2008 National Teaching Institute Research Abstracts

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RESEARCH ORAL PRESENTATIONS

RES200 Comparison of Capillary and Central Venous Point-of-Care Glucose Testing to a Venous Laboratory Gold Standard

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Purpose: To compare capillary point-of-care glucose testing (POC) and a central venous catheter sample POC to the gold standard of venous laboratory measurement. **Background/Significance:** Critical care nursing practice requires hourly glucose testing to titrate insulin infusions that maintain glucose levels within the desired range. While using blood obtained from a fingerstick sample is usually done, ICU nurses often use blood drawn from a central venous catheter to perform the test. It is not clear which POC sample best correlates with the true blood glucose as measured in the lab. **Methods:** A method-comparison study design was used to examine the agreement between different methods for blood glucose testing (POC and laboratory analysis) and difference sources of blood for testing (capillary and central venous). **Results:** A total of 63 subjects were studied. Significant differences were found between the venous and capillary POC glucose values and the laboratory glucose values (venous POC: $t_{1,61} = 3.91$, $P < .001$; capillary POC: $t_{1,61} = 5.01$, $P < .001$). Comparison of the venous and capillary glucose values obtained with the POC device found no significant difference between the 2 values ($t_{1,61} = -0.84$, $P = .41$). The number of individual difference scores between the POC and laboratory values that had glucose differences > 20 mg/dL were 13 of 62 samples (21%) for venous POC and 12 of 62 samples (20%) for capillary POC from the laboratory value. **Conclusions:** Given the narrow range of glucose levels used for different treatment levels with insulin protocols, the accuracy of the POC device is not precise enough to justify use in these situations. Caution should be used when interpreting individual glucose readings obtained from a POC device. Rosalina.DelaRosa@providence.org

RES201 The Effect of Nutritional Support on Weaning Outcome in Adult Patients Receiving Mechanical Ventilation

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Purpose: To describe the nutritional support practices and determine the effect of nutritional support on weaning outcome in patients supported by mechanical ventilation. **Background/Significance:** Nutritional support is a major issue for critically ill patients receiving mechanical ventilation because as many as 40% of intensive care patients are malnourished. Nutritional support for patients who require mechanical ventilation improves patients' outcomes by enhancing immune function, respiratory muscle function, and ventilatory drive. There are no recent studies that evaluate nutritional support and weaning outcome. **Methods:** A retrospective medical records review was conducted at an academic medical center. A random sample of 225 patients was chosen from a list of all patients who received mechanical ventilation (n = 613) during January 1 through June 30, 2007. Nutritional support, defined as enteral or parenteral solutions administered, will be evaluated by calories prescribed and administered, route administered, biomarkers of nutritional state, and cumulative fluid balance. Nutritional state will be evaluated during the time the patient received ventilation, and weaning outcome will be determined. Descriptive statistics will characterize nutritional support practices. **Results:** Data collection is anticipated to be completed by January 1, 2008. **Conclusions:** These data will provide information about the current practices related to nutritional support for patients who require mechanical ventilation and determine the effect of nutritional support on weaning outcome. maggie.roberts@uky.edu

RES202 Evaluation of a Structured Program for End-of-Life Care in a Neurologic Critical Care Unit: Surrogate Perspective

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Purpose: To determine whether a structured end-of-life (EOL) program would improve surrogate experiences with death in the neurologic critical care unit (NCC). **Background/Significance:** More than 4 million patients are admitted to intensive care units in the United States annually. Of those admitted, approximately 500 000 or 10% to 20% die. With the advent of advanced technology, patients who previously would not have lived to hospital admission are now actively receiving treatment in our NCC. In many cases, these technological advances successfully move patients toward healing. **Methods:** A before and after survey design was used to obtain results from a total of 73 surrogates. All patients who died in the NCC from March 2005 to April 2007 were evaluated for inclusion in the study. Exclusion criteria included age < 18 years, non-English speaking surrogate, patients transferred outside of NCC before death, and refusal of surrogate to participate. If inclusion criteria were met, phone calls to the deceased next of kin occurred no sooner than 3 weeks after the death of their loved one. Verbal consent was obtained from 38 surrogates followed by the completion of a 52-item Afterdeath Bereaved Family Member Interview. **Results:** Statistically significant responses were noted in surrogate areas of providing emotional support ($P = .009$), overall care rating ($P = .04$), and explanation of care ($P = .05$). Variability in the way care was delivered was decreased in all domains and specifically in relation to communication with patient/family, symptom control, and providing emotional support. Trends toward statistical significance were noted in the domains of attending to spiritual needs ($P = .09$) and informing and promoting decision making ($P = .18$). Surrogates in phase 2 were noted to be more likely to receive information on the medications used to manage the patient's symptoms ($P = .007$). A positive trend in improvement was noted. **Conclusions:** A structured intervention can decrease perceived surrogate variability in end-of-life care while improving surrogates' perception of emotional support, overall care rating, and explanation of care. syeager@columbus.rr.com

RES203 Improving CPR Quality and Resuscitation Training Among Nurses Using Novel CPR Sensing Technology

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Purpose: This study was conducted to investigate if real-time audio feedback given to nurses during simulated cardiopulmonary resuscitation (CPR) sessions could improve quality of compressions. **Background/Significance:** Sudden cardiac arrest (SCA) is a leading cause of death in the United States, with a dismal survival rate despite widespread CPR training. Recent investigations have demonstrated that CPR quality is highly variable when performed by trained health care providers. Optimal timing and quality of chest compressions during CPR can more than double the chances of survival from SCA, providing critical therapy that supports cerebral perfusion while improving the likelihood of successful defibrillation. **Methods:** A total of 80 nurses were recruited for this study. Nurses were randomly assigned to a control group or experimental group. Both groups were assessed for baseline CPR performance without feedback while using a a CPR-sensing defibrillator that measures chest compression rate and depth. The groups were then assessed with or without real-time audio feedback. After the simulations, both groups received a 5-minute debriefing. Both groups then performed CPR during a final round of arrest simulations. CPR quality parameters were collected from a defibrillator memory card. T tests, chi-square, and analysis of variance tests were performed to make intergroup comparisons with $P < .05$. **Results:** Full data of CPR quality were available for 65 of the original 80 participants. Baseline demographics between the 2 groups were

similar; however, the experiences caring for critically ill patients were significantly different. No significant differences were found between the first 2 rounds in the no-feedback group. After a verbal debriefing, depth and number of compressions improved significantly, suggesting that a simple verbal debriefing proves beneficial in improving some aspects of CPR performance. The feedback group also performed CPR during 3 separated simulated cardiac arrests. Use of the audio feedback resulted in a significant improvement in measures of CPR. **Conclusions:** This study suggests that both debriefing sessions as well as real-time audio feedback provided improvement in CPR quality measures, although the combination provided the most improvement in individual performances. reg156@hotmail.com

RES204 IT Solutions: Identifying Sepsis Early

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Purpose: To adopt an electronic screening tool to aid bedside clinicians in early recognition of patients at risk for sepsis. **Background/Significance:** Sepsis mortality rates remain among the top 10 for all diagnoses in the nation, despite international recommendations for early diagnosis/treatment. The University of Washington Medical Center reviewed *ICD-9* code data for patients in 2005 with septicemia. Data revealed a mortality rate of 39% for patients with septicemia. **Methods:** A structured approach to identify and treat patients at risk for septicemia was developed and implemented in December 2006. A sepsis screening tool was incorporated into the electronic medical record and included entries for suspected infection, 2 systemic inflammatory response (SIRS) markers, and hypoperfusion indices (mean arterial pressure < 65 mm Hg, serum lactate > 4 mmol/L). After the screen is complete, the RN receives a computerized message to rescreen if the patient screens negative and to contact the MD if the patient screens positive for sepsis. Physician order sets were designed using evidence-based recommendations from the Surviving Sepsis Campaign for all patients screening positive. **Results:** The automatic sepsis screening tool is an efficient way to aid early identification of patients with sepsis. Data are pulled to the screen from multiple sources in the chart and result in immediate feedback describing the patient's risk. Electronic entry allows for tracking and aggregating data elements for ongoing analysis. Since implementation of the screening tool, 163 of 6570 patients across the medical center (2.5%) have screened positive. Mortality rates decreased after implementation: before in 2005, 121/310 (39%); before in 2006, 103/280 (37%); and after in 2007, 65/211 (2005 vs 2007 *P* = .06; 2006 vs 2007 not significant) and the number of patients identified in 2007 is projected to exceed previous years by 17% to 29%. **Conclusions:** Implementation of evidence-based practice guidelines for sepsis requires a system for early identification of patients at risk. Using technology to assist clinicians to recognize sepsis early is an important step to early implementation of treatments that can have a direct effect on mortality. marion@u.washington.edu

RES205 Optimizing Stewardship: A Grounded Theory of Nurses As Moral Leaders in the Intensive Care Unit

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Purpose: To generate a theory of nurses' participation in life-sustaining treatment (LST) decision making for seriously ill patients and to gain an understanding of the skills and practices of critical care nurses who are active and effective participants in the LST decision-making process. **Background/Significance:** Aggressive therapies used in the intensive care unit are often beneficial and life saving, but their use can cause great distress to patients, families, and nurses if used in seemingly futile situations. Roughly 50% of nurses participate in LST decision making where use of such therapies and goals of care are discussed, yet little is known about their practice. Articulating the elements of effective participation can improve care for patients and families and can lessen

moral distress for nurses. **Methods:** Grounded theory methods were used to generate a substantive theory of nurses' effective participation in LST decision making. Theoretical sampling guided both participant selection and interview format. Criteria for participation included 1 year of nursing experience and the ability to describe a successful experience of LST decision making. Individual interviews were conducted with nurses from 2 large urban teaching hospitals in the Northeast (n = 11). A focus group (n = 3) was conducted to verify that the tentative theory was coherent with participants' experiences of LST decision making. Constant comparative analysis was used for data analysis and theory development. **Results:** Optimizing stewardship is a 3-stage process describing the responsible and careful approach nurses use to provide the necessary supports to patients and families during the illness experience and LST decision-making process. Experiencing empathic distress describes the nurse's ability to recognize and act in response to another's distress despite perceived obstacles. Actively engaging describes the actions taken to help patient/family reach an acceptable decision. Maximizing moral leadership describes the outcomes of effective participation in LST decision making. Optimizing stewardship is fortifying for the nurse. **Conclusions:** Inherent risk is embedded in the role of steward. Successfully assisting patients and families in making difficult LST decisions during crisis requires a blend of knowledge, skill, and courage. Last, nurses who act for or on behalf of a patient or family exhibit moral leadership. SBreakey@Partners.org

RES206 Pediatric Emergency Preparedness: Are We?

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Purpose: This exploratory research studies the patterns of pediatric preparedness in the nation's hospitals as it related to various community, health care, and demographic factors. The goal of the study was to explore emergency capabilities and create a model to assist in pediatric disaster preparedness. **Background/Significance:** Disaster planning in pediatrics is lacking. More than 30 states have no plan for pediatric preparedness. The National Center for Health Statistics (NCHS/CDC) conducted a survey (EPSES) to assess pediatric emergency preparedness in our nation's hospitals. It concurred with many other studies that hospitals were not adequately prepared to take care of critically ill or injured children. Why are some hospitals more prepared than others? **Methods:** This large secondary data (n = 4762) set was recoded and explored to look for patterns of preparedness as they were associated with community and hospital characteristics. Ten variables were reviewed (eg, presence of a pediatric ICU and community per capita income) to associate factors related to community and health care with pediatric preparedness. Statistical analysis included descriptive methods and logistic regression to model the data to identify "pediatric emergency ready" hospitals. **Results:** Less than 10% of hospitals have essential resuscitative equipment. Pediatric specialty services, per capita income, MSA, and region are significant factors. Infants are at an even greater risk for not having appropriate equipment available. Regionalization and the use of pediatric ICUs and hospitals are not the sole answer to disaster readiness for children, as many pediatric hospitals are not adequately prepared. An analysis of community and health care factors assist in identifying patterns of exemplars of readiness. Associations are identified by using pediatric health, emergency care, and economic factors to develop predictive models of pediatric preparedness. **Conclusions:** Pediatric disaster preparedness is seriously lagging behind. To prepare for disasters, community and healthcare factors must be included. Pediatric emergency care and surge capabilities need local as well as national attention because a "one size fits all" approach to disaster readiness does not work. Khuddles@gmu.edu

RES207 The Pendulum Swings Back to Hyperglycemia When Intravenous Insulin Infusions Are Discontinued

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Purpose: To describe transition methods used to discontinue

an intensive intravenous (IV) insulin protocol, and to observe postprotocol blood glucose (BG) management. **Background/Significance:** BG control between 80 and 110 mg/dL with an IV insulin protocol reduces morbidity and mortality in intensive care unit (ICU) patients. Methods to transition off the IV insulin infusion, and BG management in the 24 hours after protocol have not been studied. **Methods:** A retrospective chart review of 30 adult ICU patients on an intensive IV insulin protocol was conducted. Exclusion criteria: type 1 diabetes mellitus (DM), total pancreatectomy, diabetic ketoacidosis, hyperglycemic hyperosmolar state, end-of-life care, and total parenteral nutrition (TPN) with insulin in TPN bag. Data were collected on BG levels and insulin dosage before, during, and after the protocol. Precision PCx or i-Stat (Abbott) glucometers were used. Insulin dosage in the last 4 hours of the protocol was used to calculate a predictive adjusted daily insulin dose for the 24 hours after the protocol. Descriptive statistics and intraclass correlation coefficient were used to analyze data. **Results:** Thirty patients (12 male, 18 female); mean age 58 years (SD, 14); mean APACHE II score 23 (SD, 10); mean ICU length of stay 9 days (SD, 9); 70% had type 2 DM. Mean BG (mg/dL): preprotocol 241 (SD, 77); last 24 hours on protocol 109 (SD, 31); 24 hours after protocol 181 (SD, 70). To transition off: 13% (n=4) received NPH; 83% (n=25) no transition insulin. In the 24 hours after the protocol: 83% (n=25) received regular insulin scale; 17% (n=5) a short- and long-acting insulin regimen; 7% (n=2) oral hypoglycemic agent; 13% (n=4) no treatment; the total insulin administered averaged 15 units (SD=16). The adjusted daily insulin dose averaged 58 units (SD=29). A low intraclass correlation coefficient (ICC=0.09) reflects this difference. **Conclusions:** BG control in a target range of 80-110 mg/dL is achievable with an intensive IV insulin protocol in the ICU, but hyperglycemia quickly recurs without a standardized transition method and postprotocol plan to provide adequate insulin coverage. FLI@stanfordmed.org

RES208 Psychometric Testing of the KU Delirium Assessment Tool (KU DAT) for Intubated Patients

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Purpose: To test the psychometric properties of a clinician-developed screening tool for delirium in adult intensive care unit (ICU) patients who are intubated. **Background/Significance:** Delirium is a serious complication for ICU patients with reported 3-fold increase in hospital death rates. Available instruments to screen for delirium were difficult to use on nonverbal patients and/or patients with poor visual/motor function. An easy-to-use screening tool that was based on current literature and a validated tool was developed. This new tool was clinically successful, but psychometric testing was needed. **Methods:** Prospective, instrument testing design was used to examine the Delirium Assessment Tool (DAT) properties. The DAT consists of 4 assessment areas: altered level of consciousness, inattention, psychomotor agitation, and psychosis. Each was rated as present or absent. If 2 or more areas were present, the screening tool was positive, which prompted a physician referral for diagnosis. Psychometric testing included sensitivity and specificity based on whether delirium orders were written by the physician, interrater reliability, and concurrent validity with the original tool. **Results:** Of 346 assessments, 202 assessments (58%) were done on 164 intubated patients consisting of 104 males and 60 females with a mean age of 52 years (range, 19-83). Of the 164 intubated patients screened, 38 (23%) were assessed as positive, indicating the need for physician referral. Sensitivity (true positives with delirium orders) was 95% with a 95% CI of 86%-99% and a specificity of 99% (162/164). Interrater reliability for the DAT was 100% between 2 nurse raters with only 6 disagreements on subitems. The DAT captured 1 more patient with delirium than did the original instrument (97% agreement). Incidence of delirium for intubated patients in this sample was 21.9%. **Conclusions:** Although further testing is needed, the DAT shows promise in being an effective, usable screening instru-

ment for delirium. Staff learned the tool quickly with improved consistency in delirium assessment and documentation. mbolen@kumc.edu

RES209 A Qualitative Study to Determine Nurses' Perceptions of Glycemic Control in the Cardiac Surgery Patient

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Purpose: Building on our previous work that discerned nurses' perceptions of their workload, this study's purpose was to explore further the nurses' thoughts on the glycemic control protocol. **Background/Significance:** Previous work investigating the effects of glycemic control in cardiac surgery patients has demonstrated obtaining/maintaining blood glucose values between 80 and 120 is imperative in achieving excellent clinical outcomes in cardiac surgical patients. However, the caregiver's workload associated with meeting this goal is only now beginning to be understood. **Methods:** This qualitative study used focus groups held on 3 consecutive days to interview nurses in the CVICU and CVSD units about their thoughts on glycemic control. Three research questions developed from our previous work were used to help guide the discussion: (1) If this were a perfect world (utopia), what would you want to have in your workplace that would allow you to achieve tight glucose control with your patients? (2) What patient outcomes would be important for you to see in order to know that achieving tight glycemic control is worth all the work involved? (3) What thoughts or decisions go into making glycemic control important to you? **Results:** 10 nurses (3 from CVICU and 7 from CVSD) participated in the focus groups; however, saturation was accomplished. The essence of the nurses' message was that they recognize glycemic control as a very important part of their patient care. However, in order to be able to perform this intervention, they will need the following: available equipment, a designated person to obtain all blood glucose values, periodic updates on patient outcomes related to glycemic control, and a way not to have to be as intrusive with the patient to draw the blood. **Conclusions:** The ability of the nurses to obtain glycemic control is hindered by the lack of time, lack of necessary resources equipment, lack of knowledge about the long-term outcomes as a result of glycemic control, and the discomfort to patients caused by the required frequent blood draws. lhenry6@cox.com

RES210 The Role of Glasgow Coma Scores in Modeling APACHE(r)IV Scores in Neuro ICU Patients

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Purpose: To explore how different scores on the Glasgow Coma Scale (GCS) obtained during the first 24 hours of admission to the ICU will affect the computed values of APACHE(r)IV where the APACHE(r)IV is a predictor of mortality and length of stay of neurological critical care patients. **Background/Significance:** APACHE(r)IV scores are calculated from the lowest GCS score in the first 24 hours. However, the GCS in neurologically injured patients may vary significantly during the first 24 hours, and we were interested in exploring whether, with the neuro-ICU patients, the highest GCS score in the first 24 hours (when used to compute APACHE[r]IV scores) is superior in predicting mortality and length of stay (LOS). **Methods:** We created 3 models for predicting mortality and LOS for 50 patients in the neurological ICU that were in an ongoing study approved by the institutional review board. Each model used the APACHE(r)IV calculator changing only the GCS score. In the first model, we used the lowest GCS in the first 24 hours. In the second model we used the option of not including a GCS score. In the third and final model, we used the highest GCS score in the first 24 hours. **Results:** Regression analyses were performed by using SAS 9.1 for Windows (Cary, NC). The standard model using the lowest GCS was a significant predictor for mortality ($r^2 = 0.078$, $P = .049$), but not for LOS ($r^2 = 0.044$, $P = .15$). The model omitting the GCS did not significantly predict mortality ($r^2 = 0.056$, $P = .10$) or

LOS ($r^2 = 0.073$, $P = .06$). The model using highest GCS score was a significant predictor for mortality ($r^2 = 0.11$, $P = .02$), but not for LOS ($r^2 = 0.051$, $P = .12$). **Conclusions:** The model using high GCS score was a better predictor of mortality in our sample. All 3 models failed to significantly predict length of stay. This pilot study supports a need for further exploration of how high versus low GCS scores may influence APACHE(r)IV scores in neurologically injured patients. kriemen@email.unc.edu
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RES211 Work Hours, Meal Breaks, Quality of Care, and Job Intention in Critical Care and Progressive Care Nurses
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Purpose: Among a large national sample of critical care (CC) and progressive care (PC) RNs, we examined: (1) working hours and prevalence of skipping meal breaks, and (2) the relationship of skipping meal breaks with perceived quality of care and intent to stay in the job. **Background/ Significance:** Rogers et al, using small samples of RNs, found that RNs were free of patient responsibilities during a break or meal period on only 47% of shifts worked and that RNs working the longest shifts were the least likely to receive valid (free of patient responsibilities) breaks or meal periods. Further, there was a 10% decrease in the risk of making at least 1 error with an additional 10 minutes during a break or meal period. **Methods:** We used a cross-sectional design with data from the Web-based 2007 National Database of Nursing Quality Indicators (NDNQI) RN Survey. The sample included 9932 CC RNs and 5263 PC RNs in a full-time staff nurse role. RNs were asked to report on hours worked, minutes of meal breaks, patient responsibilities during meal break, and quality of care on their last shift. They also reported intention to stay in the current position. Quality of care was rated on a 4-point scale of poor, fair, good, and excellent. Questions on work hours and meal periods were modified and used with permission of Dr Rogers. Data were analyzed with descriptive statistics, chi-square, and analysis of variance. **Results:** On the last shift, 72% of CC RNs worked 12 hours (mean, 12.12; SD, 1.12), with 24% working 13 to 17 hours, and 69% of PC RNs worked 12 hours (mean, 11.94; SD 1.36), with 22% working 13 to 17 hours. Only 27% of CC and 25% of PC RNs reported a valid meal break. RNs working longer shifts were significantly less likely to have a valid meal break ($P < .001$). Ratings of quality of care were significantly higher ($P < .001$) among RNs having a valid meal break (mean, 3.51 for CC and 3.40 for PC) than among nurses not having a valid meal break (mean, 3.27 for CC and 3.17 for PC). RNs who received a valid meal break reported significantly higher ($P < .001$) intent to stay in the current job than did RNs not having a valid meal break. **Conclusions:** Of RNs working 12 hours or more, 3/4 do not take valid meal breaks and report lower quality of care and intent to stay. Our data support findings of Rogers et al and conclusions of AACN's Healthy Work Environments that inappropriate staffing is harmful to patient safety and well-being of nurses. pmiller1@kumc.edu
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RESEARCH POSTERS

RES212 Ability of an Electronic Integrated Monitoring System to Affect Duration of Patient Instability in a Step-Down Unit
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Purpose: We evaluated the ability of an integrated monitoring system (IMS) to improve nurses' ability both to detect cardiorespiratory instability according to medical emergency team (MET) call criteria in patients in an SpO_2- and ECG-monitored step-down unit (SDU) and to shorten duration of instability. **Background/Significance:** Early discharge from ICUs to SDUs has increased, but patients are at risk of instability developing that can be undetected and undertreated in this environment of lower intensity monitoring. Failure to find and treat instability adversely affects outcome. Using an electronic IMS to continuously integrate individual minimally invasive monitoring parameters into a single index value may improve nurses' ability to detect, recognize, and attend to instability. **Methods:** Prospective, longitudinal study of monitored patients (24-bed trauma SDU) in 3 phases. An IMS (Visensia) received input from bedside monitors and used 4 vital signs (VS) (heart rate, respiratory rate, blood pressure, SpO_2) to develop a single neural networked value, the Visensia Index (VSI). Phase 1 (P_1; 8 weeks) VSI was not displayed; patients received standard care; VSI and VS trends were background recorded. Phase 2 VSI was displayed on bedside and central station monitors; staff were educated on use. Phase 3 (P_3; 8 weeks) staff used a clinical algorithm for response to alert of VSI >3.2. Detection of VS parameter changes meeting MET trigger values defined instability. Data comparisons for P_1 to P_3 used descriptive statistics. **Results:** Admissions (333 in P_1; 314 in P_3) and continuous monitoring hours (18 258 in P_1 and 18 314 in P_3) were similar. Most patients in both phases were never unstable. Similar percentages of patients had at least 1 instability event develop that minimally achieved MET call criteria (METmin) in P_1 and P_3 (25% P_1 and 23% P_3). However, the mean duration (minutes) of instability per METmin patient decreased from 39.63 min/METmin patient in P_1 to 19.39 min/METmin patient in P_3 (-51.1% change). The percentage of patients in whom serious and persistent instability that fully achieved MET criteria developed and should have resulted in a call (METfull) was less in phase 3 (17.7% P_1 vs 5.7% P_3; -67.8% change). **Conclusions:** Using an IMS improved detection of clinical instability as compared with conventional 4-channel monitoring in the SDU environment. Further study will determine if improved detection alters treatment patterns for instability. mhra@pitt.edu

RES213 Accuracy of Digit and Forehead Oximetry in Patients Receiving Therapeutic Hypothermia After Cardiac Arrest
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Purpose: To evaluate the accuracy of an alternative method of monitoring pulse oximetry in patients with core body temperature <33.5°C. **Background/Significance:** Therapeutic hypothermia is recommended for patients remaining comatose after cardiac arrest to preserve neurological function. Oxygen saturation values are monitored closely in these patients and guide interventions. Conventional methods of monitoring pulse oximetry use digital sensors. Because of peripheral vasoconstriction, the signal is often weak and does not consistently reflect accurate SpO_2 values. This is problematic because clinical interventions are based on digit sensors values. **Methods:** A descriptive, prospective study evaluated accuracy and precision of forehead and digit pulse oximetry sensors in hypothermic patients after cardiac arrest, compared with co-oximetry. Cooling was initiated immediately after the cardiac arrest with a target of 33°C. SpO_2 was monitored from forehead and digit oximetry sensors and a single arterial blood gas analysis served as the comparison standard. Once the subject was cooled and maintained at a temperature of 33°C for 1 hour, digital and forehead sensor data were recorded and an arterial blood gas sample was obtained. SpO_2 and SaO_2 data were analyzed by using the Bland Altman method. **Results:** Thirty subjects were enrolled (21 males, 9 females); the mean age was 55 years. Fourteen subjects were resuscitated from ventricular fibrillation, 9 from PEA, 6 from asystole, and 1 from pulseless ventricular tachycardia. The mean (SD) functional SaO_2 was 98% (1.9), forehead SpO_2 was 99% (1.65), and digit SpO_2 was 94% (2.69). The bias (mean difference SaO_2 - SpO_2) and precision were -1.3% and 1.4% for the forehead sensor and -0.14 and 2.2% for the digit sensor. **Conclusions:** The forehead sensor was more precise than the digit sensor and is an accurate alternative for patients receiving therapeutic hypothermia. Areas of future research include accuracy and response times of the oximetry sensors during movement or desaturation in the therapeutic hypothermia population. nkupchik@u.washington.edu.
Sponsored by: AACN Research Grant, Covidien/Nellcor equipment loan

RES214 Adequate Pressure Support Level to Prevent Alveolar Collapse During In-Line Suctioning in a Model Lung
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Purpose: To determine adequate pressure support (PS) level to prevent lung volume reduction induced by in-line suctioning (ILS) using a lung model. **Background/Significance:** It has been recognized that ILS aspirates air from the lungs and may cause alveolar collapse due to lung volume reduction. Lung volume during ILS depends on the relationship between the amount of air aspirated and inspiratory flow provided by the ventilator. It is likely that sufficient inspiratory flow (eg, high PS level) prevents lung volume reduction during ILS, but an adequate PS level to prevent lung volume reduction during ILS was not well known. **Methods:** An 840 ventilator (Puritan Bennett, Pleasanton, CA) was connected to a model lung (TTL: Michigan Instruments, MI) using a ventilator circuit, an endotracheal tube (inner diameter, 8 mm), and an ILS system (14F). Mechanical ventilation settings were SIMV8+PS, VT 0.5 L, V_{max} 40L/min, PEEP 10 cm H_2O, and pressure trigger at -2 cm H_2O. PS level was changed from 0 to 15 cm H_2O by 5 cm H_2O. ILS with -200 mm Hg was performed for 8 seconds and 5 times in each PS level. Pressure in the lung model (P_{alv}) as an indirect index of lung volume was continuously measured in each PS level (0, 5, 10, 15 cm H_2O) using a respiratory mechanics monitor (Ventrack 1550, Novametrix Medical System). **Results:** With PS 0, 5 cm H_2O, P_{alv} was significantly reduced during ILS; however, P_{alv} was significantly increased during ILS in PS 15 cm H_2O. With PS 10 cm H_2O, P_{alv} was relatively constant during ILS. **Conclusions:** These findings suggest that PS 0 to 5 cm H_2O may not be sufficient to prevent lung volume reduction induced by ILS in the situation. PS level greater than or equal to 10 cm H_2O is recommended, especially in the critically ill patients with pulmonary compromise. tunoki@slcn.ac.jp

RES215 Advancing Practice: The Experiences of Being Certified As a Level 3 Critical and Progressive Care Nurse
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Purpose: To describe the nurses' experience of how certification impacts critical and progressive care nursing practice. **Background/Significance:** To promote continuing excellence in critical and progressive care nursing practice, a 2-credit academic course was created and taught to nurses in the spring of 2006 and 2007. Following completion of the course, nurses had the option to complete the national certification exam for CCRN or PCCN. Nurses' completion of this exam is important, especially in light of quantitative studies that have demonstrated that certification is linked to fewer medication errors, increased nurse job satisfaction confidence in identifying patient complications, and competence in initiating prompt interventions. **Methods:** This qualitative study uses interpretive phenomenology and evaluative methods. Interpretive phenomenology will be used to describe the meanings of nurses' experiences in being certified. The AACN Synergy Model will serve as the guiding framework for developing the evaluative portion of the study in which nurses will be surveyed for how they experience practicing the synergy concepts learned in the academic course. This combination of methods is important to reflect experiences of certification both generally through phenomenology and specifically through the Synergy Model. Participants will be nurses who have completed the academic course and national certification exam for CCRN or PCCN. **Results:** Data collection will begin November 2007 and preliminary results will be presented at NTI. cmnosek@winona.edu

RES216 Another Pressure Ulcer? A Prospective Study To Reduce Pressure Ulcers In Ventricular Assist Device Patients
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Purpose: This study evaluated the effectiveness of using the KCI Overlay (KCI) immediately following the implant of a ventricular assist device (VAD) to reduce pressure ulcers (PUs). Other factors were examined to predict PUs. **Background/Significance:** The incidence of PU following cardiac surgery is reported to be

up to 29%. A chart review at our institution revealed 38% of VAD patients experienced PU immediately after surgery. An unexpected increase in PUs occurred when there was a change in the intensive care mattress to Total Care Sport (TCS). The incidence of PUs rose from 31% to 57% when the new mattress was introduced. Further investigation was necessary to determine if other factors were responsible for the high incidence of PU. **Methods:** This prospective study used historical controls to compare the effect of using KCI for this group of patients (n = 43). Analyses of risk factors associated with the development of PUs were analyzed by using chi-square tests. Other factors unique to this population were collected for analyses. Patients not placed on KCI were included in the control group for analysis. **Results:** Patients who were placed on a KCI after surgery had significantly fewer PUs than those on the Baxter mattresses or TCS ($P = .01$). Only 6% of patients (n = 1) placed on KCI had PUs develop as compared with 31% and 63% of patients on the other surfaces. Pressure ulcers did not correlate with preoperative factors such as a diagnosis of diabetes (n = 18, $P = .99$) or renal failure requiring dialysis (n = 6, $P = 0.3$). Postoperative factors such as Braden Scale score, or undergoing a reoperative procedure (n = 16), dialysis (n = 16), or experiencing a neurologic event (n = 14) were not significant for PU development ($P = .48, 0.3, 0.3,$ and 0.9 respectively). **Conclusions:** The KCI significantly reduced the incidence of PU in VAD patients. Factors previously reported to be associated with PU development in surgery patients, such as Braden Scale or renal failure, were not associated with PU development. Further research is needed to explain this phenomenon. cballew@virginia.edu

RES217 Assessment of Knowledge, Attitudes, and Behaviors of ICU Health Care Providers Regarding End-Of-Life Care Issues
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Purpose: To assess knowledge, attitudes, and behaviors of intensive care unit (ICU) health care providers at Zablocki Veterans Administration Medical Center (ZVAMC) with respect to end-of-life care. **Background/Significance:** The importance of the quality of end-of-life care in the ICU has gained increasing attention in the medical literature. Despite the high prevalence of deaths in the ICU, the provision of end-of-life care in this setting is not adequate, and many ICU providers at ZVAMC believe that patients do not receive adequate end-of-life care. The assessment of knowledge, attitudes, and behaviors among ICU health care providers with respect to end-of-life care is the first step to meet these needs. **Methods:** A questionnaire was developed on the basis of critical quality indicators identified by Clarke et al. The questionnaire addressed the domains of patient and family decision making, communication, continuity of care, pain control and symptom management, emotional and spiritual support for patients and families, and emotional and organization support for ICU clinicians. Demographic questions were included. Participation was on a voluntary basis, a cover letter explaining the background and purpose of the study was attached to the questionnaire, and an in-service training was presented. ICU health care providers included ICU nursing staff, physicians, and others. **Results:** The greatest perceived competency was providing emotional support to patients and families, while the least was continuity of care. Differences in perceived behaviors between nursing and physicians were statistically significant ($t = 3.846, P < .001$). The behaviors subscale was significant between nursing and physicians for team behaviors ($t = 4.40, P < .001$), and the mean difference in perceived communication between nursing and physicians was statistically significant ($t = 6.179, P < .001$). Correlational studies indicated that years in practice was significantly correlated with perceived competency in providing emotional support to patient and families ($r = 0.25, P = .05$). **Conclusions:** This study has provided information needed to implement educational opportunities and best practice guidelines in EOLC, including communication, continuity of care, staff support, and decision making. It is anticipated that these

interventions will improve quality of EOLC to veterans at this VA. toni.balistrieri@va.gov

RES218 Attitudes and Beliefs of Emergency Department Staff Regarding Family Presence for Medical Resuscitations
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Purpose: To explore staff attitudes and beliefs regarding family presence (FP) during medical resuscitations in the emergency department. **Background/Significance:** FP began in the 1980s. Current research shows multiple benefits: increased rapport with the treatment team, decreased sense of exclusion from the loved one, and improved professionalism by the treatment team. **Methods:** The evidence-based practice work team at Barnes-Jewish Hospital reviewed current position statements and literature about FP. Information was provided supporting FP to nursing and physician leadership, consensus developed, a FP protocol specific to our department was created, and IRB approval was obtained to conduct a pre-post survey of staff about FP. Following collection of the preimplementation survey from all staff, 2 months were dedicated to in-service training on the FP protocol. A postimplementation survey was distributed to all staff in the ED to determine if changes in attitudes had resulted from the education and practice implementation. **Results:** The team had 150 surveys returned for the preimplementation survey and 113 from the postimplementation survey. Staff reported having worked with FP at the bedside during resuscitation 44% on the presurvey and 51% on the postsurvey. Staff reported they would want their family present during their resuscitation (82% presurvey, 87% postsurvey) and would want to be present for family members during their resuscitation (62% presurvey, 76% postsurvey). No changes in reported frequency of family interference with the treatment team (34% presurvey, 33% postsurvey). Narrative responses indicated these situations occurred before formal department implementation when no coach was present. **Conclusions:** The majority of respondents support the option of facilitated FP. Concerns that family could interfere with the treatment team were identified but staff reported these instances occurred if the family was not provided a supportive staff member as a coach. lan9812@bjc.org

RES219 Augmenting Observational Sedation Assessment With BIS Monitoring Reduces Sedative Use
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Purpose: To test the hypothesis that bispectral index (BIS) monitoring, when used as an adjunct to current sedation assessment, reduces the amount of sedation used. **Background/Significance:** Patients in the intensive care unit (ICU) often experience oversedation. Numerous sedation scales have been proposed and tested with varying results. There is confusion about BIS monitoring both in literature and practice; BIS is neither adequate, nor designed, to replace observational assessments of the patient's response to sedation. This study is unique in that it explores how a specific outcome variable (the amount of sedation) is affected by augmenting (not replacing) current methods of sedation assessment. **Methods:** This prospective randomized control trial blinded nurses to the primary dependent variable. Following informed consent for this study approved by the institutional review board, 51 subjects were randomized to receive sedation assessment with either the standard of care alone (control group, n = 25), or the standard of care plus BIS (BIS-augmentation group, n = 26). The study period began at 8:00 AM on the day of study and lasted 12 hours. Nurses were instructed to adjust sedation to a Ramsay score of 4 (both groups) and a BIS value between 60 and 70 (BIS-augmentation group). **Results:** Data were analyzed by using SAS v9.1 (Cary, NC). The mean infusion rates for the control group (30.19 µg/kg per minute) and BIS-augmentation group (15.35 µg/kg per minute) were significantly different ($F = 8.63$, $P = .005$) and explained 15% of the variance in scores ($r^2 = 0.15$). **Conclusions:** BIS augmentation was associated with nearly a 50% reduction in the sedation infusion rate. Physiologic sedation assessment tools with EEG-derived parameters such as BIS provide useful information that may decrease the incidence of oversedation in critically ill patients. Olson006@mc.duke.edu

RES220 Blood Pressure Response to Family Visitation and Nurse Physician Collaborative Rounds
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Purpose: To compare changes in mean arterial blood pressure (MAP) in response to both family visitation and nurse-physician collaborative rounds (NPCR). **Background/Significance:** Visitation policies in critical care continue to vary greatly from unit to unit, even though research in the past 25 years is largely in support of its beneficial effects on both patients and families. Even though research supports elimination of strict and inflexible visitation policies, recent survey research data indicate that more than 70% of official policies for visitation remain very restrictive. Nurses and other caregivers often believe that restrictive visitation helps promote rest. **Methods:** Subjects (N = 62) were critically ill patients on stable doses of cardiovascular medications in a 20-bed medical-surgical ICU. Blood pressure measurements were taken 5 minutes before both the family visit and NPCR and every 5 minutes throughout. All measurements were done on the same ICU day. The main outcome variable was the difference between the mean arterial pressure (MAP) measurement 5 minutes before both NPCR and the family visit, and the MAP measurement 5 minutes into each event. **Results:** Results from the paired sample t test are displayed in a table. **Conclusions:** Results indicate a significant difference between changes in the MAP in response to family visitation as compared with NPCR, most likely indicating a heightened stress response to NPCR as compared with family visitation. This research provides further data in support of flexible visitation. karen.giuliano@philips.com

RES221 Bundling of Nursing Interventions: Reducing Ventilator-Associated Pneumonia
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Purpose: This study was conducted to evaluate the effect of implementing the bundling of nursing interventions on reducing ventilator-associated pneumonia (VAP). **Background/Significance:** Lowering the incidence of hospital-acquired infections is a national patient safety priority. Although bundling of patient safety initiatives has been studied, very little is known about how nurse-sensitive performance measures can be used to monitor safe practices and to produce improved outcomes for patients. The bundled intervention specific for this study was maintenance of endotracheal cuff pressure, head-of-bed elevation, and providing mouth care. **Methods:** A comparison of individually represented interventions and a bundled autonomous nursing intervention was undertaken. Survival analysis using the Weibull Parameterization Proportional Hazard Model was used to estimate the likelihood of developing a VAP. An aim of the study was to give insight into the patient's risk process that leads to the development of a VAP and to gain insight into how the risk changes over time, after intubation. Multivariate analysis focused on the comparison between bundled nursing and individually represented nursing interventions in reducing the patient's risk for VAP developing. **Results:** The optimal nursing intervention bundle consisted of the bundling of endotracheal tube cuff pressure between 20 to 25 cm H_2O, head-of-bed elevation between 30° to 45°, and mouth care provided every 2 or every 4 hours. The risk of VAP developing was about 97.6% lower ($P = .004$) among patients who received the bundling of nursing interventions relative to those who did not receive this bundle of services. The expected time until a VAP occurred was estimated to be almost 3.5 times longer ($P = .003$) among patients receiving the optimal bundle intervention relative to those who did not receive the optimal nursing bundle intervention. **Conclusions:** Bundling of 3

autonomous nursing interventions achieved a better outcome for patients than if these same autonomous interventions were implemented individually. Linda.J.Curtin@caritaschristi.org

RES222 Caring in Pediatric Emergency Nursing

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Purpose: To identify nurse caring behaviors that were most important to the parents of a pediatric emergency department population. **Background/Significance:** The theory of human caring was developed with the assumption that caring is an essential component of a healing environment and represents the essence of nursing. There is a growing perception that nurses have lost their caring behaviors. This belief may be because the behaviors most valued by patients and families are not those perceived as most important by the nurses providing care. It is important to determine what caring behaviors are most important to the parents of pediatric patients. **Methods:** In this nonexperimental descriptive study, 300 parents of children treated in a pediatric emergency department were recruited. The parents' children were assigned an acuity level by the triage nurse as emergent, urgent, or nonurgent. Parents completed a Web-based version of the Caring Behaviors Assessment where they selected the importance of 61 nurse caring behaviors. Parents were also given a description of the acuity levels and selected the acuity that they believed their child should have been assigned during triage. Descriptive statistics were computed for instrument items and the chi-square statistic was used to determine the difference between triage-assigned and parent-assigned acuity level. **Results:** Validity was determined by using a construct validity index with doctoral and evidence-based practice experts. Internal consistency reliability was .971. Leading nurse caring behaviors were related to technical competence, providing interventions in a timely manner, communication, facilitating family presence, and including family in care delivery options without differences when comparing data based on triage-assigned acuity level and parent-perceived acuity level. Parents were most likely to perceive their child's acuity level as urgent (70%). A significant difference was found between nurse-assigned and parent-perceived acuity level, $\chi^2(4) = 36.353$, $P < .001$. **Conclusions:** Nurse caring behaviors are important regardless of the patient's acuity level. Parents' perceptions of illness were different from that of the triage nurses. Nurses should openly discuss illness severity with patients and families as a starting point to demonstrate nurse caring. gillesgl@yahoo.com
Sponsored by: Department of Emergency Medicine, Cincinnati Children's Hospital Medical Center, Cincinnati, OH

RES223 Chest Physiotherapy Is Safe With Patients at Risk for Intracranial Hypertension

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Purpose: This study was conducted to address the impact chest physiotherapy (CPT) has on intracranial pressure (ICP) for brain-injured patients with documented intracranial hypertension. **Background/Significance:** Care of the brain-injured patient focuses on minimizing ICP to reduce secondary brain injury. CPT is a common nursing intervention used to increase the surface area of the lung, thereby optimizing gas exchange. It is performed manually or automatically through the use of specialty beds. As the exchange of gas is optimized through the opening of the alveoli, intrathoracic pressure decreases. This decrease is thought to lessen resistance to cerebral venous flow, thereby decreasing ICP. **Methods:** A total of 26 subjects with documented intracranial hypertension and current ICP monitoring were studied in a prospective randomized control trial. Subjects were randomly assigned to either the control (no CPT) or the intervention (10 minutes of CPT) group. ICP was recorded every minute for the 10-minute period before, during, and after the single 10-minute intervention time. CPT was accomplished using automated beds (Hillrom SPORT)

with the highest setting and the head of the bed at 30° elevation. Mean ICP during each 10-minute period was determined and analysis of variance was used to test for differences in the control and intervention groups (SAS v9.1). **Results:** Values were measured in mm Hg. Before the intervention, mean ICP did not differ between the control (13.590) and the intervention (12.404) group ($F=.30$, $P=.59$). For the 10-minute intervention period, there was no difference in mean ICP for the control (14.986) versus the intervention (12.250) group ($F=.56$, $P=.46$). For the 10 minutes following the intervention, mean ICP did not differ between the control (15.509) and the intervention (13.327) group ($F=.67$, $P=.4215$). Slopes for ICP were also explored; despite an early signal of a greater rise in the control group (from 13.59 to 15.51) than in the intervention group (from 12.40 to 13.28), this was not significant. **Conclusions:** This pilot study demonstrates the safety of fully examining the effects of CPT in the setting of intracranial hypertension. It also supports nursing practice in that CPT is vital for patients but is not harmful to ICP. Olson006@mc.duke.edu

RES224 Clinical Outcomes and Satisfaction With Continuous Lateral Rotation Therapy (CLRT) in a Medical Intensive Care Unit

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Purpose: The purpose of the study was to compare the effect of the TotalCare SpO2RT Pulmonary Therapy System (mechanical therapy) with medical intensive care unit (MICU) standard pulmonary therapy (manual method) on clinical outcomes, patient acceptance and tolerance of rotation, and clinician satisfaction. **Background/Significance:** Despite CLRT being an available critical care therapy, the literature has presented mixed results related to its efficacy. Criticism of research has been small sample sizes and a lack of definition of rotation. Additionally, the issue of patient tolerance and acceptance appears to have limited use that may have affected effectiveness. This research attempted to fill the void by ensuring an adequate sample size and including efficacy measures as well as patient and clinicians' satisfaction. **Methods:** All intubated, weanable MICU patients were randomized into 2 groups: Hill-Rom Zone Aire bed receiving standard/usual care (bronchopulmonary hygiene, turning every 2 hours) or the Hill-Rom TotalCare SpO2RT Pulmonary Therapy System with CLRT. The primary outcome measures were time to extubation and MICU length of stay. Secondary outcomes included the incidence of nosocomial pressure ulcers and urinary tract infections (UTIs). Satisfaction of patients, nurses (RNs), and respiratory therapists (RRTs) with CLRT and standard therapy was measured by using a Likert scale. The RN and RRT satisfaction also assessed the presence of back/shoulder pain after using both therapies. **Results:** Patients were assigned to standard care (41) or CLRT (45). The 2 groups were similar in age (mean, 62 years; SD, 15 years), APACHE II score (mean, 18; SD, 5.6), primary diagnosis (respiratory failure), and indication for intubation (airway protection). Median time to extubation (CLRT 119.2 vs standard 88.5 hours; $P=.56$), and median MICU stay (CLRT 139.2 vs standard 172.8 hours; $P=.99$) did not differ. Standard care had an increased incidence of pressure ulcers ($P=.01$) and UTIs ($P=.05$). Patient satisfaction was similar except for comfort level; higher for CRLT ($P=.05$). RNs and RRTs were satisfied with CLRT functions/results and experienced no or lower levels of back pain compared with standard care ($P=.05$). **Conclusions:** CLRT was an accepted therapy by patients, RNs, and RRTs. However, not all available CLRT functions were used according to protocol, suggesting reeducation may be needed. MICU discharge may be facilitated with CLRT, as a greater proportion were extubated within 28 days ($P=.40$). fielden@ccf.org

RES225 Comparison of Forearm and Upper Arm Noninvasive Oscillometric Blood Pressures in Critically Ill Adults

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Purpose: To compare forearm and upper arm noninvasive oscillometric measurements of blood pressure (BP) in critically ill adults in the supine position and with head of bed elevated 30°. **Background/Significance:** Accurate BP measurement is essential to appropriate assessment and treatment of critically ill patients. Noninvasive measurement of upper arm BPs using automatic, oscillometric monitors is common in intensive care units. However, when patients' upper arms are not accessible because of surgery, trauma, or invasive medical devices and/or when the BP cuffs do not fit large upper arms, the forearm site has been used. **Methods:** The convenience sample included 70 English-speaking patients, mean age 68 years, admitted to a 14-bed intensive care unit in a community hospital in south-eastern Pennsylvania. After informed consent was collected, subjects were placed in 2 positions: supine and with the head of the bed elevated 30°. Initial bed position and site of BP measurement were randomized. Cuff size was based on fore-arm and upper arm circumferences. Using bedside Philips oscillometric BP monitors, 3 repeated measures of forearm and upper arm BPs, respectively, were obtained with arms resting on the bed. One minute was allowed between BP measurements. Subjects' positions were changed, and after 2 minutes, repeated BP measurements were once again obtained. **Results:** Paired t tests showed statistically significant differences in systolic BP, diastolic BP, and MAP both in the supine ($t=-5.55$, $P<.001$; $t=-3.48$, $P=.009$; $t=-5.33$, $P<.001$, respectively) and head elevated position ($t=-10.16$, $P<.001$, $t=-7.60$, $P<.001$; $t=-10.60$, $P<.001$, respectively). Bland-Altman analyses indicated that the distances between the mean values and the limits of agreement were as high as 18.3 mm Hg for individual subjects. Influence of demographics, body mass indices, tobacco use, medical diagnoses, current medications, and mechanical ventilation on BP differences was not statistically significant. However, medial forearm skin-fold measurements and vasoactive medication infusions were significantly related to BP differences. **Conclusions:** Forearm and upper arm oscillometric BPs were not interchangeable in critically ill adults. Overall, forearm values were higher and differences were greater with the head of the bed elevated 30°. kaschell@udel.edu

RES226 Comparison of Patient Classification Systems for Pediatric Intensive Care Unit Staffing

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Purpose: To compare the outcomes of 4 patient classification systems used in 4 different pediatric intensive care units, applied to the same patient population in a modeled pediatric intensive care unit (PICU). **Background/Significance:** Appropriate nurse staffing has been identified as central to both safe, quality patient care, and a healthy work environment. To achieve appropriate nurse staffing levels relative to a specific patient population, hospitals frequently rely on patient classifications systems (PCSs). Although PCSs have been studied in adult patient care settings, little is known about the comparability between PCSs in pediatric settings. **Methods:** This study consisted of 4 phases. First, the variables used by 4 PICUs' respective PCSs were defined. The PCS consisted of commercial software, hospital-designed software, and 2 systems based on nursing expertise. Second, 14 PICUs were asked to submit patient data ($n=1200$) in order to create a "St. Elsewhere 10-bed model PICU." Next, the 4 different PCSs were used to determine the nurse staffing needs of the modeled PICU for a total of 240 days of census. Finally, analysis was performed on the resultant nurse staffing as determined by the 4 PCSs for the modeled PICU. **Results:** Comparing the 4 PCSs, the average number of nurses predicted by the different PCS for the 10-bed model ranged from 5.68 to 8.23 nurses ($P<.001$), with the median number of nurses ranged from 6 to 8. Weighted kappa analysis revealed poor to fair agreement based on published standards (range, 0.003 to 0.29). When the identified nurse staffing differences between the PCSs were framed on a "per day" basis, the number of nurses needed to staff the day shift in the modeled PICU ranged from 8 to 11.5 nurses. **Conclusions:** Using actual patient data to model a PICU, we found significant variation in identified nurse staffing when comparing 4 different PCSs, ranging from 8 to 11.5 nurses per 8-hour day shift. Our findings limit comparison of outcomes related to nurse-patient staffing ratios between PICUs. glukasiewicz@nachri.org

RES227 Correlation of Spirituality With Depression and Quality of Life in Chronic Heart Failure Patients

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Purpose: To determine if any correlation exists between the degree of depression, the patient's perceived quality of life (QOL), and the role that spirituality may have as a coping mechanism. **Background/Significance:** Chronic heart failure is a disease state that can result in decreased functional capacity and QOL, which can result in emotional distress, depression, and poor clinical outcomes. Studies have suggested that spirituality may be a coping strategy that helps to mediate clinical outcomes in chronic illness. Little attention has been paid to the psychosocial aspects of CHF, particularly the role of spirituality as it relates to emotional distress, depression, and clinical outcomes. **Methods:** In a 1-year period, 1170 patients (with NYHA II-IV classification) were screened for study eligibility, of whom 369 were eligible and 119 (32.2%) agreed to be interviewed. A face-to-face interview, before hospital discharge (baseline), was conducted by using the Hospital Anxiety and Depression Questionnaire (scores $>8=$ depression), a visual analog scale (VAS) and Minnesota Living with Heart Failure Questionnaire (MLHFQ) (measures for QOL) and the Spirituality Involvement and Beliefs Scale (SIBS). A total of 53 patients (44.5%) were interviewed 3 months after discharge. **Results:** Depression and anxiety were prevalent in hospitalized patients (47% and 55%, respectively). Spirituality remained constant during the 3-month observation period. No significant relationship was found between spirituality and emotional status at baseline; however, at 3 months, a significant inverse relationship was apparent between spirituality and depression ($-.325$, $P=.01$). No significant relationship was found between QOL and spirituality, either at baseline or at 3 months. **Conclusions:** During hospitalization, spirituality has no effect on patients' outcome. Over time, spirituality may be a coping mechanism, particularly as it relates to depression. Evaluation and incorporation of the patient's spiritual support network may decrease the degree of depression and improve outcomes. drausc@comcast.net

RES228 Critical Care Performance in a Simulated Military Aircraft Cabin Environment

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Purpose: To determine the effect of 2 stressors of flight, altitude-induced hypoxia and aircraft noise, and to examine the contributions of fatigue and clinical experience on cognitive and physiological performance of Critical Care Air Transport Team (CCATT) providers. **Background/Significance:** Since the start of Operation Enduring Freedom in October 2001, more than 42 063 patients have been transported by the United States Air Force aeromedical evacuation system. CCATTs provide close monitoring and care for 5% to 10% of the injured and ill warriors of Operations Enduring and Iraqi Freedom that are transported on military cargo aircraft to definitive treatment facilities. On these long aeromedical evacuation missions, flight stressors affect both the patients and CCATT members. **Methods:** This repeated measures 2 x 2 x 4 factorial study included a sample of 60 military nurses. They completed a simulated patient care scenario under aircraft cabin noise and altitude conditions. Cognitive performance was measured with critical care scores, errors and omissions during the scenario, and with a neurocognitive battery. Physiological performance was measured 4 times during the scenario via vital signs and oxygen saturation. Differences in

cognitive and physiological performance were analyzed by using repeated-measures analysis of variance. A multiple regression model was developed to determine the independent contribution of fatigue and clinical experience as a function of altitude and noise. **Results:** Altitude (P=.002) and noise (P=.036) both had a statistically significant independent negative effect on critical care scores. Altitude significantly increased heart rate (P<.001) and respiratory rate (P<.001) while decreasing oxygen saturations (P<.001). No interaction effects and no effect on neurocognitive battery performance were noted. Fatigue and experience did not make a significant contribution to cognitive or physiological performance with altitude and noise in the simulated setting. **Conclusions:** The care of critically ill patients is affected by the environment. Safety and quality of care may be positively affected with equipment better designed to assist in monitoring and assessment during aeromedical transport. mcneillm@aol.com

RES229 Development and Psychometric Testing of a Nonverbal Pain Assessment Tool

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Purpose: To test the validity and interrater reliability of the Nonverbal Pain Assessment Tool (NPAT) developed for use in adult patients unable to self-report their pain score. **Background/Significance:** Effective pain management requires a systematic approach in the assessment of pain. Patient self-report of pain is the gold standard, but frequently patients are unable to self-report due to illness, sedation, cognitive impairments, and medical interventions. Evidence supports the use of behaviors as indicators of pain. Nurses at a large Midwestern facility requested a consistent tool to assess pain in the nonverbal adult population. **Methods:** Three phases of psychometric testing were conducted to refine the NPAT and establish validity and interrater reliability. Validity was measured against the "gold standard" of patient self-report of pain using the visual analog scale (VAS). Interrater reliability was assessed by teams of 2 RNs independently scoring patients' pain using the NPAT. Data were collected from a convenience sample of verbal and nonverbal patients from cardiothoracic surgery, cardiology, medical, and surgical ICUs and 1 general surgery postoperative nursing unit. Concordance correlations, Pearson correlations, kappa statistics, and scatter plots were performed using SPSS. **Results:** In the final revision of the NPAT, validity was found to be moderately strong (concordance correlation coefficient of 0.66, 95% confidence interval). Interrater reliability was found to be strong (concordance correlation coefficient of 0.72, 95% confidence interval). Nurses reported ease of use and a consistent approach among caregivers in assessing a nonverbal patient's pain. **Conclusions:** The NPAT was shown to have moderately strong scores for validity and strong scores for inter-rater reliability, was easy to use, and provides a standard approach to pain assessment in the nonverbal adult patient. Further studies are required to determine the usefulness of this tool. dumpem@ccf.org

RES230 Development of an Evidence-Based Practice Guideline: Music Therapy in the CCU

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Purpose: To review the available literature regarding the use of music therapy and to implement a nonpharmacologic intervention to aid in reducing the anxiety of the patient in the critical care unit. **Background/Significance:** Even though critical care units are technologically equipped to assist patients back to health, the environment itself is not considered to be therapeutic. We asked (1) Does the use of music therapy as a nursing intervention reduce patients' anxiety in the critical care environment? (2) How is this measured? (3) What is the best method of implementation? Delivery? Music selection? Amount of time? (4) Which patients are the best candidates for this type of therapy? **Methods:** We first asked the following "burning" clinical question using the PICO format: With adult critical care patients, does the addition of music therapy compared to conventional interventions reduce pain and anxiety? We did a literature search using the COCHRANE, CINAHL, and MEDLINE databases. We then used the IOWA model to

develop an evidence-based practice guideline for using music therapy with critical care patients after analyzing the levels of evidence. **Results:** Although research with music therapy for the critical care patient has been limited to relatively small sample studies, the results do show that the use of music therapy can have a positive effect on patients' physiological status as well as their perception of anxiety. The physiological benefits included positive changes in heart rate, respiratory rate, blood pressure, and sometimes finger temperature and oxygen saturation. Most important, all of the studies demonstrated that the patients' perception of their anxiety and/or pain level was lessened, as these patients often needed less pain medication and sedatives. One relatively small study even showed reduced restraint use. **Conclusions:** We have drafted recommendations for screening, assessment, implementation, and evaluation that we are forming into a guideline. We will focus next on staff education and implementation, then evaluate outcome measures of pain, anxiety, satisfaction, and cost. We will also look at future research. Candi_Lincoln@midhosp.org **Sponsored by:** Middlesex Hospital, Middlesex Hospital Vocal Chords

RES231 Does Use of a Moisture Chamber Decrease the Incidence of Corneal Abrasions in Critically Ill Children?

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Purpose: This study was conducted to determine whether the use of a moisture chamber is more effective than lubricating eye ointment alone in preventing corneal abrasions (CAs) in children receiving neuromuscular blockade (NMB). **Background/Significance:** Critically ill children requiring NMB are at risk for the development of CAs due to loss of the blink reflex. Eye care to prevent CA has traditionally included daily cleansing with saline and the instillation of ophthalmic lubricating petroleum-based ointment every 6 hours. **Methods:** Randomized controlled clinical trial in 2 PICUs. Patients were included within 36 hours of the start of NMB. Excluded were patients with abnormal blink/incomplete lid closure, history of daily eye therapy, facial trauma, eye lubricant allergy, or existing CA. After confirming the absence of a CA by fluorescein stain/blue light, patients' eyes were randomized to either control (lubrication and eye closure every 6 hours) or treatment (lubrication and moisture chamber every 6 hours). Eyes were examined 3 times daily and then 3 times every other day until NMB was stopped, CA developed, or study day 9 was reached. Data were analyzed on intention-to-treat basis. McNemar's test was used to evaluate the association between the eye-specific intervention and development of CA. **Results:** A total of 207 patients were enrolled and evaluated a median of 2 times (interquartile range [IQR] 1-4 observations). Median age was 9 months (interquartile range, 3-32 months), 58% were male, 79% were orally intubated for predominantly cardiac (50%) or pulmonary (31%) disease. CA developed in 21 patients during the study (10%; 95% confidence interval, 6%, 15%). Median time from enrollment to abrasion was 2 days (IQR, 1-3 days). The incidence of CA was not different between the patients' control and treatment eyes; specifically, 8 CAs developed in the control eye, 5 CAs in the treatment eye, and 8 CAs in both eyes (McNemar's test; P=.58). **Conclusions:** The addition of a moisture chamber did not affect the occurrence of CAs in critically ill children receiving neuromuscular blockade. lsorce@childrensmemorial.org **Sponsored by:** AACN Critical Care Research Grant and SCCM Norma J. Shoemaker Nursing Research Grant

RES232 An Early Nursing Intervention Team, a Preemptive Nurse-Led Rapid Response Model and Its Effect on Patient Outcomes

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Purpose: To examine the effect of a nurse-led rapid response team model, the Early Nursing Intervention Team (ENIT) on cardiac arrest rate outside the intensive care unit (ICU), mortality rate, length of stay (LOS), and time to transfer patients

to the ICU. **Background/Significance:** The ENIT model is a model led by critical care nurses that provides twice daily rounding on general care units in addition to having nurses respond to calls. **Methods:** The study used a before-and-after design. Data obtained during a baseline phase and during the study phase were compared. During the baseline phase, 100 charts were reviewed retrospectively from patients who were transferred to the MICU due to clinical decline. During the study phase, data were collected for the first 100 patients transferred to the ICU as a result of ENIT activation. Data collected included cardiac arrest rate outside the ICU, mortality rate, LOS, and time to transfer to the ICU. **Results:** Cardiac arrests outside the ICU have dropped from a monthly rate of 3.93 at baseline to 2.25 during the study ($P = .03$). Mortality rate has dropped from 45.4% at baseline to 31.6% during the study ($P = .03$). LOS increased, but did not reach the level of significance from 26.71 days at baseline to 20.14 days during the study ($P = .15$). Time to transfer the patient to the ICU dropped from 242.12 minutes at baseline to 88.65 minutes during the study ($P < .001$). **Conclusions:** Our nurse-led model has shown an improvement in patient outcomes in our hospital. It has been equally as effective as other team designs reported in the literature. LOS may have increased because patients who previously would have died have survived to discharge. tbase2@hughes.net

RES233 Effect of AED Device Features On Use by Untrained Laypersons

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Purpose: The strategy of public access defibrillation has led to the availability of automated external defibrillators (AEDs) for use by persons without training. It is important to know whether untrained persons can successfully use current devices and what features facilitate efficient use. **Background/Significance:** All AEDs have similar functions, but features that affect the ease and speed of use vary among devices. Since rapid delivery of care is critical, it is important to identify what makes a device easy to use. **Methods:** This was a randomized trial of volunteer laypersons without AED or advanced medical training. Passersby at various locations were recruited to attempt to use 1 of 6 models of AEDs on a mannequin in a simulated cardiac arrest scenario. No instructions were provided. Primary end points were shock delivery and time from start of scenario to shock delivery. Secondary end points were time to power on, time to pad placement, time from pad placement to shock, and time from shock to CPR. End points were analyzed by device brand and by prespecified features. Subjects also completed a survey on ease of use of 17 device features using a 5-point Likert scale (1 very easy, 5 very difficult). **Results:** Overall, 109/120 (91%; per model range 80%-100%) subjects were able to deliver shock within 3 minutes. Median time from start to shock was 103 seconds (per model range 89-147). Only 75/109 (69%) subjects began CPR after shock when indicated; median time from shock to CPR was 47 seconds (per model range 44-56). With devices that provided CPR instruction, 49/58 (84%) began CPR versus 26/51 (51%) with devices that only prompted to start CPR. Feature analysis found time to power on was shorter in devices with open lid (median 12 seconds) and pull handle (14 seconds) than with button to push (44 seconds). Subjects rated all the models easy to use. **Conclusions:** Differences in time to shock exist among brands of AEDs. Many users do not start CPR when appropriate, and a delay from shock to CPR occurs. Specific device features were identified that facilitate use by laypersons, which, if adopted, may further improve AED ergonomics and the ability of bystanders to save victims of sudden cardiac arrest. kstein@mail.magee.edu

RES234 The Effect of Glycemic Control on Weaning Outcome in Adult Patients Receiving Mechanical Ventilation

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Purpose: To describe the prevalence of hyperglycemia, to determine the glycemic control practices used in these patients, and to examine the effect of glycemic concentration on weaning outcome in adult patients receiving mechanical ventilation in an ICU. **Background/Significance:** Hyperglycemia is a common occurrence in critical illness, and the presence of hyperglycemia has been associated with critical illness neuromyopathy and muscle dysfunction. Respiratory muscle dysfunction is linked with prolonged mechanical ventilation and most likely impairs weaning success. No recent studies have evaluated glycemic control and weaning outcome. **Methods:** This is a retrospective medical records review being conducted at an academic medical center. A random sample of 225 patients was chosen from all patients who received mechanical ventilation between January 1 and June 30, 2007. Average 24-hour glycemic concentrations will be obtained from the medical record for the period the participant receives ventilation. Glycemic control measures will be examined and the number of weaning trials and total weaning time in hours will be determined. Prevalence rates and glycemic control practices will be described and chi-square and t tests will be used to compare patients who are successfully weaned and those who are not. **Results:** Data collection is anticipated to be completed by January 1, 2008. **Conclusions:** These data will provide information about the prevalence rates of hyperglycemia and the current practices related to glycemic control for patients who require mechanical ventilation and will evaluate the association between hyperglycemia and weaning outcome. mhpier00@uky.edu

RES235 Efficacy of Negative Pressure Wound Therapy (NPWT) in Obese and Diabetic Patients After Open Heart Surgery

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Purpose: To determine whether the immediate placement of wound vacs for negative pressure wound therapy (NPWT) in diabetic and/or obese cardiac surgery patients undergoing median sternotomy is effective in preventing sternal wound complications and reducing hospital readmission. **Background/Significance:** In the past fiscal year, subject facility performed 175 cardiac surgical procedures via median sternotomy. Approximately, 40% of patients had significant underlying conditions, particularly obesity and diabetes. Superficial or deep sternal wound infections or frank mediastinitis developed in 35 patients, costing $11 500 to $40 000 per case. The study is an evidentiary tool to determine if immediate application of NPWT in high-risk patients undergoing cardiac surgery reduces sternal wound healing. **Methods:** Between January 2007 and June 2007, 27 patients were treated with NPWT after median sternotomy for cardiac surgery. GranuFoam Silver sponges were used exclusively (CABG, n = 12; CABG/valve, n = 1; valve, n = 5; other, n = 1). The sternal wound vac had a uniform negative pressure of -120 mm Hg. The majority of patients receiving NPWT were either obese (body mass index > 30, n = 19) and/or diabetic (n = 10). The mean age was 63.1 years, and 94.7% (n = 26) were male. To maintain consistency in sternal wound care, dressings were replaced by the same cardiothoracic surgeon and/or clinical wound care nurse specialist and removed after the fifth day of placement. **Results:** Sternal wound vacs had a high probability ($P = .001$, n = 19) in preventing sternal wound complications in obese patients and in patients who are both diabetic and obese ($P = .001$, n = 10). Furthermore, none of the 19 patients in this sample were readmitted to the hospital due to sternal wound complications within 30 days from date of discharge. **Conclusions:** Actual observations and statistical analysis suggest that placement of a sternal wound vac immediately after open heart surgery is effective in preventing sternal wound complications and eliminating hospital readmissions. JPasion@nc.rr.com

RES236 The Effectiveness of a Children's Hospital PICU Sedative Weaning Protocol

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Purpose: To describe the effectiveness of our sedative weaning protocol in critically ill children cared for in our pediatric intensive care unit (PICU) and, as a quality improvement project, to describe provider compliance with application of our

protocol. **Background/Significance:** Critically ill children require sedation to treat pain and anxiety and to limit mobility. They receive infusions of an opiate and/or benzodiazepine. Some children require these for weeks, resulting in tolerance and dependence, so they must be weaned slowly. We have developed a protocol for weaning patients off of continuous infusions of opiates and/or benzodiazepines. This protocol has been in place for 3 years, but its effectiveness and consistent application had not been studied. **Methods:** Critically ill children receiving continuous infusions of an opiate and/or benzodiazepine for greater than 5 days were eligible. PICU nurses, fellows, and attending physicians were educated on the protocol before the initiation of the study. Children receiving infusions for 5 to 14 days were weaned by 20% every day. Children receiving infusions for more than 14 days were weaned by 10% every day. In most cases, children were receiving both morphine and lorazepam, with both drugs weaned every day. Seattle Children's pain scores and modified withdrawal scores were completed every 4 hours, with instructions to hold the wean if certain conditions were met, indicating poor tolerance of the weaning. **Results:** A total of 27 of 31 children enrolled completed the study and had complete data for analysis. Children were 0.1 to 14 (mean, 1.6) years old. Of 11 children who followed the protocol, 10 weaned successfully, as exhibited by comfort scores less than 4, modified withdrawal scores less than 7, and progression on the wean as planned. Sixteen children did not follow the protocol: 12 because of provider lack of knowledge or lack of compliance and 4 because of new acute illness requiring the weaning to be withheld. **Conclusions:** Our protocol was successful in 10 of 11 children for whom it was applied in a standard manner. We did identify a problem with lack of provider knowledge and or willingness to apply the protocol, so it is unknown if the protocol would have been effective in the remaining children.
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RES237 End-of-Life Care: The Practice of Expert, Certified Neonatal and Pediatric Intensive Care Unit Nurses

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Purpose: To explore expert, certified (CCRN) neonatal and pediatric nurses' practice at the end of life and their actions in situations of prognostic conflict. **Background/Significance:** Although the problematic state of end-of-life care for adults in the United States has been documented in several studies, less is known about the experience of neonatal and pediatric patients. In addition, the vital role played by nurses in improving end-of-life care and in shaping the decision-making processes around the experience has not been fully recognized or explicated. **Methods:** Fifteen participants, certified in either neonatal or pediatric critical care and self-identified as experts, were randomly chosen from an inclusive national list obtained from the AACN Certification Corporation. The principal investigator interviewed the participants by telephone. Interviews were audiotaped and transcribed. Data analysis techniques used both narrative and thematic methods. **Results:** Data analysis yielded several recurring narrative plots. In "presenting a realistic picture," nurses spoke about assisting family members to reframe their sense of the potential for recovery of their infant or child. Stories of "trying everything" reflect the nurses' understandings of the parents' and children's need to "go down fighting." Identified themes included supporting the family, having a relationship with the child, and creating a collaborative culture. **Conclusions:** The nurses demonstrated strategies and abilities necessary to improve end-of-life care: the development of a personal relationship with death, the ability to communicate in a compassionate manner, the ability to create a healing environment, and a willingness to express emotion and uncertainty.
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RES238 End-of-Life Transition Experiences of ICU Nurses: Mindful Realization

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Purpose: To understand the perceptions and meanings constructed by nurses who have experienced the realization in an ICU that restorative care (life-sustaining therapies) is failing and the patient is actively dying. **Background/Significance:** Despite significant advances and efforts in the past 2 decades in the management of end-of-life care and prognostication of death, experiences of dying in the intensive care unit (ICU) have not improved. Current ICU end-of-life care often lags behind human compassion that enhances well-being, provides comfort, and relieves suffering during the dying process. **Methods:** Qualitative descriptive methods informed by van Manen's hermeneutic phenomenology and directed by Colaizzi's analytic approach guided the research process. A purposeful sampling strategy was used to select 10 nurses who currently worked in ICU and had cared for adult dying patients. In-depth nonstructured phenomenological interviews were used to generate data. Interviews were audiotaped and transcribed, and all identifiers were removed. **Results:** Phenomenological analysis revealed common themes: recognition of dying, timing, emotional manifestations, and humanistic transition. Significant statements, formulated meanings, and themes were integrated into an exhaustive description to formulate the fundamental structure "Mindful Realization with a Desire to Share." Mindful realization was the essential nursing skill that facilitated awareness of dying patterns and the ability to assess whether a patient was actively dying, while being sensitive to the patient's experience. Once dying was realized, the nurses had "a desire to share" that with the others in hopes of improving the quality of the dying process for the patient and family. **Conclusions:** This study provided insight into understanding the experience of ICU nurses who cared for patients transitioning into active dying. The results have immediate application into clinical practice and can serve as the foundation for improving end-of-life experiences in the ICU environment.
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RES239 Errors in Interpretation of a Tight Glycemic Control (TGC) Protocol

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Purpose: To use simulated clinical scenarios to identify the frequency and magnitude of errors resulting from misinterpretation of a nurse-driven paper-based (ND-PB) TGC protocol. **Background/Significance:** Tight glycemic control has reduced mortality and morbidity in ICU patients. TGC is typically achieved by using ND-PB protocols. However, such protocols often have complex instructions and are prone to misinterpretation and insulin dosing errors. Protocol interpretation errors have not been previously studied. **Methods:** Sixty-two intensive care unit (ICU) nurses were given 7 simulated TGC scenarios. Each scenario included a clinical case description, a current insulin dose, and new and prior blood glucose levels. Standardized instructions on using the paper-based TGC protocol were given at the start of the study, and nurses were required to interpret the protocol and indicate the correct new insulin dose. Incorrect responses were defined as an insulin dose indicated by the participant that differed by + 0.5 units/h from the correct dose as determined from the protocol. **Results:** A total of 434 responses were recorded from the participants (62 nurses times 7 scenarios). Ninety-six of 434 (22%) responses had an insulin dosing error of greater than + 0.5 units/h. The magnitude of the dosing errors ranged from -12 units/h below to +7 units/h above the correct dose. Of the 96 incorrect responses, 72 (75%) had an error where the dose indicated by the nurses differed by more than 20% from the correct dose. **Conclusions:** Misinterpretation of

the TGC protocol is common and can result in large insulin dosing errors. Use of simulation-based testing can uncover potential errors before they reach patients and may provide the impetus to simplify complex ND-PB protocols or to use computerized protocols. bfaddoul@umm.edu

RES240 FACTORS Associated With In-Hospital Cardiopulmonary Arrest Study (FACTS)

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Purpose: To identify patient and environmental characteristics that are associated with in-hospital cardiopulmonary arrest (CPA) and are predictive of subsequent survival rates. **Background/Significance:** Since inception of guidelines for management of in-hospital cardiopulmonary arrest (CPA), researchers and providers have sought to identify factors influencing patient outcomes. The National Registry of Cardiopulmonary Resuscitation (NRCPR) was created to identify national trends in event characteristics and patient outcomes. Standardized variables in NRCPR facilitated interinstitutional benchmarking, yet opportunities for targeting improvement initiatives in our own institution were unclear. **Methods:** A retrospective analysis of consecutive CPA events in our NRCPR data set from 2002 to 2006 (n = 764) was conducted by using SPSS version 12. Data were abstracted from medical records and code blue data forms completed by nurses at the time of CPA. Descriptive characteristics were analyzed, and differences in survivors and nonsurvivors were compared by using χ^2 testing for dichotomous variables and t tests for independent samples for continuous variables (alpha level of .05.) Univariate and multivariable logistic regression were used to determine the extent to which patient and environmental characteristics predict survival of a CPA event. **Results:** Of 764 patients with CPA, the mean age was 58 (SD, 21.45), 44% were female (n = 342), and 44% survived arrest (n = 337). Most were white (58%; n = 445), 36% were black (n = 274), and 6% were from other racial groups. A majority of events were unwitnessed (80%; n = 614) and overall rate of event survival was 43% (n = 325). A multivariable model controlled for factors influencing survival including diagnosis, cause of arrest, resuscitation duration, number of shocks, initial rhythm, and location of event. Factors found to be significantly associated with survival of CPA were as follows: multiple arrests ($P < .001$), prior myocardial infarction ($P = .04$), hypotension ($P = .004$), electrolyte abnormality ($P = .003$), and malignancy ($P = .001$). **Conclusions:** Based on these results, other than a history of multiple CPAs, no significant predictors are associated with nonsurvival of CPA. With this in mind, it remains essential to emphasize the value of aggressive and competent resuscitation for CPA. mille032@mc.duke.edu

RES241 Fatigue As a Symptom of Acute Myocardial Infarction (AMI)

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Purpose: In most studies about fatigue and AMI, researchers have studied samples of women using qualitative methods. The purpose of this study was to characterize fatigue experienced by men and women during AMI and after hospitalization by using 3 quantitative instruments. **Background/Significance:** Fatigue is a commonly experienced symptom of AMI; however, there is a disturbing lack of knowledge about the fatigue that occurs among men and women at the time of AMI. Fatigue that occurs with AMI has been described but not measured in women, and data related to fatigue during AMI with men are lacking. **Methods:** During hospitalization, 108 patients from 6 Midwestern hospitals were recruited. AMI was identified by ST-segment deviation > 1 mm in 2 or more contiguous leads or troponin I > .05. Profile of Mood States (POMS), Fatigue Severity Index (FSI), and Short Form 36 Health Survey (SF-36) were completed during hospitalization. FSI interference subscale was used to quantify the degree to which fatigue interfered with

daily life. Fatigue was measured with the POMS fatigue subscale. Vigor was measured with the POMS vigor subscale, and vitality was measured with the SF-36 vitality subscale. The sample included 74% men (mean age, 59.4 years) and 26% women (mean age, 62.0 years); 73% were white, 20% African American, and 4% Hispanic. **Results:** Significant differences between men and women were found on each subscale. Women reported significantly less vitality (mean, 40.2; SD, 11.7) than did men (mean, 48.4; SD, 10.6; $t = 3.3$, $P < .05$) on the SF-36 vitality subscale. On the FSI, women reported more interference (mean, 34.8; SD, 13.8) than did men (mean 17.9; SD, 15.6; $t = -5.0$; $P < .001$). Women also reported more fatigue (mean 15.8; SD, 7.3; men: mean, 11.4; SD, 7.1; $t = -2.8$, $P < .05$) and less vigor (mean, 12.2; SD, 6.8; men: mean, 16.1; SD, 7.0; $t = 2.5$; $P < .05$) on the POMS. The POMS fatigue subscale showed significant differences between men and women at 30 days ($t = 2.26$; $P = .03$). At 30 days, males reported relatively constant scores, while women's scores changed significantly (fatigue decreased, vigor and vitality increased). **Conclusions:** Three well-established measures were used to examine the prevalence of fatigue. Women reported higher levels of fatigue during AMI than men and reported significantly less fatigue 30 days after hospitalization, lending support to the conclusion that fatigue is a symptom of AMI, especially in women. ann.eckhardt@insightbb.com

RES242 Health Care Personnel Attitudes, Concerns, and Beliefs About Family Presence During CPR and Bedside Invasive Procedures

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Purpose: To determine the attitudes, concerns, and beliefs related to family presence during cardiopulmonary resuscitation (CPR) and bedside invasive procedures (BIP) of RNs in staff and management positions, physicians, CRNAs, and other staff from a variety of patient care units. **Background/Significance:** Staff RNs and physicians' attitudes, concerns, and beliefs about family presence during CPR and BIP are known primarily for individuals working in the emergency room and pediatric populations. Little is known about the attitudes, concerns, and beliefs of RNs in staff and management positions, physicians, CRNAs, and other staff working in all areas of the hospital. Yet all these individuals may be involved in providing care or supporting policies regarding family presence. **Methods:** The descriptive and correlational study was conducted by a questionnaire to collect demographic data and a 16-item Family Presence and Support: Staff Assessment Survey with some open-ended questions. The survey included items rated on a Likert scale from 1 (strongly agree) to 5 (strongly disagree), items with a yes-no response, and open-ended questions. A question related to supporting a policy giving the family the option of being present during CPR or BIP also was asked. Surveys were distributed to staff RNs, management RNs, physicians, CRNAs, respiratory therapists, orderlies, and spiritual care staff. Descriptive statistics and Pearson correlations were applied for data analysis. **Results:** Of 1402 distributed surveys, 625 were returned for a 45% response rate. Support for a policy giving family the option of being present during resuscitation was reported at 61.3% and during invasive procedures at 67.9%. Study findings showed support for family presence during CPR or BIP by those with national certification, non-members of the code blue team, and critical care and emergency department nurses. CRNAs were the least likely to support family presence at 17.6%, whereas RNs reported support at 65.4%. RNs felt more strongly than did non-RNs ($P < .001$) and physicians ($P < .001$) that family members should have the option to be present. **Conclusions:** Findings reveal both support and nonsupport for families to be present during CPR and BIP. Allowing family presence as an option provides an opportunity for reluctant members of the health care team to refuse their presence and an opportunity for those who support family presence to welcome the family. basolr@centracare.com

RES243 Heart Rate, Pupil Size, and Cortical Arousal Differ During Noxious and Nonnoxious Procedures in Sedated Patients

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Purpose: The study compared heart rate (HR), blood pressure (BP), pupil size, cortical arousability, and nocifensive behaviors during noxious versus nonnoxious procedures in sedated, ventilated ICU patients after cardiac surgery. **Background/Significance:** Pain assessment of noncommunicative ICU patients remains a challenge because a standardized objective measure of pain is elusive. Sedated, ventilated ICU patients' objective responses to nociception are not well described. **Methods:** This was a prospective, descriptive study with repeated measures and crossover technique. Each patient underwent 2 procedures. If a noxious procedure (turning or tracheal suction) was necessary, it was performed by the patient's nurse. The investigator performed the nonnoxious procedure (gentle touch). The patients' HR, BP (per institutions' cardiac monitors), pupil size (Neuroptics pupillometer), and cortical arousability (per Bispectral Index [BIS]; Aspect Medical System) were measured at baseline, during (first and third minutes), and 5 minutes after the procedure. Two-way analysis of variance tested the difference in physiological responses between noxious and nonnoxious procedures. **Results:** The sample of 48 patients was mostly white men (mean [SD] age, 65 [14] years). Most patients (70%) were responsive to physical stimulation only or totally unresponsive per Richmond Agitation Sedation Scale. HR, pupil size, and BIS differed significantly between the noxious and nonnoxious procedures ($P < .01$). The differences in systolic and diastolic BP and mean arterial pressures were not significant. The percentage increase in physiological responses between baseline and noxious stimulation was significant for HR (+4%), pupil size (+16%), and BIS (10%). **Conclusions:** Certain physiological responses may be useful to evaluate nociception in noncommunicative ICU patients who may not exhibit commonly noted pain behaviors. Future studies with heterogeneous samples should examine the clinical utility of physiological responses associated with nociception. denise.li@nursing.ucsf.edu

RES244 Improving Organ Donation Consent Rates Through the Utilization of Effective Requestors

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Purpose: To examine the correlation of approaches for organ donation between hospital staff and organ procurement organization (OPO) designated requestors and the impact on the overall consent rate. **Background/Significance:** In the United States, 97 504 people are on the waiting list for a life-saving organ. An average of 18 people/day will die waiting because they will not receive this life-saving organ. Increasing the overall consent rates is vital to decreasing the number of patients on the waiting list, improving the quality of life through transplantation, and decreasing the number of patients dying while waiting for a life-saving organ. **Methods:** This retrospective study evaluates approaches made for organ donation during a 6-month period. The type of approach is placed into 2 categories: hospital staff (HS) approaches and OPO approaches. Once the type of approach was determined, the outcome was broken into 2 categories: consent obtained or consent denied. A majority of hospital staff do not have the training or experience to counsel the families of potential organ donors. **Results:** The sample consisted of 148 potential organ donor referrals in a 6-month period. HS approaches consisted of 43 potential donors with 3 consents and 40 denials, resulting in a 7% consent rate for donation. OPO approaches consisted of 105 potential donors with 62 consents and 43 denials resulting in a 59% consent rate for donation. **Conclusions:** Consent rates are improved by using an OPO team member to discuss organ donation with families. Vigilance in hospital staff team members to involve OPO staff members is important in order for a plan to be developed and optimal care to be provided to the family in crisis. cheriebagwell@yahoo.com, ccaillouet@lopa.org

RES245 Improving Outcomes for Patients With Severe Traumatic Brain Injury

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Purpose: This performance improvement project was intended to evaluate if discharge outcomes have improved for patients with severe traumatic brain injury (score on Glasgow Coma Scale [GCS] < 9) since guidelines were implemented in January 2006. **Background/Significance:** The Adam Williams Traumatic Brain Injury (AWTBI) Initiative assists trauma centers to adopt American Association of Neurological Surgeons (AANS)/Brain Trauma Foundation (BTF) guidelines for traumatic brain injury (TBI). Our trauma center was selected for this initiative in July 2005. Educational initiatives began in September 2005, and a multidisciplinary teamed formed to establish guidelines for the management of patients at our facility with severe TBI. **Methods:** In a retrospective chart review, 148 patients with severe TBI (GCS score <9) admitted from January 2000 to February 2006 (group 1) were compared with 40 prospective postguideline (group 2) severe TBI patients admitted from March 2006 to June 2007. Data were entered into the BTF's TBI-trac database. Outcomes included admission GCS score (aGCS), discharge GCS score (dGCS), length of stay in the intensive care unit (ICU LOS), and mortality. **Results:** The mean age for group 1 was 40 years (range, 16-85 years) and for group 2 was 36 years (range, 14-69 years). In group one, 78% of the patients were male, and in group two, 95% were male. Data for the 2 groups show aGCS was 4.4 vs 4.8; ICU LOS 18 vs 17; dGCS of 3-8: 9% vs 4%, dGCS of 9-13: 21% vs 14%, and dGCS of 14-15: 70% vs 82%. The mean change in GCS from admission to discharge was 7.35 for group 1 and 8.36 for group 2. Mortality was 33% for group 1 vs 32% for group 2. Significant differences ($P < .001$, adjusted for patient's sex and age) were found in mean dGCS between the 2 groups (mean [SD], 12.8 [3.06] vs 13.45 [2.02]) and the change in GCS from admission to discharge in group 2 (7.35 [4.8] vs 8.36 [2.01]). **Conclusions:** Group 2 had a higher dGCS, which is most likely a result of its greater proportion of patients with dGCS > 13. This difference cannot be supported statistically because of the small sample size. Improvements were noted in ICU LOS, transfers to other acute facilities, and mortality. KJohnson@queens.org

RES246 The Key to Unlocking Ventilator-Associated Pneumonia: It Takes a Village

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Purpose: To determine the effectiveness of a multidisciplinary team approach to reducing the incidence of ventilator-associated pneumonia (VAP) in the trauma/burn intensive care unit (ICU). A collaborative effort within a multidisciplinary team is the key to improving patient outcomes. **Background/Significance:** A benchmark comparison with the Centers for Disease Control and Prevention for VAP in the adult trauma/burn population indicated our rates to be above that of the National Healthcare Safety Network. Review of the literature shows that VAP is the most common nosocomial infection among patients receiving mechanical ventilation, resulting in increased ventilator days, length of stay, and mortality, all of which lead to increased health care costs. A multidisciplinary approach implementing quality improvement (QI) initiatives can lower these rates. **Methods:** QI initiatives were implemented on ventilated patients with daily VAP data collection. Initiatives include strict hand washing, chlorhexidine oral rinse twice daily, oral swabbing/secretion removal every 4 hours, head of bed at 30° or higher unless contraindicated, gastrointestinal prophylaxis, early extubation, chest physiotherapy, and changing soiled ventilator tubing. Monthly QI meetings were attended by nursing, respiratory therapy, the medical director, and an infection control liaison. Data were collected through infection control, electronic documentation, and trauma burn registry based on rates per 1000 ventilator days. Mean length of stay (LOS) and mortality were collected through APACHE data. **Results:** VAP rates before implementation in 2004 were 36.5

per 1000 ventilator days, mean LOS was 6.43, and mortality was 9.0%. After implementation of the QI initiatives, rates decreased to 31.5 in 2005 and to 13.7 in 2006, LOS to 4.84, and mortality to 7.6%. A multidisciplinary team approach improved awareness of VAP prevention, leading to better coordination of patient care and resulting in a reduction of VAP rates to 9.9 per 1000 ventilator days in 2007. LOS in 2007 is currently 5.33 and mortality is 7.5%. VAP prevention is no longer the responsibility of 1 discipline. Implementation of the QI initiatives has led to empowerment of all team members and created a more collaborative culture. **Conclusions:** Evidence supports that multidisciplinary collaboration and QI initiatives are successful in reducing VAP rates in a trauma/burn population. Ongoing evaluation of practices aimed at reducing VAP rates and a continued commitment from a multidisciplinary team are necessary for future success. jennchen@med.umich.edu

RES247 Knowledge and Attitudes Regarding Pain: A Survey Among Critical Care Nurses

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Purpose: To determine the knowledge levels and attitudes regarding pain management among critical care nurses in our facility and to investigate the greatest concerns about pain control and awareness of effective nonverbal pain tools and alternative therapies. **Background/Significance:** Comprehensive pain management is essential in providing quality patient care in the intensive care unit (ICU). Evidence shows that patients experience considerable pain related to commonly performed nursing procedures, and this pain is often undertreated. Adequate pain management is a unique opportunity and responsibility of the nurse. Literature supports that a deficit in knowledge about the proper assessment and control of pain exists among nurses. **Methods:** This study used a nonexperimental quantitative survey in the form of an electronic self-administered 38-item questionnaire developed by Ferrell and McCaffery. The tool consisted of questions on pharmacology, pain assessment, and pain control. It included true/false questions, multiple choice questions, and case studies. A section was developed for demographic information and open-ended questions about pain assessment tools and alternative therapies. The target population consisted of 120 nurses from all ICUs, including surgical, medical, and neurosurgical specialties. Subjects who completed the survey during the study period of 3 weeks comprised the convenience sample (N = 100). **Results:** Data analysis showed that the mean score for all participants was 67%. Sixteen questions about the pharmacology of analgesics had <70% correct answers. Eighty percent of nurses were aware of alternative therapies for pain relief and identified massage, prayer/meditation, music, and acupuncture as effective. Only 45% were aware of a nonverbal pain scale for pain assessment in sedated, intubated, nonverbal patients. About 15% listed the faces scale. The greatest concerns regarding pain management were inadequate pain control (40%) and oversedation or respiratory depression (14%). Only 2% mentioned fear of addiction as a consideration. About 86% of participants were interested in learning more about pain management. **Conclusions:** Results confirmed that education on pain assessment and management is needed among critical care nurses. This training will help improve the nursing practice and patient care in the ICU. The effectiveness of alternative therapies and nonverbal pain tools requires further study. yehlg@gunet.georgetown.edu

RES248 Modification of a Sedation Protocol Using Dexmedetomidine and Its Effect on Ventilator Days and Length of Stay

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Purpose: To examine the effect of a nurse-driven sedation protocol that uses dexmedetomidine on mean duration of mechanical ventilation and length of stay (LOS) for critically ill patients. **Background/Significance:** Despite use of a literature-based sedation protocol, our LOS was greater than expected for patients receiving mechanical ventilation per Medicare guidelines. We hypothesized that use of benzodiazepine infusions created prolonged ventilator days due to oversedation and that dexmedetomidine would decrease length of time on the ventilator and LOS due to its nondeliriogenic pharmacologic profile and provision of cooperative sedation. **Methods:** Our sedation protocol was modified, limiting use of benzodiazepine infusions and encouraging dexmedetomidine. Changes included initiation of sedation with propofol or dexmedetomidine for expected duration of intubation less than 5 days. If propofol is selected, timely transition to dexmedetomidine is made within 24 hours. Lorazepam was eliminated and midazolam is used only if expected mechanical ventilation is greater than 5 days. We retrospectively reviewed medical records of patients discharged 12 months before and 4 months after modification of our sedation protocol. Inclusion criteria captured patients with a respiratory system diagnosis with ventilator support and an ICU admission. **Results:** We analyzed the mean severity of illness, hospital LOS, critical care LOS, and length of time requiring mechanical ventilation. Analysis included 232 patients before intervention and 54 patients after intervention. After introduction of our nurse-driven modified sedation protocol, there was a 15% decrease in hospital LOS, a 22% decrease in critical care LOS, and a 23% decrease in mean days of ventilation. No significant difference was found in mean severity of illness and mortality rates. **Conclusions:** A nurse-driven sedation protocol using dexmedetomidine and limiting benzodiazepine infusions reduces duration of mechanical ventilation, thereby shortening critical care and overall hospital LOS. mwoodham@ohiohealth.com

RES249 New Communication Approaches to a Time Old Problem

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Purpose: To determine educational preparation, values, and frustrations of the health care staff in communication with nonverbal patients in an intensive care unit (ICU) and to identify patients' physical and social needs and the best method for communication when they were nonverbal. **Background/Significance:** Effective communication with nonverbal patients is a challenge for health care staff and patients. Despite working toward a standardized approach to deliver safe and effective care to patients, little has been done to address the issues that arise when attempting to communicate with a nonverbal patient. Often the method for communication is determined by the nurse. Without an algorithm that provides a decision-tree approach, nurses make choices based on prior experience or "trial and error." **Methods:** Approval was obtained from the institutional review board. A 21-question survey was developed through combination of 2 published communication surveys. This survey was administered to 63 surgical intensive care nurses. The survey results were used to identify nurses' present perspectives about their ability to communicate with their nonverbal patients. A total of 23 patients were interviewed after extubation to evaluate their experiences and feelings while they were unable to communicate with their caregivers. In the interviews, patients also evaluated the effectiveness of the communication tools used during their nonverbal experience. Eighteen nurses were interviewed in patients' postextubation period about tools used. **Results:** The nursing survey revealed that 75% of nurses thought that current methods for nonverbal communication were inadequate to meet their patients' needs, all nurses thought that it was important/very important that the patient be able to communicate, and 30% thought they could effectively understand the patient. In postextubation interviews of patients, 74% reported breathing, pain, and fear as the greatest physical discomfort; 31% reported

the inability to talk was their greatest social problem; 59% were extremely frustrated with the inability to communicate; and 42% wanted more information on health status. About 70% of patients were able to communicate needs through writing, hand gestures, mouthing, and use of an electronic communication board. **Conclusions:** To decrease that frustration and allow for the delivery of safe and effective patient care, emphasis must be placed on using a communication method algorithm, formal training for the nurses, patient debriefing after extubation, and availability of various tools for nonverbal communication. Charles.Reed@uhs-sa.com, Reineck@uthscsa.edu

RES250 Nonpharmacological Interventions for Procedural Pain Associated With Turning Among Hospitalized Adults

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Purpose: (1) To determine the frequency of specific nonpharmacological interventions used during turning. (2) To describe pain during turning and demographic/clinical characteristics associated with the pain. (3) To determine factors that predict use of nonpharmacological interventions for pain associated with turning. **Background/Significance:** Many hospitalized adults are incapable of repositioning themselves, so they are regularly turned in order to prevent pressure ulcer formation. Previous research indicates that turning is painful and patients are rarely premedicated with analgesia. Potentially, nurses and patients may be using nonpharmacologic techniques to help with this painful procedure; however, no research on prevalence of use of nonpharmacological interventions for any type of procedural pain has been published. **Methods:** A subsample of 1395 patients who experienced turning was selected from a multisite convenience sample study of procedural pain in hospitalized adults. Subjects were asked to rate preturn pain and peak during turn pain by using a 0-10 numeric rating scale (NRS). The patients and the nurses caring for them were asked if they used various nonpharmacological interventions to help manage pain during the turning. This was a closed-ended question, and subjects were asked to select all that applied from the following list: distraction, progressive relaxation, guided imagery, gentle touch/hand holding, acupressure, massage, presence of family/friends, information, hypnosis, deep breathing, therapeutic touch, calming voice, pillow splinting, unknown, and other (please specify). **Results:** Of 1395 patients, 92.5% got at least 1 nonpharmacological intervention. Most frequent were calming voice (65.7%), information (60.6%), deep breathing (37.9%), gentle touch/hand holding (36.6%), pillow splinting (34.0%), humor (25.9%), and distraction (22.9%). Multivariate logistic regression models predicting the use of calming voice, information, and deep breathing showed that critical care patients (odds ratio [OR] = 1.66, $P<.01$ for calm voice; OR = 1.62, $P<.001$ for information; and OR = 1.36, $P<.05$ for deep breathing) and those reporting higher pain (OR = 1.01, $P<.05$ for all 3) were consistently more likely to receive each of the 3 interventions. **Conclusions:** Nonpharmacological interventions are used frequently, notably much more than pharmacological ones. These data suggest that nurses may be aware of patients' pain during turning and respond to increased pain with nonpharmacological interventions available in that situation. bonnie@tmbox.com

RES251 Nurses' Experiences With End-of-Life Care in the Intensive Care Unit

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Purpose: To explore nurses' definitions of optimal end-of-life care and to identify system factors that affect nurses' ability to provide end-of-life care to ICU patients and their families. Nurses were asked to describe attributes of nurses who provided quality care and examples of those who did not. **Background/Significance:** Nurses are in a pivotal position to improve care for dying patients and their families by challenging current end-of-life practices. However, ICU nurses report a lack of preparation, experience, and education when providing this care. **Methods:** Convenience sampling was used to select ICU nurses at a large teaching hospital. Nurses were interviewed individually about their definition of optimal end-of-life care as well as barriers to providing this care. They were asked to describe a situation in which they felt optimal end-of-life care was achieved and a situation in which it was not achieved, as well as the characteristics of the nurses providing this care. Nine adult critical care nurses were interviewed, ranging in age from 26 to 56 years, with a mean of 10.3 years of clinical experience in adult ICUs. The interviews were transcribed and analyzed by using Bowen's Value-Behavior Congruency model adapted to ICU nursing. **Results:** Using Bowen's model of value-behavior congruency, several themes were identified and were examples of personal, environmental, and relational factors that facilitate or hinder the nurses' ability to provide quality end-of-life care in the ICU. Nurses used strategies such as "balancing," "trial and error," "coaching the physicians," and "taking a step back" to improve the quality of end-of-life care provided. **Conclusions:** The attitudes and behaviors identified by the nurses as well as personal, environmental, and relational factors identified in this study may be useful in determining factors related to improving the care delivered in the ICU at the end of life. Meg_Zomorodi@unc.edu

RES252 Nursing Specialty Certification and Patients' Outcomes: An Intangible Link

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Purpose: To determine if an association exists between the proportion of certified nurses in a unit and the rate of adverse outcomes for patients. **Background/Significance:** Certification is defined as a voluntary practice that provides recognition of knowledge, skills, and clinical practice beyond the requisite mandatory requirements of licensure. The value of certification, both to the public and to the individual, is usually synonymous with expert, quality, and competent nursing care. However, little research has been done to support or refute any differences that exist between certified and noncertified nurses in clinical practice. **Methods:** In a nonexperimental, descriptive study, all nurses working in 25 intensive care units (ICUs) in southeast Michigan (n = 866) were anonymously surveyed. The Conditions for Work Effectiveness Questionnaire-II (CWEQ-II) measured workplace empowerment, and an additional question asked about certification status. Outcomes data were simultaneously collected from administrative databases using the standard National Quality Forum (NQF) definitions for 3 nurse-sensitive patient outcomes: (1) rate of bloodstream infection associated with a central catheter, (2) rate of ventilator-associated pneumonia, and (3) prevalence of pressure ulcers. Data were aggregated and analyzed to the unit level. **Results:** No significant relationship was found between the proportion of certified nurses in a unit and patients' outcomes. However, the relationship between nurses' perception of overall workplace empowerment and certification was positive and statistically significant ($r = 0.397$, $P = .05$). **Conclusions:** Although the link between certification and patients' outcomes remained elusive, the association between workplace empowerment and the proportion of certified nurses underscored the role of organizational support in promoting professional nursing practice. krapohlg@umich.edu

RES253 On the Road to Establishing and Sustaining a Healthy Work Environment: Our Journey to Excellence

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Purpose: A clear link exists between the health care work environment, safety, and quality of care. Because of this link, we designed this study to establish a baseline assessment of the work environment not only in critical care but throughout patient care areas in a 576-bed nonteaching institution. **Background/Significance:** Leadership at our hospital has

embraced the AACN Standards for Healthy Work Environments and instituted a strategic plan to address all 6 of these essential standards. The first step in the plan is to begin with a baseline assessment. **Methods:** During phase I of our project, a pilot replication study was conducted in our 4 critical care units. After approval of the institutional review board and permission from the original study authors, a survey instrument developed by AACN, Gannett Co, and Bernard Hodes Group was distributed to RNs in critical care. Results are being compared with results of the national survey. Phase II of the study consists of surveying all RNs in non–critical care units. All data will be analyzed by using descriptive statistics including frequencies, and the differences between the groups will be assessed for significance by using nonparametric methods. **Results:** The pilot survey provided us with baseline information on the status of the work environment in 4 ICUs. Preliminary results indicate that critical care RNs rated their work units and organization higher in all 6 standards as compared with the national survey. RNs rated the health of the environment in their work units higher than they rated the health of the organization. Respect rated higher in RN to RN and RN to nurse manager than with physicians and administration. As the study is expanded to non–critical care areas, it will provide unique information as it compares and contrasts the work environment beyond critical care and examines the organization as a macrosystem. **Conclusions:** The ultimate goal is to create an environment that fosters partnership, creativity, and excellence. This baseline comparison will inform the plan of action for this project. Before and after measurements will enable us to evaluate the effectiveness of our interventions in moving toward this goal.
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RES254 The Phenomenon of Moral Distress Among Intensive Care Nurses

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Purpose: To identify situations that cause high levels of moral distress in ICU nurses, to evaluate the levels of moral distress experienced by these nurses, and to identify associations between nurse demographics and levels of moral distress. **Background/Significance:** Moral distress is a painful or unsettling feeling that results from situations in which the ethically right course of action is known but cannot be pursued or acted on. Critical care nurses are adversely affected by physical and psychological manifestations of moral distress, including emotional exhaustion, diminished self-worth, job burnout, and detrimental effects on personal relationships. **Methods:** This exploratory, descriptive, nonexperimental study used a modification of Corley's Moral Distress Scale (MDS). ICU staff nurses at the 2 largest hospitals of a 5-hospital health care system in the southeastern United States were anonymously surveyed about their personal experiences in an attempt to discern level, source, and frequency of moral distress. Data were analyzed by using SPSS software. Intensity and frequency means were computed for each item on the MDS. Relationships between demographics and level of moral distress were explored by using bivariate analysis. Free-text responses were analyzed by 3 independent evaluators to detect common themes. This was a replicated study. **Results:** Moderate levels of moral distress were reported by the nurses. Situations most frequently associated with moral distress were those pertaining to provision of aggressive care not likely to benefit the patients. Four broad themes were identified from the free-text responses: (1) nurses fighting a losing battle, knowing what to do but being hindered by other forces; (2) affirmation of our society's death-denying character; (3) more like torture than care; and (4) job burnout. Study findings were very similar to those obtained in the replicated study. More research is needed on this topic in order to generalize that the phenomenon of moral distress is the same in all critical care settings. **Conclusions:** If moral distress is not addressed by health care institutions and the nursing profession, critical

care nurses will continue to suffer its adverse physical and psychological effects in large numbers, causing some of them to change work environments and others to leave nursing altogether. michben@aol.com

RES255 Postadmission Delirium As a Modifying Factor in Intensive Care Unit Patients' Symptom Reports

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Purpose: To explore postadmission delirium as a modifying factor in symptom reports of critically ill patients in tertiary medical surgical intensive care units (ICUs). **Background/Significance:** ICU patients frequently must cope with iatrogenic barriers, such as mechanical ventilation, high acuity, and frequent use of opiates and sedatives that limit their communication of symptoms and needs to clinicians. Recent studies indicate that in the first 24 to 48 hours of admission, many of these vulnerable patients experience 1 or more episodes of delirium. It is not known if the presence of delirium, 72 hours after admission or longer, modifies these patients' symptom reports. **Methods:** In a prospective observational study, 171 eligible patients (ICU stay 72 hours or longer, no documented history of dementia, and APACHE II scores > 20) were screened for delirium following 10-item symptom surveys. The Confusion Assessment Method ICU (CAM-ICU), a validated delirium screening tool, was selected to evaluate 4 key cognitive domains in surveyed patients. In total, 325 surveys were obtained from 152 patients screened for delirium every other day up to 14 days; 19 (11%) patients who could not be CAM-ICU tested were excluded. Delirium outcomes were analyzed by using generalized estimating equations (GEE) methods that takes into account clustering of surveys by patients. **Results:** Delirium was detected in 52 patients (34.2%) at 1 or more times following their surveys. Delirious patients had higher mean APACHE II scores in the first 24 hours (31.4 vs 29.0, $P = .03$), more days in the ICU (25.7 vs 16.2, $P = .01$), and higher survey APACHE II mean scores (20.0 vs 17.4, $P = .001$), and they received more opiates (54.5 mg vs 18.7 mg in 24 hours, $P = .002$). The cohorts did not differ, however, in sex, age, ethnicity, code status, medical diagnoses, or hospital mortality. Delirious patients were more likely to report feeling confused (43% vs 22%, $P = .004$), whereas nondelirious patients were more likely to report being tired (77% vs 57%, $P = .006$). **Conclusions:** Delirious patients were more acutely ill on admission and on survey days, stayed longer in the ICU, and received significantly more opiates than did nondelirious patients. Therefore, delirium should be interpreted within the context of other patient experiences during assessment and caregiving activities.
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RES256 Potential Point-of-Care Test Predicting Intracranial Pathology After Minor Closed Head Injuries

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Purpose: This study investigates whether serum biomarkers, linked with intracranial pathology, can assist in the evaluation and treatment of minor closed head injuries. This research also provides a foundation for developing a point-of-care test for patients with head injury. **Background/Significance:** Brain injury affects more than 1.5 million persons annually; 230 000 are hospitalized and 50 000 die each year. Evaluation of head injury is extensive and costly. Existing care algorithms and protocols are insufficient to promptly identify who is most at risk for intracranial aberration. **Methods:** This pilot study enrolled 119 patients. The participants all presented within 24 hours of a minor closed head injury, as defined by a score of 14 or 15 on the Glasgow Coma Scale (GCS). Nonenhanced computed tomography (CT) scans were obtained on all participants within 12 hours of admission as the outcome variable, dichotomized as the presence or absence of intracranial

pathology (mean, 8.0 hours 14 minutes). GCS and outcome scores were obtained at presentation and at discharge. A panel of 15 serum biomarkers, previously linked with pathology of acute brain injury, was measured at time of conscription. From this panel, 3 serum biomarkers, brain natriuretic peptide (BNP), D dimer, and S-100 beta (S100B) were included in the model. **Results:** Statistical analysis was done with SAS v 9.1 (Cary, NC). General linear models that used both univariate and multivariate regression were explored. CT evidence of pathology was present in 28% of the sample. In univariate models, BNP ($F = 6.52$, $P = .01$) and D dimer ($F = 4.28$, $P = .04$) were significant predictors of pathology on CT, whereas S100B ($F = 0.93$, $P = .34$) was not significant. The multivariate model, which included all 3 biomarkers, was statistically significant ($F = 6.10$, $P < .001$, $r^2 = 0.17$). **Conclusions:** Three serum biomarkers (BNP, D dimer, and S100B) are significant predictors of brain injury when CT scans are used for comparison. The study offers support for surveying how a point-of-care test may save time, money, and ultimately provide early management and prognostic choices. amanda.peacock@duke.edu

RES257 Racial Disparity in End-of-Life Care: Disparity Versus Culture?

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Purpose: To describe patients within each level of care at the end of life and to provide an evidence-based platform on which to build our end-of-life patient care program. We sought to evaluate factors contributing to divergent views on death and end-of-life care practices. **Background/Significance:** Among nonsurvivors in the ICU, racial disparities have been associated with level of care at the end of life; however, few data exist that explore reasons for these patient differences. As frontline staff members, nurses are in a unique position to spend extended time with both patients and families, allowing them to identify patients' biographical histories, values, and preferences and to facilitate communication and understanding between patients, families, and the health care team. **Methods:** A descriptive analysis of consecutive deaths, prospectively collected from 1998 to 2006 (n = 1072) in the cardiac intensive care unit of an academic tertiary care center was conducted. Deaths were classified as full code (FC), do not resuscitate (DNR), or withdrawal of life support (WOLS). Categorical and continuous variables were compared between the 3 groups by using analyses of variance (ANOVA), and post-hoc testing was conducted. The alpha was established at .05. In addition, factors that predicted the likelihood of being in 1 of the 3 groups over another were also identified by using stepwise, hierarchical logistic regression. All statistical analyses were done with SPSS version 12. **Results:** Level of care at the end of life varied predictably by race, with blacks almost twice as likely as whites to choose FC as compared with DNR, after controlling for age, length of stay, and diagnosis (odds ratio, 1.911; confidence interval, 1.34-2.70). Of the 1072 patients in the sample, 25% were black (n = 285) and 68% (n = 760) were white. A majority (41.9%, n = 277) of blacks were full code at the time of death as compared with whites (26.4%; n = 754; $P < .001$). Whites were more likely to be DNR. Intubation at time of death was more common among blacks (55.4% vs 48.3%). Whites were more likely to be actively withdrawn from life support (79.5%, n = 232) than were blacks (20.5%, n = 60). **Conclusions:** Reluctance to withdraw life support or a decision for DNR is a deliberate choice, borne of a cultural tradition often underappreciated by contemporary providers. Appreciating historical foundations of distrust allow us to better assist black families in a manner harmonious with their culture. grang004@mc.duke.edu

RES258 Relationship Between Hyperglycemic Index Values and Outcomes in Patients With Subarachnoid Hemorrhage

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Purpose: Hyperglycemia is related to poor outcomes in some populations, but its impact after aneurysmal subarachnoid

hemorrhage (SAH-A) is not well established. This study examined the relationship between the hyperglycemic index (HGI) of SAH-A patients in the neuro ICU (NICU) and their outcomes. **Background/Significance:** Whether hyperglycemia affects SAH-A outcomes is not well described. Previous study using morning or mean glucose from varying sampling intervals does not reflect hyperglycemia magnitude over length of stay (LOS). HGI gives a single index determination of hyperglycemia persistence over time as corrected for irregular sampling intervals and LOS, and it is not erroneously lowered by hypoglycemia. Using HGI will determine if persistence of hyperglycemia over LOS affects SAH-A outcomes. **Methods:** This prospective longitudinal study recruited 243 SAH-A patients with Fisher grade ≥ 2 and/or Hunt/Hess Category ≥ 3 admitted to the NICU. Serum glucose (GLU) levels were collected as standard of care. HGI was calculated by interpolating all GLU levels and determining the mean value area under the curve for magnitude and duration above the upper normal GLU level of 130 mg/dL for NICU LOS. 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 months. Chi-square, Wilcoxon rank sum, and logistic regression were performed (SPSSv12.0). **Results:** The sample had a mean (SD) age of 54.3 (10.9) years, was primarily female (74%) and white (92%), and preadmission diabetes was rare (6%). Sample mean (SD) HGI was 18.2 (9.3) mg/dL. A significant relationship existed between higher HGI and SAH severity by Hunt/Hess ($P = .02$) and Fisher ($P = .001$). Higher HGI was significantly associated with mortality (mean [SD] HGI alive 13.8 [19.9] mg/dL vs death 39.6 [8.9] mg/dL, $P < .001$). Higher HGI was associated with poorer function by 3-month GOS ($P < .001$) and MRS ($P < .001$). Regression analysis indicated that even after controlling for age, sex, race and Hunt/ Hess, higher HGI was a significant predictor for death ($P < .001$) and poorer 3-month GOS ($P < .001$) and MRS ($P < .001$). **Conclusions:** GLU is persistently elevated over LOS after SAH-A as calculated by HGI. Even after controlling for SAH severity, higher HGI significantly predicted mortality and poor outcomes. Further study for best practice in glucose monitoring and control in SAH-A is needed. mhra@pitt.edu

RES259 Risks of Bacteremia in the Intensive Care Unit: Does Oral Care Matter?

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Purpose: To describe the effect of toothbrushing on the incidence of transient bacteremia in ventilated critically ill patients, investigate the relationship of toothbrushing to dental plaque score, and describe the clinical significance of transient bacteremia related to toothbrushing. **Background/Significance:** Bacteremia, a leading cause of mortality, is responsible for about 15% of nosocomial infections. Critically ill patients are vulnerable and susceptible to infections that increase their length of stay, hospital costs, and mortality. Substantial evidence exists in healthy populations that transient bacteremia occurs with manipulation of the oral mucosa; however, the relationship of toothbrushing to transient bacteremia and clinical significance in critically ill patients have not been explored. **Methods:** In a within-group pretest, posttest design, 30 patients receiving mechanical ventilation were enrolled within 24 hours of intubation. All subjects received a toothbrushing intervention twice a day for 48 hours. Oral microbial cultures and dental assessment were collected before the first intervention. Three blood samples were collected at 1 minute before, 1 minute after, and 30 minutes after toothbrushing on days 1 and 3. DNA strains isolated from positive blood cultures after intervention or in the presence of systemic inflammatory response syndrome (SIRS) would be compared by MLST with the cultures of blood sampled during the study period and to oral cultures collected at study initiation for a diagnosis of transient bacteremia from toothbrushing. **Results:** About 16% of subjects had positive oral cultures for organ-

isms such as *Staphylococcus aureus* and *Pseudomonas aeruginosa.* All blood cultures after toothbrushing were negative for bacterial growth. Logistic regression was used to examine predictors of SIRS. No significant relationship was found between SIRS, plaque score (P = .42), and DMF (decayed, missing, filled) assessment (P = .36). Empiric antibiotic use and Acute Physiology and Chronic Health Evaluation III data also were collected. **Conclusions:** Although subjects were positive for organisms in their oral cultures, all blood cultures from study and clinical purposes were negative. Findings indicate toothbrushing may not pose a risk in this population for transient bacteremia, which will assist in guiding oral care in ventilated adults. djjones@vcu.edu

RES260 Risk Perception of Musculoskeletal Injury Among Critical Care Nurses

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Purpose: The aims of the study were to investigate risk perception of musculoskeletal injury among critical care nurses and to identify factors influencing their risk perception of musculoskeletal injury. **Background/Significance:** Work-related musculoskeletal injury is a major occupational health problem among nurses. Perception of risk for musculoskeletal injury may play a role in promoting safer work behaviors and preventing injuries. However, little research has been done on risk perception of musculoskeletal injury among nurses. **Methods:** A cross-sectional study using a postal survey was conducted in a random sample of 1000 members of AACN. A total of 412 registered nurses participated in the study, and 361 subjects served as the sample for the data analysis. Nurses reported on the physical, psychosocial, and organizational characteristics of their jobs and on their musculoskeletal symptoms, risk perception, work behaviors, and demographics. Data were anayzed by using descriptive analysis, *t* tests, analysis of regression, correlation, and multiple linear regression. **Results:** Eighty-three percent of nurses perceived that a musculoskeletal injury was more likely than not to occur to themselves or coworkers within a year. About half of nurses perceived the risk of experiencing a musculoskeletal injury as higher to coworkers than to themselves. Multiple linear regressions revealed that significant predictors for greater risk perception of musculoskeletal injury included greater job strain, greater physical workload index, more frequent handling of patients, lack of availability of lifting devices or lifting teams, and greater musculoskeletal symptom index. These 5 predictors explained 23% of the variance in risk perception of musculoskeletal injury. **Conclusions:** Risk perception of musculoskeletal injury is understood as shaped by physical work exposures, psychosocial job stress, and personal experience of symptoms. Management efforts to improve working conditions could prove to be crucial for ensuring that nurses feel safe at work. jeongyi2@gmail.com

RES261 Shower Glove: From a Bedside Idea to Reality

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Purpose: To evaluate a shower glove to protect a patient's intravenous catheter (IV) insertion site from water exposure before showering or bathing. The glove was developed by a staff nurse who wanted to improve on the current process (cellophane, plastic bags, and tape). **Background/Significance:** The current process for protecting an IV site or PICC line from water exposure involves wrapping the extremity with cellophane wrap and tape in an attempt to create a "shield," with highly variable performance often resulting in failure to provide a proper barrier. Often the site is compromised by water exposure, leading to unnecessary changing of the IV and/or dressing. In certain cases, the site could become infected because of repetitive water exposure or improper drying. **Methods:** A quasi-experimental study

design was used with a purposeful sample. The study was approved by the hospital's institutional review board and the Office of Research Administration; informed patient consent was obtained. Ninety patients were enrolled and used the shower glove and 90 patients were showered using the current techniques. Patient selection for the trial included those who were hospitalized for 3 or 4 days, had an arm circumference of 15 inches or less, and were able to use the shower facilities. Patients with arm circumference greater than 15 inches and patients with latex allergies were excluded. Nursing and patient satisfaction levels were scored. **Results:** Covering IV sites for patient bathing is labor intensive, can be uncomfortable for the patient, and often does not provide an adequate barrier for the dressing. With the shower glove, 90% of IV sites remained dry versus 28% using the current standard. Fifty-nine percent of the patients reported discomfort or pain with the current standard, whereas only 1 patient reported some discomfort with the shower glove. About 92% of the patients had favorable responses to the shower glove versus 74% who reported unfavorable responses to the current standard. Finally, 96% of nurses preferred the shower glove to the current standard. **Conclusions:** The shower glove increased satisfaction of patients and reduced cost and pain associated with barrier dressing removal, IV site dressing changes, and IV restarts due to accidental dislodging of the IV catheter during barrier removal. Evan.Ballantyne@flhosp.org

RES262 Understanding the Symptom Burden at End of Life in Patients With Life-Limiting Illness in Intensive Care Units

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Purpose: This exploratory study examined the symptom burden and severity of symptom distress reported by critically ill patients at high risk for hospital death and compared patient-rated symptoms and distress for concordance with symptoms reported by a designated family surrogate. **Background/Significance:** Good symptom control is an essential component of care at the end of life. Yet evidence suggests that many dying patients experience debilitating pain and other symptoms, resulting in high levels of distress and suffering. Symptom research has focused on patients with cancer, with little research of ICU patients at high risk for death. This study sought to fill this scientific gap and to advance our understanding of the relationships among surrogate and patient reports of distress. **Methods:** A descriptive, correlational repeated-measure design was used to study a convenience sample of 80 adult patients with an APACHE III predicted mortality risk (60%-80%) admitted to the medical/surgical ICU in a tertiary care hospital. The study included 53 surrogate respondents. The Condensed Memorial Symptom Assessment Scale was used to gain patient/ proxy report. Patients also completed a Treatment and Procedure Survey, used to measure the interventions that may cause pain and discomfort associated with diagnostic/ therapeutic procedures and environmental stress in the ICU. Descriptive comparisons, correlations, and chi-square analyses were performed by using SPSS-14. **Results:** Hospital mortality was 21% and 25% at 3-month follow-up for the cohort. Symptoms were reported by 98% of patients, indicating a mean of 10.23 out of 14 symptoms assessed. Between 45% and 98% of patients reported experiencing lack of energy, pain, dyspnea, nausea, sleep disturbance, lack of appetite, and anxiety rated as moderate or severe. About 98% reported psychological symptoms on day 1 at highest levels of distress; 82.5% reported severe distress on day 3. Significant pain/discomfort were associated with common ICU procedures/treatments. Surrogates provided concordant ratings regarding symptom distress 85.5% of the time, yet rated patients' physiological symptoms higher than their psychological symptoms. **Conclusions:** Correlates of high symptom burden in ICU patients near death were admission diagnosis, age, sex, and multiple comorbidities. Findings should be used to develop interventions to be tested through correlational, repeated-measure studies to improve symptom control for patients and to guide decisions regarding futile use of ICU therapies. p.kalowes@verizon.net

RES263 The Value-Behavior Congruency Model in End-of-Life Care
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Purpose: By developing a conceptual model of end-of-life care, we can examine nurses' values and behaviors when providing end-of-life care in the intensive care unit (ICU) as well as the personal, environmental, and relational factors that nurses face when providing this care. **Background/Significance:** The Value-Behavior Congruency (VBC) model was developed by Bowen to explain marital satisfaction in couples. VBC includes values, behaviors, and system factors (personal, environmental, and relational) that can either facilitate or hinder goal-directed behavior. The concepts identified by Bowen in his conceptual model have some merit when transitioning to ICU practice and end-of-life care, especially as the relationship between the nurse and family is often an intimate one. **Methods:** The value-behavior congruency model was used as a classification tool for a literature review. Literature was reviewed by using the following search terms: *end-of-life, ICU, nursing, competence, quality,* and *family perceptions.* In addition to the literature review, 9 critical care nurses in adult critical care units were interviewed about their values and behaviors as well as their perception of the family's viewpoints. Nurses also were asked to identify common barriers to providing this care, which was analyzed and classified into the personal, environmental, and relational factors inherent in the health care system as part of a concept analysis. **Results:** Using Bowen's model of value-behavior congruency, several examples of personal, environmental, and relational factors were identified that relate to critical care nursing. The conceptual model has been expanded to include conceptual definitions and relationships as identified by the literature and from the qualitative interviews. **Conclusions:** Adapted to the ICU, the VBC model can be used to examine end-of-life care in the ICU and suggests that care is improved in circumstances in which the nurse and family work together to ensure that their values and behaviors are congruent, especially in response to the health care system. Meg_Zomorodi@unc.edu
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Session A: Monday 8 AM to Tuesday 1 PM

The attendees will be able to discuss the posters with the authors at the "Meet the Authors" on Tuesday from 10 AM to 12 PM.

Session B: Wednesday 8 AM to Thursday 1 PM

Attendees will be able to discuss the posters with the authors at the "Meet the Authors" on Wednesday from 10 AM to 12 PM.

Poster presentations will be located at Chicago's McCormick Place West at the back of the NTI Resource Center.