing/breathing, and chest tube removal were the 3 most frequent sources of pain experienced by patients. A large proportion of patients (47.3%) identified the thorax as the location of their pain. All patients had a sternotomy. Pain was mild for 16 patients, moderate for 21, and severe for 25. Patients mentioned using different means to communicate pain when they were intubated: head nodding, moving arms and hands, grimacing, and using the bell. **Conclusions:** Despite advances in pain management, our findings are disturbingly similar to those from 17 years ago (Puntillo, 1990). Evidence from research about effectiveness of pain interventions must be applied to the care of cardiac surgery patients to decrease suffering. **Sponsored by:** Nursing Research Fellowship Award from the Heart & Stroke Canadian Foundation and Doctorate Degree Award from the "Fondation de recherche en sciences infirmières du Québec" (FRESIQ).

#### **Meaningful Measures of Staff Satisfaction in Times of Turmoil** *Johnson R, Granger B, Bride W, Kessenich A, Duke University Health System, NC.*

**Purpose:** To identify meaningful measures of staff satisfaction from among myriad satisfaction and work culture surveys in use at our academic medical center. **Background/Significance:** Work culture and staff satisfaction surveys at our hospital showed a decrease in overall satisfaction over the last 2 years (2004 vs 2006,  $P < .05$ ). Due to the lack of specificity and absence of reliability and validity measures for the surveys in use, the reasons for the decrease were unclear. Whereas many managers felt that short staffing and an increase in expectations related to technology were to blame, the actual reasons for the change were indeterminate. We conducted a factor analysis of 2 of the primary surveys used—a staff satisfaction survey used for the last 8 years and a work culture survey used for the last 6 years—to determine whether changes in instrument development were indicated. **Methods:** Raw data scores from the previous staff satisfaction surveys, 2004 and 2006 (n = 238), were combined and a factor analysis was performed. **Results:** Constructs being tested included leadership skills, teamwork, communication, and professional development. In the factor analysis only 2 of the expected constructs loaded significantly: leadership skills (.75) and teamwork (.84). Other constructs were not strongly supported, indicating a need to revise the survey. **Conclusions:** Use of staff satisfaction surveys is widespread, particularly during times of turbulence and staffing shortages. One way to stabilize the workforce is to target nurse-sensitive indicators of satisfaction; however, few satisfaction surveys demonstrate adequate construct validity on which to

base changes. This analysis suggests that revising constructs would allow more accurate attainment of the information necessary to identify factors to promote an environment that fosters staff satisfaction.

**Measuring the Effects of Heated Humidification on Sputum Viscosity in the Spontaneously Breathing Tracheostomy Patient**  
*Ecklund M, Kurlak S, Rochester General Hospital, NY.*

**Purpose:** To determine if there is a difference in sputum viscosity when heated humidification is used. **Background/Significance:** No standards exist for humidification of spontaneously breathing tracheostomy patients. Some evidence suggests that air delivery with 100% relative humidity supports the normal airway mucosal function. Decreased humidity can negatively affect lung mechanics. Adverse effects of low humidity are proportional to duration of exposure. Viscosity is resistance to flow; lowering viscosity of mucus improves clearance. A simulated cough machine is based on the premise of airflow-dependent mucus clearance and measures the sputum recoil. A sample of mucus is placed at the base of the "trachea." Different aliquots can be used for successive measures. Measurement variability with different aliquots in repeated measurements on the same sample is generally less than 10%. **Methods:** The pilot study included 10 hospitalized adult patients with tracheostomy tubes. Each patient, serving as his or her own control, received humidification with or without a donut heater with the alternative condition for the following 3 days, with 24 hours between therapies. Six samples were collected for each subject. The data collector was blinded to the application of heater to the circuit. Samples were tested on the simulated cough machine to measure sputum viscosity, using 3 repeated measures of the same sample. Data were analyzed using repeated-measures ANOVA. **Results:** Consistent differences attributable to heating condition were detected in circuit relative humidity, circuit temperature, oxygen percent, and oxygen flow. Average mucus viscosity was not affected by the heating condition. **Conclusions:** The study added evidence for humidification, but no standards can be written based on the findings. Additional measures would help provide more data about the effect of heat on mucus viscosity.

**Nurses' Thoughts on Evidence-Based Practice**

*Snyder K, Harborview Medical Center/University of Washington School of Nursing, Wash.*

**Purpose:** To identify nurses' beliefs about evidence-based practice (EBP) and to evaluate their use of EBP at the bedside. **Background/Significance:** In the move toward EBP, nurses play a key role in the translation of research into bedside care and in the formation of relevant clinical questions. Initiatives to enhance nurses' use of EBP rely on the identification of barriers to EBP in nursing practice and provision of education and professional incentives to move beyond those difficulties. **Methods:** This descriptive correlational study used a survey developed by Melnyk and Fineout-Overholt (2003) that included 2 instruments assessing beliefs about EBP and implementation of EBP. The sample consisted of acute (n=8) and critical care (n=52) nurses working at Harborview Medical Center in Seattle, Wash, during the study period. **Results:** Although respondents scored positive beliefs about EBP, implementation of EBP steps, especially those that referred to the access and application of research evidence, was low. Nurses believed EBP was important and improved patients' outcomes, but lacked knowledge about EBP and skills to perform it. Results can be used to develop educational programs specific to the needs of nurses in this hospital. **Conclusions:** Nurses' beliefs about EBP influenced its implementation. Nurses need education and training in the steps of EBP, especially in the evaluation and application of

evidence to practice. Assessing nurses' thoughts on EBP allows for educational interventions tailored to the needs of specific units or hospitals. **Sponsored by:** University of Washington School of Nursing.

**Outcomes of Continuous Local Anesthetic Infusion at the Sternotomy for Pain Management After Cardiac Surgery**  
*Langley M, Husain A, Cape Fear Valley Health System, NC.*

**Purpose:** This study examined analgesic requirements and pain scores, time to extubation and ambulation, return of GI function, and ICU and hospital length of stay (LOS) for cardiac surgery patients receiving a continuous local infusion of bupivacaine at the sternotomy. **Background/Significance:** Continuous infusion of local anesthetics has been described as reducing analgesic requirements and pain, yet few studies have explored patient outcomes following cardiac surgery. **Methods:** A retrospective chart review was conducted on 46 adult patients after elective, uncomplicated cardiac surgery. Patients who received a local anesthetic infusion catheter at the sternotomy were compared with patients who did not have the catheter placement. **Results:** On postoperative days (PODs) 1 through 3, analgesic requirements of the groups were comparable. Reduction of analgesic administration was noted on POD 4 in the group that received the catheter. Pain scores were similar for both groups on PODs 1 through 3, but lower on POD 4 for patients with the local anesthetic infusion. This group also had a shorter interval to tracheal extubation; however, there were not significant differences in time to ambulation, return of bowel function, or ICU or hospital LOS. **Conclusions:** Continuous local anesthetic infusion at the sternotomy may reduce postoperative analgesic requirements and pain. The anesthetic infusion was associated with earlier extubation; however, differences were not seen for time to ambulation, return of bowel function, or ICU and hospital LOS. The potential of this pain management adjunct following cardiac surgery warrants further investigation.

**Successful Mentor-Mentee Relationships in Healthcare**  
*Bidan B, Florida Hospital, Orlando, Fla.*

**Purpose:** To gain insight into successful mentor-mentee relationships in a healthcare setting. **Background/Significance:** Throughout the last decade numerous articles, reports, and presentations have predicted a major nursing shortage by 2020. Mentoring has been identified by the American Hospital Association as one strategy for addressing the impact of this shortage on healthcare. This study contributes valuable insight and information focusing on the mentor-mentee relationship. **Methods:** A qualitative narrative inquiry research design was used to answer the question, "What are the leadership attributes of the mentor that contribute to a successful mentor-mentee relationship?" The sample population included 4 mentors and 4 mentees. Mentors used storytelling to provide information and data were obtained from mentees during appreciative interviews; all participants were asked to provide a picture, drawing, or photograph that represented a successful mentor-mentee relationship. Data analysis included bracketing, theme development, pawing, and data segregation. **Results:** Identified themes were as follows: (1) common goals, (2) ability to provide learning opportunities, (3) teaching, (4) "willingness to learn," and (5) mentor-mentee relationships are as unique as the individuals involved in the relationship. **Conclusions:** We concluded that (1) a commitment to the mentoring program/process is essential for a successful mentor-mentee relationship, (2) a commitment to quality patient care and patient safety are mentor qualities that contribute to a successful mentor-mentee relationship, (3) a commitment to the mentee's learning is a component of a successful mentor-mentee

relationship, (4) teaching skills and the ability to teach advanced patient care skills during a crisis are leadership attributes of a mentor that contribute to a successful mentor-mentee relationship, and (5) a successful mentor-mentee relationship is only as successful as the relationship itself.

### The Effect of Certified RNs on Workgroup Satisfaction and Perceived Quality of Care in Critical Care Units

Boyle D, Miller P, Gajewski B, Klaus S, Goodyear-Bruch C, Dunton N, University of Kansas Schools of Nursing and Allied Health, Kan.

**Purpose:** We examined the association between the prevalence of certified RNs in CCUs on RN workgroup satisfaction with autonomy, decision making, and nurse-physician interaction and perceived unit quality of patient care (QOC).

**Background/Significance:** The few studies conducted on certified RNs and quality outcomes have suffered from small sample sizes and failure to control for confounding variables.

**Methods:** We used a correlational design based on linked administrative and RN satisfaction survey data from the 2005 National Database of Nursing Quality Indicators®. The sample included 521 CCUs. Hierarchical linear modeling estimated the effect of the prevalence of certified RNs (percent of unit RNs with national certification) on aspects of RN workgroup satisfaction and perceived QOC, controlling for hospital (eg, Magnet status, size) and unit (eg, mean RN years on unit, patient-to-RN ratio) characteristics. **Results:** A direct negative relationship was found between certification prevalence and RN workgroup satisfaction with autonomy; the higher the prevalence of certified RNs on a unit, the lower the workgroup satisfaction with autonomy ( $P = .01$ ). No effect was found between certification prevalence and workgroup satisfaction with decision making or nurse-physician interaction. The relationship of certification prevalence with perceived QOC was mediated by workgroup satisfaction with autonomy ( $P = .000$ ) and decision making ( $P = .000$ ); the higher the satisfaction with autonomy and decision making, the higher the workgroup perceived QOC on the unit. **Conclusions:** The unexpected negative relationship between prevalence of certified RNs and workgroup satisfaction with autonomy may be explained by higher autonomy expectations of certified RNs combined with lack of specific strategies to use certified RNs' knowledge and skills. Unit level strategies are needed to provide certified RNs with more autonomy, which in turn may improve QOC. **Sponsored by:** American Nurses Association.

### The Effect of HOB Elevation on Filling Pressures and Cardiac Index in Patients With Low Cardiac Index States

Burns K, Demlow K, Fernandez M, George S, Head A, Martin B, Mast J, Pfanner D, Wheeler J, Wise C, Saint Thomas Health System, Tenn.

**Purpose:** As part of a larger study, variability of pulmonary artery (PA) pressures and cardiac index (CI) measurements were determined at backrest elevations of 0°, 15°, and 30° in patients with low CI (<2.5). **Background/Significance:** Studies have evaluated the effect of backrest elevation on PA and CI measurement in patients with normal CI. Limited data are available for patients with low CI. **Methods:** A prospective, repeated measure, experimental design compared CI and PA pressure measurements at different backrest elevations. Inclusion criteria included CI of <2.5 and physiologic stability for 15 minutes prior to data collection. PA pressures and CI measurements were obtained at 4 backrest positions (0°, 15°, 30°, 0°). PA pressures were recorded from the bedside monitor using the pressure scale and cursor and on a graphic paper tracing. Pressures were measured at end expiration. Data were analyzed with ANOVA and Scheffé's multiple comparison test.

The level of significance was set at  $P < .05$ . **Results:** A total of 15 consenting subjects were studied. CI values during data collection ranged from 1.77 to 3.67, averaging 2.42 ( $\pm 0.38$  SD) at 0° baseline measurement. Maximum differences in mean values during backrest elevation were 2.3 mm Hg for systolic, 2.3 mm Hg for diastolic, 1.8 mm Hg for mean, 2.2 mm Hg for capillary wedge PA pressure, and 0.06 for CI. ANOVA found no significant differences in PA pressures or CI measurements during backrest elevation. Pressure differences between the graphic and monitor methods for measurement of PA pressure also were found not to be significant. Mean arterial pressure and heart rate remained stable throughout data collection. **Conclusions:** This study found that PA and CI measurements are similar when measured at backrest elevations up to 30° in patients with low CI. This study extends the findings of prior studies of patients with normal CI to those patients with CI below 2.5. **Sponsored by:** Nursing Innovation Fund, Saint Thomas Foundation.

### The Effect of Rest and Nonrest Periods on Physiological Stability, Sedation, and Agitation in Ventilated Patients

Mellott K, Grap M, Hamilton V, Best A, Wetzel P, Munro C, Sessler C, Virginia Commonwealth University, Va.

**Purpose:** This study examines mechanically ventilated patients' biobehavioral responses during rest and nonrest periods in a medical respiratory ICU. **Background/Significance:** Rest periods may promote a healing environment through reduction of noise, light, and noxious stimuli, possibly improving physiological stability and reducing agitation and sedation. **Methods:** Twenty-four mechanically ventilated patients (71% female; mean age, 53 years; mean APACHE II score, 28) were studied. Time-synchronized, continuous 24-hour measurements of heart rate (HR), respiratory rate (RR), saturation of oxygen (SpO<sub>2</sub>), arm and leg movement (agitation), processed EEG (sedation = Patient State Index, or PSI), and environmental light and sound were obtained for 435 hours (mean, 18.2 h/subject). Defined rest periods (2-4 PM, 1-3 AM) and nonrest periods (9-11 AM, 6-8 PM) were compared using ANOVA. **Results:** HR ( $P < .0001$ ) and SpO<sub>2</sub> ( $P < .0001$ ) were higher during rest, whereas RR and leg movement ( $P < .0001$ ) were higher during nonrest periods ( $P < .0001$ ). No difference in arm movement was found. PSI was lower (more sedated) during rest ( $P < .0001$ ). Light and sound levels were lower during rest than during nonrest periods. SpO<sub>2</sub> levels were highest during the 2 PM to 4 PM rest period than during all other periods ( $P < .0001$ ). RR was significantly increased during 9 AM to 11 AM than during all other periods ( $P < .0001$ ). Leg movement was significantly higher from 2 PM to 4 PM than during all other periods ( $P < .0001$ ). Sound levels were lowest during the 6 PM to 8 PM time, during which they were different from all other time periods ( $P < .0001$ ). **Conclusions:** Although sound was lower during rest periods, all levels are greater than recommended hospital standards for both day and night. Rest periods may not be effective for promoting physiologic stability. Future research should investigate this question as well as causative variables and interventions to improve noise levels.

### The Effectiveness of Advance Directives: Nurses Share Their Perspectives

Turcotte J, Florida Hospital Orlando, Fla.

**Purpose:** To determine, through the experiences of RNs, what factors influence the ability of patients, surrogate decision makers, and healthcare providers to carry out advance directives. **Background/Significance:** As frontline healthcare providers, RNs have valuable insights regarding factors that prevent congruency between an individual's wishes and the actual medical care he or she receives. **Methods:** An inductive qualitative

research approach was used to gain firsthand knowledge from 8 frontline assistant nurse managers who were selected using purposive sampling. Data were collected through an anonymous online survey and then through individual in-person interviews. Data analysis consisted of manually identifying and grouping themes. **Results:** Factors identified included communication, which included locating and understanding information; beliefs (eg, professional, personal, cultural, religious); legal aspects, which were related to documents, designation of decision makers, and interpreting information and meaning; education and support for health-care personnel, family members, and decision makers; and ownership (ie, whom does this benefit most?). **Conclusions:** The ability to carry out advance directives depends on the clarity with which patients' wishes are understood by the patient and communicated to those responsible for carrying them out. Identifying the legal decision maker and providing support to that person and to others involved is important. In addition, a means to deal with conflicting beliefs must be established. Finally, there is a need for additional education related to the legal, ethical, professional, and—especially—personal aspects of advance directives.

#### **The Effects of Body Position, Body Mass Index, and Body Fat Distribution on Resting Lung Volume**

*Villars P, The University of Texas MD Anderson Cancer Center, Tex.*

**Purpose:** Traditional pulmonary physiology teaches that moving from a supine to a partial Fowler's position is an effective maneuver to increase functional residual capacity (FRC). This pilot study investigated whether a postural intervention improved FRC and the ratio of closing capacity (CC) to FRC in a sample of overweight and mildly to moderately obese persons. The study also evaluated whether, and to what extent, body mass and body fat distribution influenced these effects. **Background/Significance:** Respiratory complications are a common cause of morbidity in ICUs; overweight and obesity are preoperative risk factors for perioperative pulmonary complications. There is evidence that loss of FRC is a key contributor to airway closure and atelectasis in critical care settings. **Methods:** A quasi-experimental study using a repeated measure, within-subjects design. The sample included 32 volunteers with BMI 25 to 39.9. FRC was measured with a helium dilution technique using a Yaeger MasterScreen PFT system. Closing volume was measured with the single-breath nitrogen washout technique using a SensorMedics Vmax Spectra system. Descriptive statistics were obtained for each demographic variable. Repeated-measures ANOVA was used to test changes in FRC and CC-FRC from sitting, supine, and 30° Fowler's positions. **Results:** The mean FRC in the supine and wedge positions was similar ( $1.65 \pm 0.43$  L and  $1.69 \pm 0.45$  L, respectively) with the mean FRC higher in the sitting position ( $2.13 \pm 0.56$  L). Neither BMI nor measurements of body fat distribution moderated the effects of position on the FRC or ERV. From repeated-measures ANOVA, statistically significant results were found for FRC and  $SpO_2$  ( $P < .0001$  and  $P = .0013$ , respectively). **Conclusions:** A 30° Fowler's position did not increase FRC in a sample of awake, healthy, overweight, and mildly to moderately obese subjects. Further research into improving pulmonary function in spontaneously breathing overweight and obese patients is clearly warranted. **Sponsored by:** American Association of Critical-Care Nurses.

#### **To Breathe: The Lived Experience of Mechanical Ventilation**

*Harris P, Pillor E, Nelson R, California State University, Sacramento, Calif.*

**Purpose:** To describe and analyze patients' experiences of mechanical ventilation with an emphasis on the weaning

process. **Background/Significance:** Early weaning can be correlated with better patient outcomes. Many studies have focused on physiological indicators of patients' readiness to wean. Less research has been performed to understand psychological factors. Given that patients are well served by involvement in their own healthcare, there is need to learn more about their perceptions to enhance full participation in weaning. **Methods:** Researchers recruited 7 volunteers who had been mechanically ventilated for 1 to 14 days. Interviews were conducted with open-ended questions aimed to awaken memories of weaning. Six participants were interviewed within 2 weeks of extubation while one had been mechanically ventilated several years before. The interviews were carried out either in hospital ( $n = 4$ ) or home ( $n = 3$ ), then recorded and transcribed. Hermeneutic phenomenological interpretation was used to analyze data. **Results:** There were 2 patient categories: respiratory failure ( $n = 4$ ) and cardiothoracic surgery ( $n = 3$ ). Whereas most memories of weaning itself were unclear, all patients spoke of their ICU experiences before, during, and/or after mechanical ventilation. All expressed complete trust in their healthcare team. Pain, fear, and loss of control were common concerns. Analysis revealed 7 themes associated with mechanical ventilation and recovery in ICU: knowing nothing, trusting in others, entering the here and now, letting go of control, receiving guidance, accepting pain, and rising above fear. **Conclusions:** Trust is vital to help participants gain awareness of their situation and receive guidance in weaning. The themes might serve as tools for nurses in coaching patients as they move toward recovery. More research is needed to understand patients' experiences and to evaluate nursing actions that promote successful weaning.

#### **Using the Synergy Model to Study Spirituality in Intermediate Care: Report of a Pilot Study**

*Smith A, University of Massachusetts, Boston, Mass.*

**Purpose:** To describe the spirituality of nurses on an intermediate care unit (IMCU) and their initial patient spiritual assessments. **Background/Significance:** JCAHO standards require spiritual assessment, and though spiritual care contributes to patient satisfaction and a humane and healing environment, many nurses deem it nonessential. The AACN Synergy Model is built on patient-nurse relationships; data support the model in so far as a nurse's personal spirituality predicts his or her ability to provide spiritual care. No reported studies of spirituality have used the Synergy Model. **Methods:** Spirituality of Nurses was a convenience survey of 35 nurses from 2 IMCUs, using the Spiritual Well Being Scale (SWBS), Spiritual Care Perspectives Scale (SCPS), demographics, and measures of self-reported religiosity/spirituality. The Spiritual Assessment of Patients was a retrospective study of 102 patient charts randomly selected from 1 year of IMCU admissions; data extracted were related to gender, age, religion, spiritual assessment, and chaplaincy referral. Descriptive statistics were generated using SPSS. **Results:** More than 91% of the nurses were women (mean age 39 years with 14 years' experience) and 65% had a nursing BS or higher. More than 70% had had spiritual care education in their basic nursing program, 62% were Christian, self-rated spirituality was 4.1, and religiosity was 3.3 (scale of 1-5). Mean SWBS score was 97 (maximum 120) and SCPS score was 37 (maximum 50). More than 50% never/rarely attended religious services. Forty-four percent of patients were men and 56% were women (mean age 61 years). Religious affiliations were as follows: 30% Catholic, 27% Protestant, 9% Jewish, and the remainder none/unknown. Seventy-seven percent received a complete spiritual assessment; 14% requested chaplaincy referrals. **Conclusions:** These older, experienced, well-educated and quite spiritual (attributes that may reflect sample bias) IMCU

nurses had a high rate (77%) of completing initial spiritual assessments. Appropriate designs to study nurses and their patients need to be developed to support research using the Synergy Model. **Sponsored by:** Dean's Research Initiative Grant, College of Nursing and Health Sciences, University of Massachusetts, Boston, Mass.

#### What Are Current Education and Training Practices of Nurses Caring for Patients Receiving Mechanical Ventilation?

*Kelly S, Frazier S, University of Kentucky, Ky.*

**Purpose:** To describe critical care nurses' basic education and training related to mechanical ventilation and to characterize continuing education and training related to ventilatory support. **Background/Significance:** Mechanical ventilation supports ventilation and oxygenation for critically ill patients. Although critical care nurses are responsible for the care of these patients, the education and training received by these nurses prior to providing care to ventilated patients has not been methodically evaluated and continuing education has not been comprehensively described. **Methods:** This was a descriptive, comparative research study. A convenience sample of critical care nurses (n = 793) from AACN completed the Mechanical Ventilation Survey. Most nurses were white, female, aged 46 ± 9 years, and were prepared at the BSN level. Most were employed in a community hospital with 17 ± 9 years of critical care experience. **Results:** Most respondents (70%) received an introduction to mechanical ventilation during basic nursing education. Roughly 85% of the nurses learned to care for ventilated patients from another nurse while on the job, but only 57% received formal education in the workplace. Nurses employed by larger facilities were more likely to receive formal coursework ( $P < .001$ ). Few reported use of regular systematic competency evaluation in their workplace (36%). Most respondents articulated the need for more specific content and training prior to and during care of patients who require ventilation. **Conclusions:** Few nurses received formal education related to the care of patients who require ventilation, and even fewer participated in regular competency evaluation. Although nurses received basic education, specific content and ongoing training related to ventilation

should be regularly provided and evaluated. **Sponsored by:** University of Kentucky Small Grant Award.

#### Mobility Protocol Reduces Hospital Length of Stay Independent of Baseline Body Mass Index (<18-45)

*Goad AJ, Wake Forest University Baptist Medical Center, NC.*

**Purpose:** ICU patients with high or low body mass index (BMI) reportedly have worse hospital outcomes than do patients with normal BMI. Immobilization in the ICU and prolonged post-ICU functional limitations are common for patients with respiratory failure. Although exercise improves functional outcome in patients with chronic obstructive pulmonary disease and congestive heart failure, few data exist with respect to early mobility in ICU patients. **Background/Significance:** We set out to determine whether a protocol approach to passive range of motion (PROM) and physical therapy delivered by an ICU mobility team to patients with acute respiratory failure would shorten hospital length of stay (LOS). In addition, the project questioned whether the mobility protocol was equally effective across BMI (<18-45) to reduce hospital LOS in patients with acute respiratory failure. **Method:** Medical patients with acute respiratory failure who required mechanical ventilation (MV) were assigned either to a protocol group (P) or a nonprotocol group (NP). Inclusion criteria included acute MV via endotracheal tube. Exclusion criteria were as follows: >45 BMI, neuromuscular disease, and MV >48 hours before transfer. The P group received mobility therapy 7 days a week by a mobility team composed of an RN, nursing assistants, and a physical therapist. The effects were adjusted for age, gender, and baseline APACHE II score. **Results:** In 22 months, 309 patients were assigned to the P group or NP group upon admission to the ICU. Hospital LOS was roughly 14.4 days for the P group and 16.3 days for the NP group ( $P = .0084$ ). No single BMI category accounted for the overall effect of the mobility team on hospital LOS ( $P = .1953$ ). There were trends in reduction of hospital LOS for both high and low BMI patients. **Conclusions:** The reduction in hospital LOS by a mobility team using a mobility protocol was not associated with any particular BMI category. Reductions in hospital LOS were seen in patients with both high and low BMI (<18-45). **Sponsored by:** North Carolina Baptist Hospital, Winston Salem, NC.