

# 2006 National Teaching Institute Research Abstracts

Presented at the AACN National Teaching Institute in Anaheim, Calif, May 20-25, 2006.

## RESEARCH ORAL PRESENTATIONS

### *Research Oral Abstract Award Winner*

#### **To Feed or Not To Feed? That Is the Question: Aspiration Prevention in Acute Stroke Patients**

*Harris D, Gadishaw S, Larghi, P. Memorial Hospital West, Fla.*

**Purpose:** To determine whether nurses (RNs) could quickly and accurately assess the swallowing of acute stroke patients before administering medications or food. **Background/Significance:** Dysphagia is a frequent manifestation following acute stroke. The term dysphagia is used to describe disorders that occur in the oral or pharyngeal phases of swallowing. Dysphagia develops in 27% to 50% of all stroke patients. Furthermore, 43% to 54% of stroke patients with dysphagia will experience aspiration, and among those patients, pneumonia will develop in 37%. A swallowing tool (FAST-Feed After Stroke Tool) based on the Dysphagia Nursing Screen and the SStuff tool was developed. The RNs' results were compared with those of speech therapy evaluations of the same patients. **Methods:** The FAST tool development and study was done at a Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) primary certified community hospital that is participating in a 1-year JCAHO stroke study. Measure-7/Screen for Dysphagia was the catalyst for our hospitals to improve dysphagia assessment. Fifty patients were assessed with the FAST tool. The RN quickly (mean 9 min) and accurately assessed patients' swallowing and consulted speech therapy for further evaluations. **Results:** The FAST results that led RNs to have patients take nothing by mouth correlated 100% with speech therapy results. Speech therapy further recommended alternative dysphagia diets such as thickened liquids and pureed foods. None of the patients were readmitted with aspiration pneumonia within 30 days. **Conclusions:** The success of the FAST tool will continue to be monitored. The tool is slated for implementation for use with acute stroke patients.

### *Research Oral Abstract Award Winner*

#### **Prevalence of Electrocardiographic Abnormalities in Patients With Subarachnoid Hemorrhage**

*Hravnak M, Crago E, Kong Y, Horowitz M. University of Pittsburgh, Pa.*

**Purpose:** To examine the prevalence of electrocardiographic (ECG) abnormalities in patients after aneurysmal subarachnoid hemorrhage (SAH-A), and their relationship to sympathetic stimulation and myocardial injury. **Background/Significance:** Although ECG abnormalities and their possible causes have been described to some degree for patients with embolic stroke, they have not been well explored in patients with hemorrhagic stroke, specifically SAH-A. **Methods:** This prospective longi-

tudinal study recruited 74 SAH-A patients ages 38-75 (mean 55.8, SD 9.6) with a Fisher grade  $\geq 2$  and/or a Hunt/Hess grade  $\geq 3$  admitted to the neurovascular intensive care unit. ECG abnormalities were determined from initial 12-lead ECG and continuous 24-hour Holter monitoring for 5 days after SAH-A. Concentrations of total serum catecholamines were measured every 12 hours. Serum markers for myocardial ischemia and infarct (TCPK, CPK/MB, CPK/MBI and cardiac troponin I [cTnI]) were measured daily. Descriptive,  $\chi^2$ , and repeated measures analyses were performed by using SAS v8.2. **Results:** ECG abnormalities were present by initial 12-lead ECG in 82% of patients, and in 93% by Holter monitor. A significant relationship existed between 12-lead ECG and total serum catecholamines ( $P = .05$ ), and a nonsignificant trend was noted between 12-lead ECG and cTnI ( $P = .06$ ), but not between 12-lead ECG and CPK/MB ( $P = .1$ ). There was no relationship between ECG abnormalities by Holter monitor and total serum catecholamines, cTnI, or CPK/MB. **Conclusions:** ECG abnormalities are common after SAH-A. There is some evidence to support relationships between abnormalities on the initial 12-lead ECG, sympathetic stimulation, and some markers of cardiac injury, but these relationships are not present with regard to 24-hour Holter monitoring data. Vigilance in monitoring for ECG abnormalities in this complex patient population is important for optimal care, and the reasons for causation require further study. **Sponsored by:** National Institutes of Health, National Heart, Blood, and Lung Institute.

### *Research Oral Abstract Award Winner*

#### **Trajectory of Quality of Life in Heart Failure Patients With Preserved and Nonpreserved Systolic Function**

*De Jong M, Riegel B, Armola R, Moser D. Wilford Hall Medical Center, Tex.*

**Purpose:** To investigate whether the trajectory of health-related quality of life (HRQL) in heart failure (HF) patients differs by sex or systolic function during the first 6 months after hospitalization. **Background/Significance:** Heart failure patients have worse HRQL than do patients with other cardiac conditions, and HRQL predicts mortality. Clinicians often assume that patients with preserved systolic function (ejection fraction [EF]  $> 0.40$ ) have better HRQL than those with nonpreserved systolic function (EF = 0.40). Differences between the sexes in HRQL have been proposed, yet little is known about how HRQL changes over time based on either sex or EF. **Methods:** This was a longitudinal study of HF patients enrolled in the Multicenter Quality of Life Registry. The Minnesota Living with Heart Failure Questionnaire (LHFQ) was used to measure HRQL at baseline (during hospitalization), 3 and 6 months after discharge. Repeated-measures analysis of variance deter-

mined whether trajectory of HRQL differed by sex or preserved versus nonpreserved systolic function. **Results:** A total of 419 patients (age  $70 \pm 12$  years; 51% female; EF  $42 \pm 18\%$ ; New York Heart Association class III/IV 71%) completed the LHFQ at each interval. During hospitalization, HRQL was poor for all patients. Neither sex nor EF group interacted to produce an effect on the trajectory of HRQL. There was a main effect of time. All patients reported substantially worse HRQL during hospitalization than at 3 months and 6 months after discharge ( $P < .001$ ). Regardless of sex or EF, HRQL improved from baseline at 3 months ( $P < .001$ ) and 6 months ( $P < .001$ ). Moreover, HRQL was better at 6 months than at 3 months ( $P < .001$ ). **Conclusions:** HRQL was most impaired during hospitalization, but significantly improved after discharge for both men and women, irrespective of EF. Clinicians may advise male and female patients that HRQL will most likely improve after discharge. However, clinicians should be aware that HRQL is appreciably impaired even for HF patients with a preserved EF. **Sponsored by:** Philips Medical-AACN Outcomes Grant.

#### **Research Oral Abstract Award Winner**

#### **Development and Application of the Workload Management System for Critical Care Nurses (WMSCN) Using the Workload Management System for Nurses (WMSN)**

*Cho Y, Shin H, Cho J, Jung M, Lee B. Samsung Medical Center, International.*

**Purpose:** To develop a nursing workload classification system in Korea specific to intensive care units (ICUs), establish the validity and reliability of this system, and identify the conversion index of nursing hour per 1 point of nursing workload score.

**Background/Significance:** In 1992, the Korean Association of Clinical Nursing had revised the factor-typed patient classification system (PCS) with WMSN, developed at Walter Reed Army Hospital. But validity and reliability testing and appropriate teaching of correct guidelines were not done. Many differences were apparent between general wards and ICUs and also between Korea and the United States. Therefore, the Korean Association of Critical Care Nurses decided to develop a valid and reliable WMSCN for ICUs in Korean hospitals. **Methods:** The items were revised at the 256 ICUs in 45 hospitals from WMSN by checking the frequencies of items. Nursing care hours (NCH) were checked by trained observer and WMSCN scores were checked by registered nurses (RNs) caring for patients after training on the guidelines. Pretraining and posttraining scores were compared. Validity was tested through the correlation between direct NCH and WMSCN score. Interrater reliability between head nurses and RNs was tested at 18 of 45 hospitals. Finally, the conversion index of NCH by point of score was measured at 5 of the 18 hospitals. **Results:** The WMSCN consisted of 8 categories and 82 nursing indicators. The average WMSCN score decreased from 124.0 to 82.2 after training on the guidelines. Scores of RNs were highly correlated with scores of head nurses ( $r = .94$ ). WMSCN scores were highly correlated with the direct NCH ( $P = .007$ ). Finally, the conversion index was 7.99 minutes. **Conclusions:** WMSCN is valid and reliable for classifying ICU patients according to their nursing workload. Training on the guidelines and repeated evaluations of validity and reliability are required to use WMSCN effectively. The conversion index should be

adjusted to estimate the appropriate staffing in Korea. **Sponsored by:** Korean Association of Critical Care Nurses.

#### **Practices of Nurses and Nursing Assistants in Preventing Incontinence Dermatitis in Acutely/Critically Ill Patients**

*Peterson K, Bliss D, Nelson C, Savik K. Methodist Hospital and University of Minnesota, Minn.*

**Purpose:** To describe current practices of nursing staff in preventing and managing incontinence-associated dermatitis (IAD) in acutely and critically ill patients. **Background/Significance:** Acutely and critically ill patients are at risk for IAD. There is no standard protocol for preventing or managing IAD, and numerous skin care products are available. Little is known about the practices of nursing staff to address IAD in these patients. **Methods:** 8 nurses (8 female, 1.5-30 years hospital employment) and 8 nursing assistants (6 female, 4-6 years employment) in 3 community hospital units (ICU, oncology, and a medical unit) participated in 1-hour focus groups. A 3-day prospective surveillance showed that the prevalence of IAD in incontinent patients in those units was 95%, 35%, and 32%. Focus group responses were audiotaped, transcribed, and analyzed by 2 investigators.

**Results:** Staff recognized the importance of preventing IAD. Timely cleansing of soiling was identified as essential, but incontinence frequency, lack of time, and patients' acuity were barriers. Staff used a variety of cleansers including soap and water, baby shampoo, shaving cream, and commercial cleansers whose names they did not know. Moisture barriers or body lotion were used inconsistently, and staff did not usually know product names or ingredients. To keep perineal skin dry, staff used baby powder, placed cloths in skin folds of obese patients, and turned patients. Absorbent briefs were avoided in 2 units, cotton underpads were preferred, rectal tubes were uncommon and reserved for liquid stool, and rectal pouching was rare. Product fragrance and availability at the bedside were primary factors in selection and use of skin care products/devices. **Conclusions:** Staff opinions about appropriate IAD care differed, and practice varied considerably among individuals and units. Findings support plans to develop a protocol and computerized education program about perineal skin care, IAD prevention, and use of related products/devices. **Sponsored by:** Park Nicollet Institute and an AACN Evidence-Based Clinical Practice Grant.

#### **Managing Diarrhea and Fecal Incontinence: Results of a Prospective Clinical Study in the Intensive Care Unit**

*Gallagher J, Wishin J. University of Florida-Shands Hospital, Fla.*

**Purpose:** This prospective study evaluated safety and performance of F\* in 42 subjects with diarrhea and incontinence in 7 US hospitals. **Background/Significance:** Managing fecal incontinence and diarrhea challenges intensive care unit (ICU) and hospital staff. An innovative fecal management system F uses an inflated balloon to retain a tube within the rectum. An external pouch collects fecal material for patients with uncontrolled diarrhea. **Methods:** Endoscopic rectal vault proctoscopies assessed anorectal mucosal condition before insertion and after removal on 8 initial subjects. Investigators reported on ease of F insertion and removal, device retention and leakage, patients' comfort, perineal skin condition, and odor during use. F performed well with duration of use ranging from 1 to 14 days. **Results:** The device was

generally well-tolerated. Five deaths occurred from non-product-related illnesses and one subject with multisystem organ disease and history of gastrointestinal bleeding had an episode of lower gastrointestinal bleeding while using the device. Clinicians rated F easy-to-insert (97% of subjects rated), remove (97%), and dispose of (100%) with easy-to-follow instructions (100%). On 200 daily assessments, F was rated as improving fecal incontinence control in 83%, as time efficient in 89%, and as efficacious in 86%. Four subjects were unable to retain the device. Clinicians reported no odor on 85% of daily assessments and no or limited leakage on 82%. Perineal and buttock skin condition were maintained/improved in 92% of patients with diarrhea and incontinence. **Conclusions:** The device was determined to have an overall favorable safety profile in this study, helping reduce risk of perineal and buttock skin breakdown. **Product notation:** \*Flexi-Seal Fecal Management System, ConvaTec, Princeton, NJ, USA. Flexi-Seal is a registered trademark of E. R. Squibb & Sons, L. L. C. **Sponsored by:** ConvaTec, A Bristol-Myers Squibb Co.

### Assessment of Intensive Care Unit (ICU) Delirium and Depression

*Idemoto B. University Hospitals of Cleveland, Ohio.*

**Purpose:** To examine the accuracy of critical care nurses' clinical assessment of delirium and depression compared with standardized validated tools. Accuracy of nurses' assessment of these syndromes can be improved. **Background/Significance:** Studies have shown high incidence, poor outcomes, and long-term sequelae for ICU patients who experience delirium or depression. **Methods:** A total of 126 adult postoperative patients with >24-hour stay in the surgical ICU of a large urban medical center were assessed and findings were compared with the assessments of nurses caring for the patients on the day of interview. The Confusion Assessment Method-Intensive Care Unit was used (CAM-ICU) for delirium, and the Hospital Anxiety and Depression Scale (HADS-D, depression subscale) to assess depression, and the nurse caring for the patient was asked for an informal clinical assessment. **Results:** Following study completion, August 2004, data were examined for concordance using percent agreement and the kappa statistic. Logistic regression was used to assess the influence of patients' characteristics (age, sex, race, hospital day on day of interview, and primary procedure or diagnosis) and selected characteristics of nurses (sex, educational preparation, years of nursing experience) to assess the accuracy of the nurses' judgment. The regression model for depression was significant with these predictors of concordance: hospital day (odds ratio [OR] 1.119,  $P = .02$ ) and nursing years of experience (OR .725,  $P = .03$ ); the regression model for delirium was not significant. Clinical significance or insights for clinical practice may be found with further analysis. **Conclusions:** This surgical ICU study is the first to assess nurses' accuracy of detection of delirium and depression in the postoperative ICU patients. This study demonstrates the feasibility of investigating these complex phenomena in the ICU environment and can be pivotal in the building the foundation for future studies with the ultimate goal of improved outcomes for critically ill patients. **Sponsored by:** Sigma Theta Tau Alpha Mu Chapter Research Grant and Frances Payne Bolton School of Nursing Alumni Research Award.

### Interrater Agreement of the Checklist of Nonverbal Pain Indicators in Intubated and Sedated Patients in Surgical Intensive Care Units (ICUs)

*Tyberg K, Chlan L. University of Minnesota, Minn.*

**Purpose:** To determine the interrater agreement of the Checklist for Nonverbal Pain Indicators (CNPI) in intubated and sedated ICU patients, and to have nurses evaluate the feasibility of using the CNPI in their practice. **Background/Significance:** Pain management in the ICU is a challenge with intubated and sedated ICU patients because of their inability to use the traditional pain scales to describe their pain levels. The CNPI was designed for use in persons with Alzheimer disease who are unable to use traditional pain scales because of cognitive impairment. The CNPI consists of 6 items where the observers rate yes/no if a certain behavior is present at rest and with activity. The CNPI might be useful to evaluate pain for intubated and sedated patients and warrants testing in the ICU. **Methods:** Eligible patients ( $n = 8$ ) were enrolled from 1 surgical ICU in the urban Midwest after consent was obtained from family. A pair of nurses observed patients for the presence of CNPI behaviors (bracing, restlessness, grimacing, rubbing) at rest and with repositioning; nurses independently recorded their observations. A total of 22 paired nurse observations were collected. Nurses evaluated the feasibility of the CNPI on a 0-5 Likert scale for ease of use, whether it reflected the patient's pain, and likelihood of using it in the future. **Results:** Overall interrater agreement of nurses' observations of patients' pain behaviors using the CNPI were high (mean = 97.72%, range 90.91%-100% overall). Nurses thought the CNPI was easy to use (mean = 4.4, SD = 0.62) and that it reflected the patient's pain (mean = 3.7, SD = 1.1). Only 73% of nurses indicated that they would be likely to use the tool in the future. **Conclusions:** Nurse ratings of patients' pain behaviors on the CNPI were in close agreement and the nurses found the tool easy to use. The CNPI has the potential for use in the ICU but requires further testing with a larger sample and investigating the nurses' hesitancy to use the CNPI in their practice. **Sponsored by:** AACN/STT Clinical Practice Grant.

### Judgments of Nurses and Physicians Regarding Futility and Withdrawal of Treatment in Medical and Surgical Intensive Care Units (ICUs)

*Miller C, Funk M, Wiegand D. Yale University School of Nursing, Conn.*

**Purpose:** To compare judgments of nurses vs physicians and clinicians in medical (MICU) vs surgical intensive care units (SICU) regarding futility and withdrawal of treatment; examine the accuracy of judgments in predicting hospital mortality; and determine factors influencing judgments about withdrawal of treatment. **Background/Significance:** Many patients face death in an ICU. Patients, families, and clinicians often deal with decisions regarding withdrawing and withholding therapy in situations that are deemed medically futile. **Methods:** Data were collected on 101 adult patients who had been in the MICU or SICU for >48 hours. A brief questionnaire eliciting information on judgments about futility and withdrawal of treatment was completed daily by the patient's nurse and physician for the duration of the patient's ICU stay. A total of 1263 questionnaires were completed by 36 nurses and 39 physicians. Both  $t$

test and chi-square analyses with kappa coefficients were performed to determine the association of type of clinician and type of unit with judgments, accuracy of judgments, and factors affecting judgments. **Results:** Nurses were more likely to judge treatment as futile (35.8%) and believe that treatment should be withdrawn (16.9%), compared with physicians (26.6% and 11.4%;  $P = .001$  and  $P = .02$ ). Clinicians in the MICU were more likely to consider treatment futile (26.2%), and believe that treatment should be withdrawn (24.1%), compared with clinicians in the SICU (8.1% and 3.0%;  $P < .001$  for both). Judgments about futility indicate that nurses and physicians were moderately accurate in predicting hospital mortality ( $\text{kappa} = 0.43$ ). Type of unit ( $P < .001$ ), physician specialty ( $P < .001$ ), and nurse's education ( $P = .004$ ) influenced judgments surrounding withdrawal of treatment. **Conclusions:** Clinicians should initiate end-of-life discussions earlier in the patient's ICU course, which can prevent later misunderstandings, and perhaps avoid unnecessary invasive and painful procedures.

#### **Implementing Research-Based Out-of-Bed Guidelines After Percutaneous Transluminal Coronary Angiography (PTCA)**

Breton E, Merdinger P, Buonocore D. Bridgeport Hospital, Conn.

**Purpose:** To safely reduce time in bed after PTCA/stenting by implementing a research-based protocol. **Background/Significance:** Patients after PTCA in our institution typically spend anywhere from 6 to 18 hours in bed depending on the attending physician, type of anticoagulant used during the procedure, size of the introducer catheter used, and what method was used for femoral artery hemostasis. Increased length of time in bed after femoral arterial sheath removal has been associated with increased discomfort of patients. We had a research-based guideline that was several years old and did not reflect the use of several new anticoagulants and artery closure devices. **Methods:** In an effort to standardize time out of bed safely, a thorough review and evaluation of the current literature was undertaken. Based on this literature search, the guideline was updated. The new updated guideline allows for ambulation 4 hours after femoral artery hemostasis in PTCA/stent patients with a 6F sheath or smaller and closure by manual compression, CClamp, FemoSTop, Angioseal, or Perclose and using either heparin or bivalirudin for anticoagulation with or without the use of a IIa/IIIb inhibitor. Ambulation is 6 hours for those patients with an 8F or larger sheath. Implementation of the updated guideline was facilitated by staff education, physician education, and an information bulletin board. **Results:** Data on postprocedural ambulation regarding hematoma formation as well as bleeding complications were tracked through our quality improvement program. **Conclusions:** Since the implementation of the program, no significant hematoma or bleeding complication related to the earlier time out of bed has been observed.

#### **A Comparison of Sex and Age Differences in Symptoms After Myocardial Infarction and After Coronary Artery Bypass Graft**

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**Purpose:** To determine if differences between the sexes are present in the symptoms of pain, shortness of breath, and fatigue

in persons with a diagnosis of either myocardial infarction (MI) or coronary artery bypass graft surgery (CABG) over time. **Background/Significance:** Pain, shortness of breath, and fatigue are among the most frequently reported symptoms in persons after MI or CABG. These symptoms can impair quality of life and functional status for up to 1 year after acute hospitalization. Yet, few studies have longitudinally explored symptom change over time. Further, research suggests that differences between the sexes may exist in the experience of pain, shortness of breath, and fatigue. **Methods:** Data on pain, shortness of breath, and fatigue were collected from 248 persons by telephone at 6 weeks (t1), 3 months (t2), and 6 months (t3) after either an acute MI or CABG. All symptoms were measured on a 0-to-10 scale (0 = absent and 10 = worst possible symptom experience). All data were analyzed by using repeated measures analysis of variance. **Results:** Of the 248 subjects enrolled in the study, 94 had an MI and 154 underwent CABG. All of the subjects were unpartnered cardiac elders with a mean age of 76 (85 men, 163 women). There were significant reductions in pain, shortness of breath, and fatigue noted over time, but the symptom experience did not differ by sex or cardiac diagnosis. The mean levels of fatigue dropped from 4.54 (t1) to 4.28 (t2) to 3.25 (t3), with the greatest reduction between 3 and 6 months. The mean levels of pain dropped from 3.37 (t1) to 0.82 (t2) to 0.78 (t3), with the greatest reductions between 6 weeks and 3 months. Finally, mean levels of shortness of breath dropped from 3.36 (t1) to 2.18 (t2) to 1.69 (t3), with the greatest reductions between 6 weeks and 6 months. **Conclusions:** The presence of symptoms decreased over time with a variable pattern of change. It is surprising to note that there were no significant differences in the symptom experience between men and women and between persons with MI or CABG.

#### **Demonstrating the Impact of a Web-Based Education Program for Family Members of Intensive Care Patients**

Kleinpell R, Silva N, Tully M, Hancock B. Rush University Medical Center, Ill.

**Purpose:** To assess the impact of a unique web-based education program for families of intensive care unit (ICU) patients on several outcomes: family education, family satisfaction, content of educational information taught by the nursing staff, and nurses' satisfaction with use of the program. **Background/Significance:** Research has demonstrated that the need for information is a top priority for family members of ICU patients. Yet, retaining information that is verbally communicated is difficult, and printed pamphlets are frequently misplaced. **Methods:** This descriptive study was conducted with family members and nurses in 3 ICUs in a midwestern university-affiliated medical center. Preimplementation surveys assessing satisfaction with communication and education were conducted with ICU nurses ( $N = 50$ ) and ICU family members ( $N = 51$ ), which revealed that a significant amount of time was being spent re-educating family members on ICU equipment. A dedicated computer was provided in the family waiting room to enable families to access educational information using the program ICU-USA. **Results:** During the first 3 months of use, family members visited more than 300 pages of the educational program. Frequently visited sites included web pages describing the ICU, ICU equipment,

diagnoses, procedures, and hospital services including dining and general accommodations. Family satisfaction surveys completed on the computer provided immediate feedback and revealed a high degree of satisfaction with daily communication and information. Postimplementation surveys with the ICU nursing staff are currently being conducted to assess further the impact of the web-based educational program on educational needs of family members and communication content. **Conclusions:** The use of a web-based educational initiative can improve ICU family member satisfaction with information and enhance communication in the ICU. **Sponsored by:** Golden Lamp Society.

### High School Students' Perceptions of Nursing Versatility—Stories Told!

Porter G, Boggs P, Bonifield S, Bride W, Granger B. Duke University Health System, NC.

**Purpose:** To explore high school (HS) students' perceptions of nursing as a career choice, and to gain insight into their impressions of the nurse as a key healthcare team member. **Background/Significance:** Consistent with national trends, our institution is experiencing a nursing shortage. To stem this trend, a study was designed to intervene at the HS level. **Methods:** The Academy of Health Sciences (AHS) was created in our area to assist HS students in selecting health-related careers. We offered students an opportunity to fulfill part (30-40 hours) of their AHS observation requirement by shadowing nurses in our Heart Center Observational Program (HCOP). Three information sessions were held to elicit student interest. Students completed study and shadowing consent forms, a pre-program information form, postobservation questionnaires, a postprogram questionnaire, and a guided interview with the program coordinator. Narrative methods were used to explore 16 taped interviews (45 minutes average). Constant comparison and thematic coding identified salient themes of field notes and recorded narratives. **Results:** Of 24 students enrolled, 16 completed the program. Misconception of nursing was the dominant theme. Subcategories included misperceptions of tools/technology used, helping relationships, role responsibility, interdisciplinary respect, patient fragility, and knowledge synthesis. Experiential knowledge of nursing was identified as a core need for students interested in nursing and health careers. **Conclusions:** These data suggest experiential knowledge of nursing at the HS level may alter perceptions of nursing and influence perceptions on a broader scale than is currently achieved by contemporary media. One student's impression summarized this experience well, "My idea of nursing has definitely changed!" **Sponsored by:** Duke Heart Center Fellowship.

### Acute Effects of Music on Stress in Patients Receiving Mechanical Ventilatory Support

Chlan L, Engeland W, Anthony A, Guttormson J. University of Minnesota School of Nursing, Minn.

**Purpose:** To evaluate the effect of relaxing music on the stress response (SR) in mechanically ventilated patients (MVPs) in the intensive care unit (ICU). **Background/Significance:** Non-pharmacological interventions such as music have been suggested as effective means for interrupting the SR in MVPs. Previous investigations have focused solely on indirect markers

of SR activity in the sympathetic nervous system (SNS) only. There is an absence of research measuring direct serum markers of activity in both the hypothalamic-pituitary-adrenal (HPA) axis and SNS. **Methods:** A 2-group experimental design with repeated measures pilot study was used to address the study purpose. Ten (6 female, 4 male) alert, hemodynamically stable MVPs (mean age 64.9 [SD 8.2] years) with intact renal function were recruited from a university-affiliated tertiary care center in the urban Midwest. Subjects were randomized to 60 minutes of listening to self-selected relaxing music through headphones or to resting quietly for 60 minutes. Heart rate and serum samples were obtained at baseline, +15 minutes, +30 minutes, +60 minutes; samples were assayed for epinephrine, norepinephrine, adrenocorticotropic hormone, and cortisol. **Results:** Data analysis via Kruskal-Wallis and Friedman test revealed no significant differences between groups on any measures due to the small sample size and wide variability among subjects. The experimental group demonstrated a downward trend for all measures, while the control group showed a variable pattern of increases and decreases for all measures over time. **Conclusions:** Data trends indicate that music may interrupt the SR in MVPs as demonstrated by a general pattern of reductions in serum markers of HPA axis and SNS activity. Additional research is warranted with an adequately powered sample size to build further the knowledge base of effective nonpharmacological nursing interventions for stress reduction in intensive care patients receiving mechanical ventilation that can improve patients' outcomes. **Sponsored by:** Grant-in-Aid University of Minnesota Graduate School.

### The Effects of Music Twice Daily on Various Outcomes in Intensive Care Patients Receiving Mechanical Ventilation: Improving Umbilical Venous Catheter Care by Implementing an Evidence-Based Practice Guideline in the Neonatal Intensive Care Unit

Sarin-Gulian A, Heliker B, Gawlinski A. UCLA Medical Center, Calif.

**Purpose:** To decrease the number of clotted umbilical venous catheters (UVCs) in the neonatal intensive care unit (NICU) by implementing an evidence-based practice (EBP) guideline. **Background/Significance:** Variability exists in UVC care practices, specifically regarding the frequency of and the solution and amount used for flushing. This variability may lead to lumen clotting, which necessitates placement of alternative catheters. **Methods:** The study used a pretest-posttest design. The intervention was an EBP UVC care guideline. Outcomes measured were nurses' knowledge, catheter patency, and practices before and after implementing an EBP guideline. A convenience sample of 64 NICU nurses was surveyed. UVC care practice was observed in 13 cases before and 17 cases after intervention. **Results:** A significantly higher percentage of nurses achieved mastery of knowledge after the intervention (78%), compared with before the intervention (21%,  $P < .05$ ). Significant increases also occurred in nurses' correct stopcock use (23% before, 81% after,  $P < .05$ ) and consistency in flushing (22% before, 64% after,  $P < .05$ ). UVC patency increased to 92% (after), compared with 86% (before). **Conclusions:** The use of an EBP UVC care guideline successfully improved

UVC care practice in the NICU. Statistically significant findings were (1) increase in nurses' self-reported stopcock use and flushing of capped lumens, and (2) increase in the number of nurses who achieved mastery of knowledge and nurses' total knowledge scores regarding frequency of selecting the appropriate lumen to flush and flushing lumens after procedures. Clinically significant findings were (1) increase in knowledge scores related to minimum amount of flush solution and (2) increase in the number of patent UVCs after the intervention.

#### **Methicillin-Resistant *Staphylococcus aureus* and Vancomycin-Resistant Enterococcus Screening in the Intensive Care Unit** *Schweon S, Zanders S, Roethke F. St Luke's Hospital, Pa.*

**Purpose:** Critically ill patients who acquire the antibiotic resistant pathogens methicillin-resistant *Staphylococcus aureus* (MRSA) or vancomycin-resistant enterococcus (VRE) during their hospitalization are at increased risk for infection, resulting in a greater length of stay, increased hospital resource utilization, and mortality. MRSA and VRE can be carried on the hands of healthcare workers from unidentified colonized patients. **Background/Significance:** During the past 4 years, an increasing number of community-acquired and healthcare-associated MRSA and VRE infections have occurred in the intensive care unit (ICU). **Methods:** The team decided to initiate surveillance cultures for MRSA and VRE for all ICU patients being admitted, regardless if they are being admitted from the emergency department, operating room, or another inpatient unit. The ICU staff and physicians were educated about the program. All patients upon admission are assessed for a history of MRSA or VRE. Patients that are colonized with either of these organisms are placed into contact isolation precautions. Patients who are not colonized then have samples from both the anterior nares cultured to assess for MRSA colonization and rectal samples cultured to assess for VRE colonization. Additional surveillance cultures are then obtained from the patients weekly. Culture samples are not obtained when the patient refuses or there is a physical limitation that prohibits the obtaining of a culture (eg, packing of nares after surgery). **Results:** During an 11-week period, 290 patients were screened for MRSA. Seven (2.4%) were newly discovered to be colonized. Three patients, initially testing negative upon admission, later tested positive within 3 weeks of their ICU stay. A total of 298 patients were screened for VRE. Fifteen (5%) were newly discovered to be colonized. Six patients, who initially tested negative upon admission, later tested positive within 3 weeks of their ICU stay. **Conclusions:** The multidisciplinary team caring for patients is notified when cross-transmission occurs and recommendations are given to improve practices.

#### **Successfully Launching a Rapid Response Team by Using Quantitative Data to Prove Efficacy and Dispel Misconceptions**

*Link J, Wilson J, Rock S, Henderson S. Park Nicollet Health Services, Minn.*

**Purpose:** To evaluate the efficacy of the rapid response team (RRT) model, especially to dispel misconceptions and determine actual crisis intervention versus nuisance calls. **Background/Significance:** RRT is gaining widespread attention,

but has proven challenging to implement as it requires significant cross-disciplinary staff support. At Methodist Hospital, a 426-bed facility, our RRT consists of a resident physician, respiratory therapist, critical care nurse, and the bedside nurse. **Methods:** An ongoing quantitative data analysis with 100% chart review of all RRT calls and collection of the following data: time, location and length of initial call; triggers for call; interventions within 3 to 5 hours of initial call; and short-term outcomes. **Results:** There were 70 calls in the program's first 10 weeks. Sixty percent occurred on second shift (3 PM to 11 PM). Remaining calls were split evenly between first and third shifts. Most patients had multiple triggers for an RRT call, averaging 2.1. The top 3 triggers were respiratory changes (55.7%), neurological changes (40%), and blood pressure changes (32.9%). After the initial RRT call, a critical care nurse did follow-up visits at 2-4 hours and then again at 12 to 15 hours after the initial call. Interventions were tracked from the initial visit through the first follow-up. During this 3 to 5 hour period, patients received an average of 2.8 interventions. Eleven interventions emerged as significant, used in 10% or more cases. Also, 50% of RRT patients required transfer to higher level of care (ie, intensive care). **Conclusions:** Quantitative data dispelled the 2 most common staff misconceptions about the RRT program. First, the false perception that most RRT calls were nuisances or unnecessary; second, that most RRT calls occur on the day shift, interrupting the resident's work when the primary doctor was only footsteps away. Finally, the data showed that our program was reaching its ultimate goal: to intervene sooner in a crisis and rescue patients earlier.

#### **Progress Toward Meeting Backrest Elevation Standards in Patients Treated With Mechanical Ventilation**

*Grap M, Munro C, Sessler C, Russell S. Virginia Commonwealth University School of Nursing, Va.*

**Purpose:** To identify progress toward meeting head-of-bed (HOB) elevation standards in patients receiving mechanical ventilation. **Background/Significance:** Recommendations from the Centers for Disease Control and Prevention (CDC) for prevention of nosocomial pneumonia in patients receiving mechanical ventilation include HOB elevations to 30° to 45°. Both the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) and the Institute for Healthcare Improvement include HOB elevation at greater than 30° as part of their pneumonia reduction recommendations. Studies published from 1994 to 2005 document HOB elevation in this population ranging from 19° to 23° without significant progress in meeting the above standards. Recently these recommendations have resulted in systematic documentation and evaluation of HOB elevation, which may increase compliance. **Methods:** HOB elevation was measured daily, using the bed's electronic pad, over a 4-year period during a large clinical trial related to ventilator-associated pneumonia reduction. Data were obtained from subjects receiving mechanical ventilation during their first 7 days of intubation in 3 intensive care units (medical, surgical-trauma, neuroscience). Year by year comparisons of HOB elevation were made as well as comparisons between the years before and after implementation of systematic HOB documentation and evaluation (January 2004). **Results:** HOB elevation

was measured in 323 patients over 1148 patient days. When analyzed by year, HOB elevation increased significantly over time, from 17.4° in 2002, 21.9° in 2003, 26.9° in 2004, to 28.2° in 2005. Whereas only 30% of HOB measurements met the standard in 2003, 56% met it in 2004 and 66% in 2005. By units, only the medical unit met the standard overall in 2005. **Conclusions:** Although recommendations are clear for minimal HOB elevation in patients treated with mechanical ventilation (30°), and HOB elevation is approaching this standard, the change in practice has been slow and is not yet at a complete level of compliance. **Sponsored by:** National Institutes of Health/National Institute of Nursing Research.

## RESEARCH ABSTRACTS

### Job Satisfaction and Stressors Among Experienced Nurses in the Pediatric Intensive Care Unit

Shaw J, Huth M. Cincinnati Children's Hospital Medical Center, Ohio.

**Purpose:** To explore job satisfaction and dissatisfaction of experienced staff nurses in a pediatric intensive care unit (PICU). **Background/Significance:** Job satisfaction surveys of all nurses in the PICU in 2003 indicated that nurses with greater than 3 years of experience had higher levels of dissatisfaction than less experienced nurses. Nurse's role satisfaction may be a contributing factor in PICU retention. Growth in numbers of patients and the nursing shortage make retention of experienced PICU nurses a high priority. **Methods:** Herzberg's (1959) 2-factor theory of employee satisfaction provided the conceptual foundation for the study. A convenience sample of 11 nurses with >3 years of experience chose to participate. Focus groups, individual interviews, and demographic surveys were used to collect data. Content analysis was performed. Data were categorized and compared with the Herzberg model. **Results:** Participants were 26 to 60 years old. Fifty-five percent had 10 years or less of PICU experience. The major dissatisfier was relationships with physicians and other co-workers. Other dissatisfiers included low staffing, lack of supplies, and lack of financial recognition for longevity or extended roles. Motivating factors (satisfiers) included recognition of nursing excellence, the fulfilling nature of the work, and making a difference for children. There was no significant difference in work-related and non-work-related stress. **Conclusions:** It is important to address relationships between experienced nurses, physicians and co-workers in the PICU to decrease dissatisfaction. Further dialogue with nurses and physicians to seek understanding of relationship issues that are present and ideas for improved relationships will occur. Limitations of this study include a small number of participants, interviews that were not tape recorded, and interviews that were structured to elicit information about dissatisfaction more than satisfaction.

### A Cumulative Analysis of Bispectral Index Monitoring in Critical Care

Olson D, Wong G, Bissett J, Dioguardi M, Kovitch L. Duke University Hospital, NC.

**Purpose:** The volume of literature discussing bispectral index (BIS, Aspect Medical Systems) exceeds 2000 peer-reviewed

articles. The purpose of this project was to perform a systematic review of literature addressing validity and reliability of using physiological sedation assessment (BIS) in the intensive care unit (ICU). **Background/Significance:** Many ICUs now use BIS as an adjunct to routine observational forms of sedation assessment. Despite its multiple correlation studies with subjective assessment tools, authors have arrived at different conclusions on adopting BIS. It is erroneous to expect that physiological and observational methods of assessment would correlate higher than a pair of observational methods. Two different methods of assessing sedation are expected to correlate at lower levels than 2 similar methods. The significance of each correlation is a statistical query. **Methods:** A computer-aided literature search identified articles that were then reviewed for inclusion in this study. Articles included discussed psychometric evaluations of BIS and at least 1 sedation scale. Average weighted correlations were computed for each sedation score by converting  $r^2$  values to standard correlation coefficients. **Results:** Of 2005 publications, 245 were ICU-related, 73 of these were peer-reviewed, and 22 met inclusion criteria for our study. There were 5 correlations of BIS to the Sedation Agitation Scale (SAS), 7 to Ramsay scale, 4 to COMFORT, and 2 to the Richmond Agitation Sedation Scale (RASS). Average weighted correlations were explored for analyses of BIS and SAS ( $r = .60$ ), Ramsay ( $r = .58$ ), COMFORT ( $r = .57$ ) and RASS ( $r = .66$ ). **Conclusions:** Despite a range of correlations, most authors found statistically significant correlations between BIS and one or more observational assessment tools. Future research into BIS use should focus on nursing decision making and clinical outcomes as a result of incorporating physiological data into current sedation assessment protocols.

### Clinical Factors Associated With Agitation

Gardner K, Sessler C, Grap M. Virginia Commonwealth University Schools of Nursing and Medicine, Va.

**Purpose:** To examine the relationship of clinical, laboratory, and intervention characteristics of consecutive patients in the medical respiratory intensive care unit (MRICU) to the development of agitated behavior. **Background/Significance:** Sixty percent of ICU patients experience agitated behavior ranging from apprehension or anxiety, to self-removal of indwelling tubes or frankly combative behavior that are potentially life-threatening. Identification of patients at particularly high risk for developing agitation would provide an opportunity to implement preventative strategies to protect patients from self-induced injury. However, there are few data to identify those at risk. **Methods:** Retrospective chart review of 83 subjects admitted to the MRICU in a 1-month period included medical/medication history, admitting diagnosis, severity of illness, frequency of agitated behavior, and number of tubes and lines pulled. Data were collected for 274 patient days of ICU stay. **Results:** Subjects' mean age was 50, and they were primarily male (55%), with an Acute Physiologic and Chronic Health Evaluation (APACHE) II score of 20.3, and an ICU length of stay of 5.9 days. Of the 83 subjects, 35 (42%) were agitated during at least 1 day of their ICU stay. Agitation was observed 32% of the time (n=86 days). APACHE II scores were significantly greater (23.8 vs 17.5;  $P = .002$ ) in those subjects who

experienced agitation during their ICU stay compared with those who did not. Daily multiorgan dysfunction scores (MODS) were also higher (8.2 vs 6.8;  $P = .002$ ) on days when subjects were noted to exhibit agitated behavior. The pulmonary ( $P = .001$ ), cardiovascular ( $P < .001$ ) and neurological ( $P < .001$ ) subscores of the MODS were higher in agitated subjects. No relationship was found between presence of agitation and age, sex, admitting diagnosis, history of psychiatric disorder or alcohol/drug abuse. **Conclusions:** Patients with greater levels of illness severity appear to have greater risk for agitation developing.

#### **Determining Correlation Between Clinical and Electroencephalogram (EEG)-Based Sedation Assessment**

*Arbour R, Bucher L, Seckel M, Waterhouse J. Christiana Care Health System and the University of Delaware, Del.*

**Purpose:** To evaluate correlation between clinical assessment of sedation using the Sedation-Agitation Scale (SAS) and an electroencephalogram (EEG)-based parameter, the bispectral index (BIS). **Background/Significance:** Oversedation masks neurological changes and increases mortality/morbidity. Undersedation risks prolonged stress mobilization and patient injury. In situations such as deep sedation/analgesia, an adjunct to clinical assessment of sedation using BIS may be useful in determining depth of sedation and navigating between sedation extremes. Determining correlation between clinical and EEG-based measures of sedation may validate BIS for use in practice. **Methods:** Intensive care patients meeting inclusion criteria were monitored using the SAS and BIS. Nurses assessing sedation level were blinded to BIS values. To generate paired measurements, data collectors initiated event markers with BIS at the time of SAS assessment. SAS values were extracted from medical records and corresponding BIS data from monitor downloads. Statistical analysis was performed on the paired observations to determine correlation. **Results:** Data were collected on 40 subjects, generating 209 data points. Moderate positive correlation between BIS and SAS values was shown with a Spearman rank coefficient ( $r$ -) value of .502 and an  $r^2$  of .252 ( $P < .001$ ). Strong positive correlation was noted between BIS and electromyography (EMG) with an  $r$ - value of .749 ( $P < .001$ ). **Conclusions:** In situations where the clinical assessment is compromised or equivocal, BIS monitoring may have an adjunctive role in sedation assessment given the moderate positive correlation between BIS and SAS. BIS values should be interpreted with caution, however, because EMG activity remains a potentially significant confounding factor that may produce BIS elevations independent of level of sedation. More research is necessary to determine the optimal role of BIS monitoring in intensive care units. **Sponsored by:** AACN/Sigma Theta Tau Critical Care Research Grant.

#### **Adopting Technology to Enhance Patient Care**

*Baker K, Bokovoy J, Soete R, Matchett S. Lehigh Valley Hospital & Health Network, Pa.*

**Purpose:** To evaluate the impact of an intensive care information system (ICIS) on nurse workflow in a medical-surgical intensive care unit (ICU) and a trauma ICU. **Background/Significance:** Several studies have been done to evaluate the

impact of an ICIS on nursing workflow. Using a combination of these earlier reported workflow sampling methods, our study evaluates ICU nurse workflow on all shifts, including weekdays and weekends at random times. **Methods:** We used workflow sampling methods to randomly evaluate frequency of nursing workflow activities on all shifts in 2 ICUs during a 2-week period before and after ICIS implementation. Workflow observations were done in January 2004 and in April 2005, and ICIS went live in June 2004. Activity types were defined using previous research. These activities were then grouped under the following 4 categories: (1) patient care, (2) documentation, (3) unit-related, and (4) personal. **Results:** At baseline, 1373 activities were observed and after the ICIS was implemented, 1249 activities were observed. Using  $\chi^2$  analysis, the distribution of before and after values for all 4 categories were significantly different ( $P < .001$ ). Unit-related, documentation and personal categories decreased 2.8%, 2.8% and 4.8%, respectively, whereas patient care increased by 10.4%. Extrapolating data to a theoretical 24-hour shift, percentages of observation were converted to minutes. **Conclusions:** The use of ICIS to support patient care in 2 ICUs improves nursing workflow. It reduces the time for documentation and increases time for direct patient care.

#### **The Course of Delirium in Older Patients in Surgical Intensive Care Units**

*Balas M. University of Pennsylvania School of Nursing, Pa.*

**Purpose:** To examine the frequency, course, and duration of delirium in older adults admitted to surgical intensive care units (SICUs). A secondary objective was to compare delirious and nondelirious subjects with respect to hospital and SICU length of stay (LOS), mortality rates, postdischarge institutionalization rates, and discharge functional and cognitive ability. **Background/Significance:** Delirium is one of the most frequent, dangerous, and costly complications associated with hospitalization in the older adult population. Prior studies on delirium, however, lacked data on the course of delirium in older adults admitted to SICUs. **Methods:** The sample included 114 subjects aged 65 and older admitted to the SICUs of a 672-bed university teaching hospital. Baseline characteristics were obtained through surrogate interviews and medical chart reviews. Subjects were screened for evidence of dementia and impairment in activities of daily living by using validated surrogate-rated instruments. Subjects were screened for delirium daily throughout their hospitalization. The subjects' functional and cognitive ability and postdischarge placement were assessed within 24 hours of hospital discharge. **Results:** Eighteen percent of older adults were found to have evidence of dementia on admission to the SICU. This diagnosis was frequently unrecognized by both healthcare providers and the elders' surrogates. While few elders (2.6%) were admitted to the SICU with evidence of pre-existing delirium, 28% had delirium develop during their SICU stay and 23% after their SICU stay. Delirious older adults had significantly longer hospital and SICU LOS, more frequent discharge to institutional care, and decreased functional ability at hospital discharge than did nondelirious elders. **Conclusions:** Delirium is a significant clinical and societal problem in need of further exploration and intervention. Future research is needed to elucidate the exact role delirium plays in the outcomes of older

adults admitted to SICUs. **Sponsored by:** John A. Hartford Foundation Building Academic Geriatric Nursing Capacity Predoctoral Scholarship, AACN Educational Grant.

### **The Experience of Critically Ill Patients Receiving Neuromuscular Blocking Agents**

*Ballard N, Robley L, Barrett D, Fraser D, Mendoza I. Wellstar Health System, Ga.*

**Purpose:** To understand the remembered experiences of persons who are given neuromuscular blocking agents and sedatives and/or analgesics to facilitate mechanical ventilation, improve hemodynamic stability, and improve oxygenation while in the critical care unit. **Background/Significance:** Neuromuscular blocking agents, used in the critically ill for therapeutic purposes, paralyze patients but leave them fully conscious. Sedatives and analgesics are necessary to reduce awareness, relieve fear, produce comfort, decrease anxiety, induce unconsciousness, and minimize latent complications such as posttraumatic stress syndrome. The extent to which patients experience awareness during therapeutic paralysis has been the subject of very little research. **Methods:** A phenomenological approach using in-depth interviews with 11 participants was employed. Data were analyzed by applying the constant comparative approach. **Results:** Four themes and 3 subthemes were identified from the data. The first theme was back and forth with a subtheme of having weird dreams. The second theme was loss of control, with subthemes of fighting/being tied down and being scared. The third theme was almost dying, and the fourth theme was feeling cared for. **Conclusions:** Patients can recall both negative and positive experiences during neuromuscular paralysis. Healthcare professionals are encouraged to search for improved assessment parameters, advocate for the development and use of sedation/analgesia guidelines and invest in quality improvement programs to assess for awareness during therapeutic paralysis and provide follow up and referral as necessary. **Sponsored by:** Sigma Theta Tau Mu Phi Chapter.

### **The Effects of Massage Therapy on Cardiac Transplant Recipients Following Coronary Angiography**

*Ballew C, Pocanic F, Potts W, Bergin J. University of Virginia Health System, Va.*

**Purpose:** To understand how massage therapy influences pain, anxiety, and overall satisfaction in cardiac transplant recipients who undergo coronary angiography. **Background/Significance:** Cardiac transplant recipients commonly undergo routine coronary angiography to evaluate for graft vasculopathy. Studies suggest anxiety is commonly expressed in patients during coronary angiography. Because no published studies about transplant recipients quantify anxiety, pain, and overall satisfaction during the procedure, we evaluated the effects of massage therapy in this unique population. **Methods:** After receiving approval from the human investigation committee, we approached 40 cardiac transplant recipients who were scheduled for routine coronary angiography. After consent was obtained, we randomized subjects into a treatment group (massage) or control group (no massage). Within 40 minutes of returning to the recovery area, all subjects were asked to rate their pain and overall satisfaction with the procedure. Subjects were also

asked to complete the State Trait Anxiety Inventory (STAI). Next, subjects randomized into the treatment group received a 20-minute massage from a licensed massage therapist. Subjects in the control group received no massage. Forty minutes after completing the baseline questionnaires, all subjects were asked to again rate their pain and satisfaction and to complete an STAI. A  $\chi^2$  and Fisher exact test were used to analyze the data. **Results:** No demographic differences between the groups were found. Subjects in the treatment group had a significant reduction in anxiety scores ( $P \leq .05$ ) and a trend toward pain reduction ( $P = .07$ ). Overall satisfaction with their angiography experience did not differ between the groups ( $P = .3$ ). **Conclusions:** It appears that massage therapy in this population helps reduce patients' anxiety. These results validate the need for more research in the area of understanding patients' coronary angiography experience.

### **Factors Associated With Prolonged Prehospital Delay Time in African Americans With an Acute Myocardial Infarction**

*Banks A, Dracup K. University of San Francisco and University of California, San Francisco, Calif.*

**Purpose:** To characterize the symptom experience of African Americans after an acute myocardial infarction (AMI). **Background/Significance:** Research to date has shown prolonged delays from onset of symptoms to arrival at the hospital in African Americans experiencing an AMI. **Methods:** African Americans ( $N = 61$ ) diagnosed with an AMI were interviewed on average 2.6 (SD 1.1) days after hospital admission. Patients were aged 60 (SD 12) years on average and 52% ( $n = 32$ ) were women. Patients were interviewed using a structured interview. Delay times were calculated from patient interview. **Results:** Median delay time was 4.3 hours and did not differ significantly between women and men (4.4 hours vs 3.5 hours). Most patients (69%) experienced their initial symptoms at home with the most common witness being a family member (36%). The ambulance was the most common means of transportation to the hospital (59%) with higher use among women (52.8%) than men (47.2%). Three factors were associated with increased delay times: insurance status, marital status, and diabetes. Median delay time for insured patients was longer than that for uninsured patients (4.5 vs 0.5 hours,  $P = .03$ ). Single patients had longer median delay times than did married patients (5.3 vs 2.5 hours,  $P = .04$ ), and patients with diabetes had longer median delay times than nondiabetics (7.3 hours vs 3.5 hours,  $P = .02$ ). **Conclusions:** In this sample of African American AMI patients, median delay times were substantially longer than the recommended time of less than 1 hour, making it difficult for most patients to benefit fully from reperfusion therapies. Public education and counseling of patients and their families must be a major strategy in optimizing patients' outcomes and decreasing the time to definitive treatment. **Sponsored by:** National Institute for General Medical Sciences.

### **Temperature Measurement in Critically Ill Adults**

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**Purpose:** To describe the accuracy and precision of oral (OR), tympanic (TYMP), temporal artery (TMPL), and axillary (AX)

temperature measurements compared with pulmonary artery (PA) temperature in critically ill adults. **Background/Significance:** Research is equivocal on the accuracy/precision of non-invasive temperature methods in critically ill adults, particularly for TMPL. **Methods:** Repeated measures design. Inclusion: Patients requiring a PA catheter. Exclusion: oral inflammation/trauma, tympanic membrane not intact/not visualized by otoscopy. Measurements were taken by trained ICU nurses using calibrated thermometers and manufacturer recommendations: OR/AX (SureTemp Plus, Welch Allyn), TYMP (Genius 3000A, Sherwood), TMPL (TemporalScanner, Exergen), and PA (VIP Swan-Ganz Catheter, Edwards). Temperatures were taken in sequence within 1 minute on the same side of the body, and were repeated 3 times at 20-minute intervals. Accuracy, precision and confidence limits (CL) were analyzed. **Results:** 60 critically ill patients (20 females, 40 males, 57 [SD 15] years) with cardiopulmonary disease (medical n = 33; surgical n = 27) were studied. PA temperature range: 35.3-39.4°C. Mean (SD) offset and CL differences were: PA-ORAL (0.09 [0.43]°C; CL = -0.75, 0.93), PA-TYMP (-0.36 [0.56]°C; CL = -1.46, 0.74), PA-TMPL (-0.02 [0.47]°C; CL -0.92, 0.88) and PA-AX (0.23 [0.44]°C; CL = -0.64, 1.12). Percentage of pairs with differences greater than 0.5°C: PA-ORAL 19%, PA-TYMP 49%, PA-TMPL 23%, PA-AX 27%. There was 1 outlier for TMPL (PA > TMPL 2.6-2.9°C). The subject was febrile and diaphoretic with a fan blowing. Intubation significantly increased oral temperatures (OR > PA 0.3 ± 0.3°C). **Conclusions:** The OR and TMPL were most accurate. The AX underestimated PA temperature. The TYMP was least accurate and had the greatest variability. Intubation affected the accuracy of OR measurements, and diaphoresis/airflow across the face may affect TMPL. Further study is needed for the TMPL in patients with fever, sepsis, or trauma and with oxygen delivery via face mask/tent.

#### **Development of Perineal Dermatitis in Critically Ill Adults With Fecal Incontinence**

*Ehman S, Thorson M, Lebak K, Bliss D, Savik K, Beilman G. University of Minnesota School of Nursing and School of Medicine, Minn.*

**Purpose:** To describe the onset and severity of incontinence associated dermatitis (IAD) in critically ill (ICU) adults with fecal incontinence. **Background/Significance:** Incontinent ICU patients are at high risk for IAD. IAD is manifested by redness when less severe and skin loss and secondary infections when more severe. Little is reported about the incidence and characteristics of IAD in ICU patients. **Methods:** Patients in surgical/trauma critical care units at 3 urban hospitals who were incontinent of feces and free of perineal skin damage were recruited for prospective observation of their perineal skin. The hospitals did not have a protocol for IAD prevention/management. Daily visual inspection and DermaSpectrometry of perineal skin was done by the investigators. Nurses reported characteristics of feces and incontinence each shift on a bedside record. Surveillance continued until participants transferred to another unit, received a rectal pouch/tube, or died. **Results:** 15 patients from each hospital were enrolled (n = 45, 34 male); 35 white, 8 African American, and 2 Asian. Patients' mean age was 49 (SD 19) years. Diagnoses were multitrauma = 28,

traumatic brain injury = 6, cerebrovascular accident = 6, abdominal aortic aneurysm = 2, and sepsis = 1. Mean score at admission on the Acute Physiology and Chronic Health Evaluation (APACHE) II was 15 (SD 5). Patients were receiving mechanical ventilation a mean of 66% of observed time. Length of surveillance was 7 (SD 4) days. Of 514 stools, 98% were incontinent and 68% of these were loose/liquid. IAD developed in 35.5% of patients. Time to onset of IAD was 4 (range 1-6) days. Severity of perineal skin redness was mild, moderate, or severe for a mean of 10%, 7%, or 3% of the observed time. Partial tissue loss occurred 7% of the observed time and fungal infections 3.5% of the time. DermaSpectrometer measures and investigator ratings of skin redness were significantly correlated (Spearman's  $\rho = 0.262$ ,  $P < .001$ ). **Conclusions:** IAD is a problem in ICU patients. Its onset is rapid, and its severity is usually mild to moderate. An IAD prevention protocol is recommended. **Sponsored by:** Greater Twin Cities Area Chapter of the American Association of Critical-Care Nurses.

#### **Stroke Knowledge of Patients With Atrial Fibrillation**

*Fowler S, Ruh D. Somerset Medical Center, NJ.*

**Purpose:** To answer the following question: What is the stroke knowledge of patients with atrial fibrillation and is there a sex or age difference in this knowledge? **Background/Significance:** Atrial fibrillation (AF) is the most common sustained arrhythmia encountered in clinical practice. In the United States, about 2.2 million people have AF. Its incidence increases with age and the presence of structural heart disease. It is a major cause of stroke, especially in the elderly. On average, about 700 000 Americans have a stroke each year, and 15% of strokes are related to AF. Assessing patients' knowledge can help healthcare professionals in planning measures directed at prevention. **Methods:** Patients (N = 50) are being interviewed prospectively during hospitalization if they meet the following criteria: (1) 18 years of age and older, (2) atrial fibrillation in admitting diagnosis, (3) alert and oriented at time of interview, (4) medically stable at the time of the interview, (5) English speaking, and (6) able to understand informed consent and provide consent. Patients complete a demographic form and risk factor and stroke knowledge questionnaires (Test Your Stroke IQ). **Results:** Frequencies and percentages for demographic and questionnaire data and mean/range, when appropriate, will be calculated. Differences in questionnaire scores based on demographic variables (eg, sex, age) will be detected with a *t* test. **Conclusions:** Prevention of stroke and management of complications associated with atrial fibrillation targets one of AACN's research priority areas: prevention and management of complications. If critical and acute care nurses are to make their optimal contribution to a healthcare system driven by the needs of patients, we must first understand those needs by asking our atrial fibrillation patients about their stroke knowledge.

#### **The Relationship of Light, Sound, and Rest Periods on Sedation, Physiological Stability, and Movement in Patients Receiving Mechanical Ventilation**

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

**Purpose:** To describe the level of light and sound for patients treated with mechanical ventilation during and outside of unit rest periods and the effect of rest periods on sedation, physiological stability, and movement. **Background/Significance:** The U.S. Environmental Protection Agency recommends hospital sound levels of less than 45 decibels (dB, daytime) and less than 35 dB (nighttime). Sound levels in critical care units average 50 to 60 dB and frequently peak above 80 dB. Recommendations for lighting in hospitals range from 10 to 20 foot-candles (fc). Excessive stimuli may impede recovery and present a barrier to effective sleep. Sedation may be used to blunt environmental stimulation, potentially resulting in oversedation. Rest periods with diminished lighting and sounds are used theoretically to improve patients' rest. **Methods:** Fourteen patients receiving mechanical ventilation (73% female; mean age 55, mean score of 27 on the Acute Physiology and Chronic Health Evaluation II) were studied. All measurements were obtained every 15 seconds. Sound and light were measured by calibrated meters positioned at the head of the bed. Patient State Index (PSI), a processed EEG, was used to determine sedation level, physiological stability consisted of heart rate and respiratory rate, and patients' movement was measured with arm/leg actigraphy. **Results:** A total of 38 165 samples were obtained, resulting in 159 hours of data. The mean light was 5.3fc (SD 4.25). Mean sound was 70.6 dB (range 61-82). During unit rest periods, sound was significantly lower ( $P < .001$ ), and subjects' heart and respiratory rates were lower than during nonrest periods ( $P < .001$ ). Sedation level was lighter during the rest period, and there was no difference in light or patients' movement. **Conclusions:** Although sound levels are above those recommended, they were reduced by use of a rest period and some positive effects on patients were noted. Although significant differences were found, clinical differences in PSI, heart rate, and respiratory rate were small. Further study of the efficacy of rest periods is warranted. **Sponsored by:** Physiometrix, Inc.

**Physiological Stability and Patients' Comfort During Varying Levels of Sedation in Adults Receiving Mechanical Ventilation**  
*Grap M, Sessler C, Best A, Wezel P, Hamilton A, Mellott K, Munro C. Virginia Commonwealth University Schools of Nursing, Medicine and Engineering, Va.*

**Purpose:** To examine the effect of level of sedation on sedation outcomes of physiological stability and comfort. **Background/Significance:** 85% of ICU patients receive sedation to help attenuate the anxiety, pain, and agitation associated with mechanical ventilation. Inappropriately high levels of sedation prolong duration of mechanical ventilation and increase ventilator-associated pneumonia, whereas low levels of sedation place patients at risk for unplanned (self) extubation, hemodynamic instability, and physical injury. Sedation scales are used to assess sedation level; however, the extent to which various levels of sedation actually achieve the goals of physiological stability and comfort is unknown. **Methods:** Fourteen subjects in the medical respiratory ICU were continuously monitored and data were recorded every 15 seconds for a total of 159 patient-hours. Sedation level was measured by using the Patient State Index (PSI; processed electroencephalogram), physiological

stability was documented by using heart rate (HR) and respiratory rate (RR), and comfort was evaluated by using arm and leg actigraphy, a method to detect patients' movement. All data were downloaded for analysis and the percent of time outside normal range for HR, RR, and actigraphy were evaluated. Sedation level was categorized as deep (PSI < 60), mild/moderate (PSI 60-80) or awake/alert (PSI > 80). **Results:** Subjects were predominantly female (73%), with a mean age of 55 years, and admitted for acute respiratory failure. Subjects were physiologically unstable (either HR or RR outside of normal limits) 63% of the time during deep sedation, 56% of the time during mild/moderate sedation, and 56% of the time when alert. The percentage of time patients were moving, which may indicate discomfort, was 2% during deep sedation, 7% during mild/moderate sedation, and 13% while alert. **Conclusions:** Although patients' movement increases as expected with less sedation, physiological stability is not being achieved even with deep levels of sedation. The present methods of sedation evaluation may not be adequate for assessing all domains of sedation efficacy. **Sponsored by:** Physiometrix Inc.

#### **Joint Professional Analysis of a Novel Proton Pump Inhibitor (PPI) Dosage Form**

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**Purpose:** A collaborative evaluation of a novel proton pump inhibitor (PPI) dosage form (Prevacid SoluTab, lansoprazole orally disintegrating tablet, or LODT) conducted by nursing and pharmacy faculty used 3 approaches to analyze pharmacy/nursing tasks and labor/supply costs. **Background/Significance:** Patients requiring acid-suppressing therapy need special dosage forms to accommodate nasogastric (NG) tubes and difficulty swallowing. An alternative to current intravenous (IV) and oral forms could improve patients' care and require less preparation and administration time. **Methods:** A survey of nurses and pharmacists in 5 practice settings assessed usage experience and tasks required to prepare and administer PPIs. Results from 48 surveys were used to develop a simulated Time-and-Motion (TM) analysis of tasks and costs related to 5 dosage scenarios. **Results:** A TM analysis of videotaped pharmacy staff preparing/dispensing doses and nurses preparing/administering doses to Lifeform adult manikins indicated IVs (Protonix IV, pantoprazole, Wyeth) were the most time intensive for pharmacy ( $P < .001$ ) but the least time intensive for nursing ( $P < .001$ ). For nursing, NG administration of both lansoprazole capsule granules and LODT required more time than oral capsules in applesauce or oral LODT, but LODT administration was significantly faster regardless of route. Cost minimization analysis indicated the LODT dosage form offered potentially significant cost savings. Savings for LODT over IV administration were estimated at \$71.57/dose, LODT over oral capsule at \$2.20/dose, and LODT NG over capsule NG at \$2.32/dose. The LODT dosage form also appeared to be easier to administer both orally and by the NG route. **Conclusions:** Cost savings and ease of use associated with this novel PPI dosage form may provide a compelling argument for its use in patients with special PPI needs. **Sponsored by:** TAP Pharmaceutical Products, Inc.

### **Averting High-Risk Dosing Errors Associated With Infusion Pump Programming**

*Jacobs B. George Washington University Hospital, DC.*

**Purpose:** To determine the incidence of averted IV medication errors resulting from utilization of dosing limits during intravenous infusion pump delivery. **Background/Significance:** Of all the medication errors that result in significant harm, 35% are the result of infusion pump errors, with the most common error being incorrect programming of the infusion parameter into the pump. **Methods:** A total of 550 infusion pumps with dose-limiting technology were put in use throughout all departments of George Washington University Hospital. After a study period of 5 months, data logs were collected from a random sample of 150 pumps. The data logs were analyzed for incidence of dose alerts and the medications involved. **Results:** Among 42,837 programmed doses, 122 dose alerts were identified. Twenty-seven doses (22%) were programmed below the allowable dose limit, and 95 doses (78%) were programmed above the allowable dose limit. Of the 122 dose alerts, we felt that 7 represented potentially high-risk dosing errors that could have led to a significant patient event. Medications associated with these 7 “near-miss” events were vasopressin, milrinone, nesiritide, fentanyl, heparin, and oxytocin. **Conclusions:** Dose-limiting technology enabled our hospital to improve patients’ safety by averting potential high-risk medication errors. Dose alerts served as a double-check system for our clinicians when dosing IV medications. In addition, our study helped us identify the need for staff education on the dosing guidelines for particular drugs. Further data collection over a longer period of time is warranted to determine if there is a relationship between incidence of dose alerts and time of day, time of year, and the number of critical IV medications infusing simultaneously.

### **Natural History of Dental Plaque Accumulation in Mechanically Ventilated Adults**

*Jones D, Munro C, Grap M. Virginia Commonwealth University School of Nursing, Va.*

**Purpose:** To describe the pattern of dental plaque accumulation in adults receiving mechanical ventilation. **Background/Significance:** Dental plaque may serve as a reservoir in critically ill patients for potentially pathogenic microorganisms. Accumulation of dental plaque and bacterial colonization of the oropharynx are associated with a number of systemic diseases including ventilator-associated pneumonia (VAP). Understanding the accumulation pattern of plaque in intubated patients is essential to the development of an effective standardized oral care program. **Methods:** Data were collected from 66 critically ill adults who were control subjects in a large clinical trial related to oral care intervention. Subjects were enrolled within 24 hours of intubation; dental plaque was assessed on study days 1, 3, 5 and 7. Dental plaque was measured by using the University of Mississippi Oral Hygiene Index; each tooth was divided into 10 standardized sections, and every section of every tooth was scored (plaque present or absent). A fluorescein plaque-disclosing rinse, visible only in ultraviolet light, was used to enhance discrimination of plaque. **Results:** The sample demonstrated diversity in race and sex. The average length of intubation was 7 days. The mean number of decayed,

missing, or filled teeth was 7.7. Plaque: All surfaces had greater than 50% plaque coverage from day 1 to day 7; lingual surfaces contained the greatest plaque average on all days (>70%); molars and premolars contained the greatest plaque (mean >70%). Systemic antibiotic use on day 1 had no significant effect on plaque accumulation on day 3 ( $P=.73$ ). **Conclusions:** Patients arrive in critical care units with preexisting oral hygiene issues that vary over their stay and theoretically increase their vulnerability to systemic disease. Knowing accumulation trends of plaque will guide the development of effective oral care protocols. Such protocols may decrease length of stay, length of intubation, and hospital costs in critically ill patients. **Sponsored by:** National Institutes of Health.

### **End-of-Life Care: Can We Predict to Prepare?**

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

**Purpose:** To assist nurses in identifying demographics that correlate with comfort care at end of life. **Background/Significance:** We questioned if there was a method to predict when to change the focus of patient care from curative to comfort, thereby enabling staff to better anticipate and tailor end-of-life care. **Methods:** Demographics were kept on 996 patients who died during the past 8 years in a 16-bed intensive care unit (ICU). The patients were divided into 3 categories: full code (FC), do not resuscitate (DNR), and active withdrawal of life support (AW). **Results:** The mean age of death was 67 years (median 68), with 63% of deaths occurring in patients more than 65 years of age. Regardless of the level of care delivered, FC, DNR, or AW, more men than women died (53% vs 47%,  $P<.001$ ). The only outlier was the category of brain death with a total of 6 men and 8 women. Most patients died with an endotracheal tube (ETT) in place (53%). The majority with an ETT were FC (81% died with an ETT). By contrast, only 22% of AW patients had an ETT at the time of death (indicating that the healthcare team was successful in adjusting the focus of care for this subgroup.) The majority of patients did not have a pulmonary artery catheter (PAC) in place. For FC 89%, for DNR 82% and for AW 95% did not have a PAC. The time of day that deaths occurred was distributed relatively evenly: morning 31.4%, evening 36.3%, and night 32.4%. **Conclusions:** This preliminary information has prompted us to take the next step and consider additional analysis to more clearly identify criteria that would enhance our ability to determine the most appropriate level of care for individual patients. Length of ICU stay and cause of death will be examined to ascertain if patients’ outcomes can be more accurately predicted. With this additional information, we hope to be able to foresee patients’ outcomes earlier, allowing us to care for patients as they should be cared for at the end of life—with comfort, dignity, and compassion.

### **How Low Should You Go? Nursing Practice of Aggressive Blood Glucose Management Following Cardiovascular Surgery**

*Kinney T, Frank A, Steinberg K. Mayo Foundation, Minn.*

**Purpose:** To describe the role of intensive care unit (ICU) nurses in the implementation of an aggressive blood glucose management protocol following adult cardiovascular surgery.

**Background/ Significance:** Intense review of the background of hyperglycemia, along with the conventional postoperative hyperglycemic nursing protocol of the adult cardiac surgical population was implemented. The support of evidence-based literature summarizing strict glycemic control displays its significance. **Methods:** A retrospective observational study was completed on 409 consecutive adult patients undergoing cardiac surgery at Mayo Clinic Rochester between June 2002 and August 2002, looking at how much perioperative hyperglycemia affected patients' outcomes. This study led to a prospective insulin study comparing outcomes, length of stay (LOS), and glucose control with 2 strategies: intensive therapy of continuous intravenous infusion of insulin to maintain blood glucose at 4.4 to 5.6 mmol/L (80-100 mg/dL), and conventional glucose management practiced by the ICU nurse. **Results:** Results summarized the insulin study and its effects on primary and secondary outcomes up to 30 days postoperatively. Outcomes compared included prolonged intubation, stroke, heart block requiring pacemaker, new-onset atrial fibrillation, acute renal failure, cardiac arrest, hospital LOS, ICU LOS, and infection. **Conclusions:** The intensive perioperative insulin protocol had no significant change on outcomes when compared with the conventional postoperative protocol. Although no significant change was demonstrated, the importance of aggressive nursing management of postoperative hyperglycemia continues to be a relevant nursing practice.

### Replace the Glasgow Coma Scale?

#### Validation of a New Coma Scale: The FOUR Score

*Miers A, Pfrimmer D, Gusa D. Mayo Clinic-Saint Marys Hospital, Minn.*

**Purpose:** To validate a new coma scale, the Full Outline of Un-Responsiveness (FOUR) score. **Background/Significance:** The Glasgow Coma Scale (GCS) is widely used even though the scale cannot be used to assess the verbal score in an intubated patient or to test brainstem reflexes. A new coma scale, the FOUR score, was recently devised. It consists of evaluation of 4 components (eye, motor, brainstem, and respiration), and each component has a maximum score of 4. **Methods:** An interdisciplinary, prospective study was undertaken to determine tool validity. The FOUR score was tested on 120 intensive care unit patients and compared with the GCS score by interrater pairs of neuroscience nurses, neurology residents, and neurointensivists. **Results:** The overall interrater reliability was .82, which was the same as the reliability of the GCS (.82). The FOUR score provided greater neurological detail than the GCS, allowed recognition of "locked-in syndrome," and was superior to the GCS because it allowed scoring of the brainstem reflexes, breathing patterns, and allowed different states of herniation to be recognized. Evidence also indicated that the probability of in-hospital mortality was higher for the lowest total FOUR scores when compared with the lowest total GCS scores. **Conclusions:** The FOUR score is a valid and reliable assessment tool to evaluate coma status of patients in the intensive care unit. It shows superiority in several areas over the GCS. Further testing is planned to test the tool in the emergency unit and pediatrics. Details of the validation process and subsequent testing will be presented.

### Description of Enteral Feedings in Adults Receiving Mechanical Ventilation

*Munro C, Grap M, Sessler C, Russell S. Virginia Commonwealth University, Va.*

**Purpose:** To describe enteral feedings in critically ill adults during the first 7 days of mechanical ventilation. **Background/Significance:** Nutritional support through enteral feeding is an important aspect of the care of critically ill patients. Because enteral feeding improves clinical outcomes, reduces length of stay, and reduces cost, current recommendations suggest that nutritional support should begin within 24 to 48 hours of admission to the intensive care unit (ICU). However, enteral feeding has been identified as a risk factor for ventilator-associated pneumonia (VAP), particularly when associated with large residual volumes or alkaline pH of gastric secretions. Many questions related to optimal feeding strategies remain. **Methods:** The sample consisted of 296 critically ill adults who were subjects in a large clinical trial related to reduction of VAP. Enteral feeding data were obtained from subjects receiving mechanical ventilation during their first 7 days of intubation in 3 ICUs (medical, surgical-trauma, neuroscience), resulting in 1147 observation days. **Results:** Percentages of subjects receiving enteral feedings increased over time (38.0% day 1, 55.4% day 2, 66.3% day 3, 72.1% day 4, 77.5% day 5, 78.5 day 6, 78.7% day 7). Most feedings were delivered via nasogastric or orogastric tube (86%) and by gastric route (89.4%) rather than small bowel (9.6%). Continuous delivery was more common (84.4%) than bolus feedings (10.4%). Residual volumes greater than 0 were present in 63.3% of observations. Of observations with residual volume, mean residual volume was 107.5 mL (SD 132.5), and 21.0% were greater than 150 mL. Recording of pH was not routine (recorded on only 25.4% of observation days); pH was greater than 7 in 9.6% of documented observations. **Conclusions:** Enteral nutrition support was initiated in most patients by the second day of intubation. The relationships of enteral feeding variables and outcomes in patients receiving mechanical ventilation require further research. **Sponsored by:** National Institutes of Health.

### Bereavement After-Care Project

*Parker L, Clark S, Patterson C, Ulrich L, Caldwell M. Charles F. Kettering Memorial Hospital, Ohio.*

**Purpose:** The current practice in critical care units (CCUs) is that "end-of-life care" ends when the patient dies. The nursing staff is focused on saving the patient's life rather than supporting the families' bereavement process. With the acuity and morbidity of the patients in the CCU increasing, nurses are challenged to assess the steps in the bereavement process. **Background/Significance:** A caring program was developed to address the needs of the bereaved family. This program will help guide them through the process without abruptly ending the ties with the nursing staff at the time of death. **Methods:** After a literature review, a tool was identified to obtain data from the patient's families regarding their needs and formulate their experiences to improve the care given. The survey was created to establish a follow-up program. During the stay in the CCU, a relationship is formed with staff. Information regarding the support groups and community resources are provided. Verbal

permission is obtained to continue contact. Communication via notes and telephone calls to the bereaved person(s) is scheduled. Within the first year, a questionnaire and survey regarding the end-of-life care along with the grieving process will be collected and the results will be shared with the CCU staff. **Results:** When we give support to the community in regards to education and resources, the grieving process has less of an impact. Grieving persons reestablish ties within their communities, families, and jobs at a faster pace. Children are quickly acclimated into their social and academic environment. CCU nurses have a better rapport, knowing that our family-centered support system is intact and ongoing after the grieving person leaves the CCU. **Conclusions:** The survey results from the families will provide information that will be used to assess the bereavement program. Adjustments will be made to the program as needed. Continued improvement during the second stage of bereavement is expected.

### **Development of a Scale to Measure the Risk of Skin Breakdown in Critically Ill Patients**

*Rose P, Cohen R, Amsel R. McGill University Health Centre and McGill University, International.*

**Purpose:** To develop a scale that assesses the risk of skin breakdown in critically ill patients and to test its feasibility, reliability, and validity. **Background/Significance:** Critically ill patients are at risk of developing skin breakdown. Scales currently used to measure this risk do not include factors specific to critical illness. Scales that have been explicitly developed for use with this population demonstrate serious limitations. **Methods:** Generation and preliminary reduction of scale items was done through literature review, clinical observations, and 5 focus groups of staff. The 36-item scale was tested on a consecutive sample of 111 patients admitted to the intensive care unit (ICU) of a university teaching center. Data collected included baseline chart data, assessment of risk of skin breakdown using both the Braden scale and the 36-item scale, and assessment of skin integrity. Risk and skin assessments were independently rated so that data collectors remained blind to the other measures. Assessments were performed within 48 hours of admission and every 2 days until day 8. Data collection ceased if a pressure ulcer developed or the patient died, went home, or was transferred to another institution. **Results:** Interrater reliability, estimated by calculating percentage agreement on 10% of the sample, was 0.93. Content and face validity of the scale were supported by reliance on scientific literature, expert opinions, and clinical observations to develop items. Comparison of sensitivity and specificity of the 36-item scale and the Braden Scale provided an estimate of concurrent validity. Multiple regressions determined which group of items best predicts pressure ulcers: skin quality, restricted movement, and temperature. This 3-item scale demonstrates better sensitivity and specificity than the Braden Scale. **Conclusions:** This research suggests a practical 3-item scale that provides clinicians with a reliable and valid tool to identify those critically ill patients at risk for skin breakdown. **Sponsored by:** Newton Foundation, Canadian Nurses' Foundation, and the Foundations of the Montreal General Hospital, Royal Victoria Hospital and Montreal Childrens' Hospital.

### **Symptom Clusters in Acute Myocardial Infarction**

*Ryan C, Devon H, Horne R, King K, Milner K, Moser D, Quinn J, Rosenfeld A, Zerwic J. University of Illinois at Chicago, Ill.*

**Purpose:** To identify common clusters of symptoms in a population of people with acute myocardial infarction (AMI) and to compare symptom clusters across demographic groups. **Background/Significance:** Previous studies identifying AMI symptoms have indicated that people do not experience single symptoms but rather a constellation of symptoms. However, clusters of symptoms have yet to be identified. **Methods:** The sample for this study consisted of AMI symptom data obtained from 9 different researchers (1073 subjects) in the US and the UK. The data were originally collected for purposes other than clustering during face-to-face interviews with persons who had recently experienced AMI. **Results:** Twelve common symptoms and 5 clusters were identified. Age ( $P < .001$ ), sex ( $P = .047$ ), and race ( $P = .03$ ) were covariates that described the clusters. Persons in cluster 1 had a high probability of experiencing chest pain, upper extremity pain, sweating, weakness, and fatigue. Persons in cluster 2 had a high probability of experiencing chest pain and a moderate probability of experiencing upper extremity pain and sweating. Persons in cluster 3 were likely to suffer the most symptoms, with a high probability of experiencing chest pain, upper extremity pain, indigestion, nausea/vomiting, shortness of breath (SOB), sweating, dizziness, weakness, and fatigue. This group was the youngest (mean age 51.2 years). Persons in cluster 4 had a high probability of experiencing chest pain, abdominal pain, and indigestion and a moderate probability of experiencing SOB and sweating. Persons in cluster 5 did not have a high probability of experiencing any symptom. They had a moderate probability of experiencing chest pain and SOB. This group was the oldest (mean age 70.76 years) and included the largest number of minority subjects. **Conclusions:** Identification of common clusters of AMI symptoms is essential for education regarding prompt recognition of symptoms and for a reduction in the number of unnecessary AMI workups that are commonly done in emergency departments. **Sponsored by:** UIC Center for Reducing the Risks for Vulnerable Populations.

### **The Effect of Comprehensive Oral Hygiene and Position on Ventilator-Associated Pneumonia**

*Salapata B, Frazier C, Harrington M, Larkins N, Lowenthal M, Zongolowicz D. Frankford Hospital, Pa.*

**Purpose:** To determine the effectiveness of comprehensive oral hygiene and maintaining the semirecumbent position in patients who are receiving mechanical ventilation in decreasing the incidence of ventilator-associated pneumonia (VAP). **Background/Significance:** VAP is the most common nosocomial infection acquired in the intensive care unit (ICU) and occurs in 21% of intubated patients any time after 48 hours of intubation. Among critically ill patients, pneumonia prolongs the duration of mechanical ventilation and ICU days and increases the risk of mortality. On average, pneumonia increases the hospital length of stay by 7 to 9 days per patient. **Methods:** A retrospective chart review of 100 patients receiving mechanical ventilation before the interventions of maintaining semirecumbent position and standardized oral hygiene protocol are insti-

tuted will be conducted to determine the incidence of VAP in this group. Another retrospective chart review of 100 patients receiving mechanical ventilation will be conducted after these interventions have been instituted to determine the incidence of VAP in this group. Frequencies and percentages will be used to analyze the demographic information. Means and SDs will be used to summarize the number of VAP diagnoses. A *t* test will be used to test differences in the number of VAP diagnoses before and after the nursing interventions of oral care and maintenance of semirecumbent position. **Results:** Data collection, after interventions, was completed as of August 19, 2005. Medical records are being reviewed for demographic information. These medical record numbers will be given to the infection control department to determine which of these patients had VAP develop. **Conclusions:** Data analysis and research results will be completed.

#### **Drotrecogin Alfa (Activated) and Two Types of Heparin: Effect on Mortality and Venous Thrombosis**

*Schlichting D, Short M, Booth F. Eli Lilly and Company, Ind.*

**Purpose:** To demonstrate that concomitant treatment with heparin is equivalent to treatment with placebo as determined by 28-day all-cause mortality in adults with severe sepsis who are receiving drotrecogin alfa (activated) (Drot AA). A secondary objective is to examine effects on deep venous thrombosis (DVT). **Background/Significance:** The role of Drot AA in prevention of DVT and the effect of simultaneous use of heparins on mortality has not been established. Theoretical concerns exist surrounding co-administration of Drot AA with prophylactic heparin. Each has anticoagulant properties and may increase the rate of serious bleeding. Some *in vitro* studies have shown increased inhibition of activated protein C activity in the presence of unfractionated, or low-molecular-weight heparin, albeit under high-local concentration conditions. Thus, co-administration of heparin might increase the clearance rate of Drot AA, resulting in subtherapeutic dosing. **Methods:** Patients at high risk of death due to severe sepsis who were receiving Drot AA at 24 µg/kg per hour for 96 hours were randomized to receive prophylactic unfractionated heparin, low-molecular-weight heparin, or a placebo during the infusion period of Drot AA. Ultrasound examination for DVT was done after the end of Drot AA infusion. Patients were followed up for 28-day survival. **Results:** Between December 12, 2002 and August 2, 2005, 2002 patients with severe sepsis who were assessed as being at a high risk of death were enrolled in this study from 20 countries. In the United States, 102 sites enrolled 827 patients. In Europe, 79 sites enrolled 698 patients; in the rest of the world, 64 sites enrolled 477 patients. **Conclusions:** This study created one of the largest databases of patients with severe sepsis in whom treatment with Drot AA was indicated. Incidence of DVT and its relationship to patients' outcomes will be available as well as patients' characteristics.

#### **Spirituality of Patients in a Cardiovascular Interventional Unit: A Pilot Study**

*Sendelbach S, Melander M, Gaillard P. Abbott Northwestern Hospital, Minn.*

**Purpose:** To explore the spirituality of cardiovascular inter-

ventional patients, to study how the patients' degree of spirituality related to characteristics, and to determine whether patients wanted their providers to pray with them. **Background/Significance:** Studies suggest that a sense of spirituality may relieve anxiety, provide purpose and meaning to life, and enhance health. The World Health Organization declared spiritual care a patient right. A survey of 1 732 562 inpatients, representing 33% of all US hospitals, revealed that patients' satisfaction with emotional and spiritual aspects of care had one of the lowest ratings among all clinical care quality indicators. **Methods:** Using a cross-sectional, descriptive, correlational design, a survey was distributed to patients in a cardiovascular interventional patient care unit. The Spiritual Involvement and Beliefs Scale was used to measure spirituality; 2 investigator-developed questions asked if patients desired their physicians or nurses to pray with them. **Results:** Respondents (n = 106) tended toward a higher degree of spirituality. Only faith affiliation was significantly correlated to level of spirituality, that is, Protestants had higher spirituality scores ( $P = .007$ ) than did subjects with no faith affiliation. When subjects were asked if they wanted their nurse or physician to pray with them, 20.9% to 22.6% agreed mildly to strongly and 47.3% to 49.5% mildly to strongly disagreed. **Conclusions:** Cardiovascular interventional patients tended toward a higher degree of spirituality. However, only 20.9% to 22.6% wanted their nurse or physician to pray with them. Future studies should include development of simplified tools to assess the spiritual needs and an examination of how nurses and/or physicians can most effectively meet the spiritual needs of hospitalized patients.

#### **Teaching an Old Drug New Tricks: Use of Promethazine Gel in Postoperative Cardiovascular Surgery Patients**

*Severance B, Chiappe J, Jones S. INTEGRIS Baptist Medical Center, Okla.*

**Purpose:** To compare the efficacy of intravenous (IV) promethazine (12.5 mg) with that of promethazine (12.5 mg) compounded into a topical gel for the treatment of postoperative nausea and vomiting (PONV). **Background/Significance:** The antiemetic efficacy of generically available promethazine (PMZ) is well established. Animal studies confirming the transdermal absorption of PMZ have inspired the widespread use of compounded PMZ gel in the outpatient setting as an alternative route of administration where IV access is frequently unavailable. Considering IV PMZ's association with necrosis related to extravasation, an alternative route of administration would be beneficial in the cardiovascular surgery (CVS) population. Clinical data are not available and are necessary for the acceptance of PMZ gel as an advantageous antiemetic dosage form in this population. **Methods:** CVS patients were enrolled preoperatively in this institutional review board-approved, double-blind, double-dummy placebo-controlled study. Patients experiencing PONV within 24 hours after surgery were randomized into 1 of 2 treatment groups (IV PMZ + placebo gel or IV sodium chloride solution + PMZ gel). Nausea was assessed at 30-minute intervals after treatment. Treatment failure after 2 doses resulted in administration of a rescue antiemetic. A total of 98 patients were enrolled, PONV developed in 48 patients within 24 hours after surgery, and 24 were randomized to each

treatment arm. The  $\chi^2$  test of independence was used to compare efficacy between treatment arms. **Results:** Efficacy of PMZ (88%) was independent of the dosage form used, as shown by the lack of a statistically significant difference between the treatment arms ( $P > .05$ ). **Conclusions:** PMZ gel compounded in-house (\$0.70/dose) is a cost-effective alternative to IV promethazine (\$1/dose), and its administration to spare the use of the 5-HT<sub>3</sub> receptor antagonists (Zofran at \$14/dose) is a practical option. In this age of cost-containment, the need to provide effective, cost-efficient care demands that all effective treatment options be examined.

#### **Family Involvement With Personal Care in Long-Term Cardiothoracic Surgical Patients in the Intensive Care Unit** *Silvernale M, Williamson M, King C. North Carolina Baptist Hospital, NC.*

**Purpose:** To investigate a nursing intervention involving family members in the personal care of long-term (> 72 hours) cardiothoracic (CT) surgical patients in the intensive care unit (ICU) and how this intervention affects anxiety levels, satisfaction of family members, and patients' length of stay (LOS). **Background/Significance:** A review of the literature revealed studies investigating the needs of family members of the critically ill. However, few studies were found that implemented and evaluated family participation and its effects with adult critical care patients. **Methods:** Surveys before and after the intervention were used to explore the effects of participation with regards to family anxiety and family satisfaction. The sample was obtained in the CT ICU for patients with a LOS greater than 72 hours. Family members were asked to participate if their loved one met the criteria, they were physically able, spoke English, and were willing to provide personal care with direction. Surveys were used before (at time of consent) and after (upon discharge from ICU) the intervention. The surveys consisted of the HADS (Hospital Anxiety and Depression Scale), FAMCARE, and our ICU satisfaction survey. Hospital data were used to assess LOS and readmission. **Results:** In 9 months, 17 families agreed to participate. The HADS revealed 62% of participants had decreased their anxiety level with participation. The FAMCARE and ICU survey revealed 62% of participants were satisfied with participation. The LOS for participants vs nonparticipants was comparable (18 days vs 17 days). Readmission within 30 days was slightly higher in the nonparticipant group than in participants (20% vs 12%). **Conclusions:** Family participation did affect anxiety levels and satisfaction in adult CT patients. From this study, it was determined that this is a feasible area for research. Additional studies should be done on family participation in care of critically ill patients and its effects. **Sponsored by:** AACN Evidence-Based Clinical Practice Grant.

#### **A Simple, Low-Cost Oral Care Protocol Reduces Ventilator-Associated Pneumonia Rates**

*Sona C, Zack J, Schallom L, Schwartzkopf L, Huey W, Mcsweeney M, McMullen K, Mazuski J, Schuerer D, Coopersmith C, Boyle W. Barnes Jewish Hospital, Mo.*

**Purpose:** Implementation of a simple oral care protocol to decrease the frequency of ventilator-associated pneumonia

(VAP) in our 24-bed surgical intensive care unit (SICU). **Background/Significance:** Oral care in ICUs is inconsistent and historically done at nurses' discretion despite the fact that the primary mode of VAP transmission is aspiration of colonized oropharyngeal secretions. **Methods:** The protocol was initiated in June 2004 in our 24-bed SICU that cares for both trauma and general surgical patients. Prestudy VAP rates were collected prospectively for 1 year before implementation by our hospital infection control team. The protocol involved both mechanical removal of plaque and application of an antibacterial agent. Patients' teeth were cleaned with toothpaste and brush for at least 1 minute and then 15 mL of 0.12% chlorhexidine gluconate (CHG) solution was applied to all oral surfaces every 12 hours until the patient was liberated from mechanical ventilation. VAP rates were collected for 1 year after protocol implementation until May 2005. **Results:** The preintervention VAP rate was 5.2 infections/1000 ventilator days. After the intervention, the rate decreased to 2.4 infections/1000 ventilator days ( $P = .03$ ). The total ventilator days were similar in the 2 periods (4606 vs 4158). The number of every type of organism, except *Serratia marcescens* decreased. The overall monthly compliance rate was 81.0%, as assessed by biweekly random audits. At a cost estimate of \$40 000 per VAP infection, the reduction in number of VAP cases by 14 resulted in \$560 000 cost reduction. Also, the cost/day/patient for our oral care protocol is \$0.62. Current commercially available oral care products cost an estimated \$8.50 day/patient, so that is a significant savings. Total cost for implementing this in all SICU patients with 81% compliance was \$2088 for a total savings of \$557 912. **Conclusions:** An effective, simple, and cost-effective oral care protocol successfully reduced VAP rates in our SICU.

#### **Comparison of Ventilation Sedation Protocols Using Dose Minimization Versus Dose Minimization and Daily Interruptions**

*Stewart E, Castillo M, Laine G, Herlihy P, Warren M. St. Luke's Episcopal Hospital, Tex.*

**Purpose:** Dose minimization and daily interruption protocols for continuous infusion of sedatives can decrease duration of mechanical ventilation (DOMV) and ICU length of stay (ICU LOS) in patients requiring mechanical ventilation. **Background/Significance:** Incorporating a daily interruption strategy into the dose minimization sedation protocol has been reported to decrease DOMV and ICU LOS and to improve outcomes. As a part of the implementation process and to evaluate patients' safety, a pilot study was designed to evaluate a daily interruption in our patient population. **Methods:** Ninety-six patients receiving mechanical ventilation were prospectively evaluated in 2 phases using a quasi-experimental design. In phase I ( $n = 56$ ), nurses titrated infusions per protocol based on the Richmond Agitation Sedation Scale. In Phase II ( $n = 40$ ), the protocol incorporated a daily interruption of sedation to facilitate pulmonary and neurological assessments and to evaluate the need for continued sedation. DOMV and ICU LOS for both medical and surgical groups were analyzed using a Student *t* test. Protocol compliance, tracheotomy, and self-extubation rates were analyzed by using  $\chi^2$  analysis. **Results:** Incorporating a daily interruption of sedation produced non-statistically

significant trends toward reduced DOMV, shorter ICU LOS in both medical and surgical patients, and a nonsignificant decrease in tracheotomy rate in medical patients while extubation rates remained flat. In phase II, the mean DOMV decreased 12% and ICU LOS by 47.4%. Eighteen of 40 patients did not require resumption of therapy following an interruption. **Conclusions:** Incorporating a daily interruption of continuous sedation produced trends toward decreased DOMV and tracheotomy rate, with a significant decrease in ICU LOS and no added risk related to patients' safety.

### **Retrospective Review of the Safety of Nesiritide in Children With Congenital Heart Disease**

*Tucker D, Sundberg G, Jacoby K. Children's Hospital of Orange County, Calif.*

**Purpose:** To evaluate the safety of nesiritide use in children with congenital heart disease. **Background/Significance:** Nesiritide is the first new drug in over a decade to be approved by the Food and Drug Administration for treating acute congestive heart failure. It improves hemodynamic function and clinical status in adults. Most recent meta-analysis found nesiritide to be associated with increased risk for renal dysfunction requiring medical intervention along with increased risk of death. However, these findings have not been studied in children. **Methods:** Charts were retrospectively reviewed and the safety of nesiritide use was evaluated. Data collected included the patient's sex, age, diagnosis, date and type of surgery (when applicable), nesiritide start/stop time, date, and dose, mortality at discharge, 30- and 180-day survival, creatinine levels before, during, and after nesiritide infusion, use of dialysis and nephrotoxic agents, toe temperature before and during nesiritide therapy, vasoactive support before and during nesiritide therapy, supportive fluid boluses, urine output before, during, and after nesiritide infusion, use of diuretic therapy before nesiritide infusion. **Results:** In 60 patients with congenital heart disease receiving nesiritide infusion, data revealed no increase in patient mortality or renal failure compared with patients who did not receive nesiritide. Further studies are indicated to determine appropriate use and dose therapy in children. **Conclusions:** Because of the retrospective study design, relationships between multiple variables could not be evaluated for relationship significance. A second limitation of this study was inconsistent dose therapy. Further prospective studies are needed to establish the significance of the relationship between variables and recommendations to determine appropriate use and dose therapy in children.

### **Use of Cues by Expert Pediatric Critical Care Nurses in Making Judgments Related to Endotracheal Suctioning**

*Thomas M. Children's Hospital of Eastern Ontario, International.*

**Purpose:** The study was conducted to describe the cues that expert pediatric critical care nurses (CCNs) use in making judgments about endotracheal suctioning (ETS). **Background/Significance:** Nursing practices related to suctioning intubated children receiving mechanical ventilation vary depending on unit routine and on patients' needs. Recent practice guidelines give no specific directions as to the indications or frequency of ETS. How expert CCNs make judgments about ETS has not

been fully explored. **Methods:** A qualitative, naturalistic study of 7 expert CCNs was conducted in a Canadian pediatric critical care unit. Data collected during direct practice using 3 methods—participant observations, thinking aloud (concurrent verbalizations), and semistructured interviews (retrospective verbalizations)—were transcribed for content analysis using Bernard's techniques. **Results:** CCNs used a nonlinear and iterative core process of cue utilization to determine the need to suction. Two cognitive activities—cue recognition and weighing the evidence—contributed to use of cues. Cues that nurses recognized were grouped into 2 categories: perceptual awareness (visual, auditory, and tactile cues) and knowing (cues derived from knowledge of this type of patient, this particular patient, and this practice environment). Once recognized, CCNs considered the significance of the cues in the process of weighing the evidence as part of making the judgment to suction. **Conclusions:** As the cues for ETS derived from this analysis are more numerous and complex than those identified by current nursing resources, it is recommended that practice guidelines consider evidence from the practice of clinical experts as well as from empirical studies. Practice environments should support strategies that enable nurses to develop multiple ways of knowing particular patients (verbal face-to-face report, consistency in patient assignments) to enhance the recognition and use of cues in making clinical judgments. **Sponsored by:** Research Institute, Children's Hospital of Eastern Ontario.

### **Pain Management in Cardiothoracic Patients: Then and Now!**

*Wall W. Wake Forest University Baptist Medical Center, NC.*

**Purpose:** To ensure that cardiothoracic patients are receiving proper pain management after their surgery, and to address any issues that are identified to improve pain management. **Background/Significance:** Presently in the cardiothoracic setting, the plan of pain management is to treat what is being experienced by the patients versus taking a proactive approach to pain management. Although pain is the body's way of identifying that something is wrong, left untreated or undertreated, the person experiences increased levels of anxiety with the end results being decreased concentration, decreased daily activities, and a decrease in the amount of rest and sleep that the body must have in order to heal itself. All of these reactions within the human body threaten the recovery progress for these patients; it is the goal of this study to identify dilemmas in the current treatment of pain. **Methods:** The sample size will be 30 to 40 patients in phase 1 and approximately 30 to 40 patients in phase 2. In these different phases, one group will receive the present-day treatment for pain management and the other group will receive pain management administration around the clock, with additional as-needed medication with the patient determining when it is needed. **Results:** When the 2 phases were compared, a marked decrease in pain levels was noted in phase 2 when pain medication was given around the clock versus a reactive type of pain management. An increase in patient's perception of pain control being above average or excellent was also noted in phase 2. **Conclusions:** The data support changing present-day reactive treatment of pain management to a proactive standard. This standard is directed at all open-heart surgical patients and is one

in which pain management will be started at the time of admission to the intensive care unit. This standard now is pain medication given around the clock for a 24-hour period with additional pain control if needed by the patient.

#### **Use of Physical Restraints in Intensive Care Units (ICUs)**

*Cho Y, Kim J, Kim N, Choi H. Samsung Medical Center, International.*

**Purpose:** To identify the pattern of use of physical restraints and related factors in ICUs. **Background/Significance:** Physical restraints have commonly been used in ICUs for a long time. Several physical and psychological complications have been reported, but we have no formal guidelines for use of restraints. Hence, we needed the fundamental survey to support making guidelines. **Methods:** The data were collected repeatedly from 90 restrained patients out of 215 patients over 7 years old in 6 different ICUs for 2 weeks by using the questionnaires and checklist to find out the ratio, duration, relative factors, and nursing cares. The data were analyzed by  $\chi^2$  test, *t* test, and analysis of variance (SAS program). **Results:** The restraints were used on 31.4% of patients for a mean of 36.76 (SD 55.7) hours. Restraints were used for longer during the night shift than during the day and evening shifts. Mean duration ( $P < .001$ ) and frequencies ( $P < .001$ ) differed significantly among shifts. Both wrists (85.5%) were common sites of application. Nurses usually made the decision to use restraints (93.2%). Alternatives to restraint were used in 32.5% of cases. Use of restraints was noted in the nursing records in only 16.7% of cases. Score on the Glasgow Coma Scale ( $P < .001$ ), restless behavior ( $P < .001$ ), discomfort factors ( $P = .04$ ), medical devices ( $P = .009$ ), and presence of life-sustaining devices ( $P < .001$ ) differed significantly between patients who were restrained and patients who were not. Significant relationships were found between the mean duration of use of restraints and GCS score ( $P < .001$ ), restless behavior ( $P = .006$ ), discomfort factors ( $P < .0001$ ), and medical devices ( $P = .03$ ). **Conclusions:** Main factors in the decision to use restraints were GCS score, restless behavior, emotional state, discomfort factors, medical devices, and life-sustaining devices. The level of observance of guidelines was low. Therefore, it is important for guidelines on the use of restraints to be developed, taught, and followed.

#### **Complex Care Nursing: Enhancing Technology in Nursing Education**

*Bittner N. Regis College, Mass.*

**Purpose:** To evaluate the outcome of a technology-enhanced educational offering for nurses and provide a model for peer educators in practice for developing technology-enhanced programs. **Background/Significance:** Greater use of technology and flexibility meet the unique needs of adult learners within nursing practice and education. Educators in practice and academic settings are turning to technology to address this need, but little evaluation has been done on the effectiveness of technology-enhanced learning. **Methods:** A hybrid course, defined as a combination of face-to-face meetings with online instruction, was developed and conducted with 13 nurse participants. The participants were then electronically surveyed. **Results:** All participants rated the program as encouraging learners to

take responsibility for their own learning. Participants reported that 92% found this course stimulating, 70% were more comfortable participating in discussions, 70% found this course helpful in managing large complex tasks, 92% felt they worked at their own pace, 100% agreed the course encouraged creativity, 92% felt they reflected more before engaging in discussions, 46% felt they spent too much time on the computer, and 15% felt the time on the computer was not worth the benefit.

**Conclusions:** Presently, many practice institutions and nursing programs use web-based software for course and program delivery. Web-based software used covers a wide range from information reservoirs to multifaceted applications of content delivery. Increasing flexibility in educational programs through technology-enhanced courses will attract adult learners to educational programs in nursing and aid in retention and progression of nurses in their professional development.

#### **Transforming Pediatric Resuscitation in the Community Hospital Setting: Exploring Barriers and Strategies of Care**

*Fleener M, Felker B, Laughlin J. Bloomington Hospital, Ind.*

**Purpose:** Optimal pediatric resuscitation in community hospitals requires collaboration, leadership, and commitment of all healthcare professionals. This project focused on the perceptions of responding healthcare professionals regarding barriers to adequate resuscitation. **Background/Significance:** As experienced Pediatric Advanced Life Support (PALS) instructors, we have noted that in rural communities where pediatric resuscitation is an infrequent occurrence, inadequate preparation may contribute to insufficient clinical skills and poor outcome. **Methods:** Using a retrospective, qualitative study, we surveyed physicians, respiratory therapists, and nurses to obtain their perception of skills, pediatric equipment availability, and continuing education. **Results:** Seventy-nine participants responded to the survey. Surveys were returned from 20 physicians, 1 oral surgeon, 7 respiratory therapists, and 39 nurses. The responses demonstrated the average individual resuscitation exposure to be 1 to 2 annually. Less than 89% stated that they had adequate pediatric equipment. Only 47% were current in PALS certification. Twenty percent stated that they would feel comfortable in a pediatric emergent situation. No more than 44% of respondents participated in pediatric mock codes or practice sessions. **Conclusions:** Because of the infrequency of pediatric resuscitation in rural communities, a great need exists for increased awareness of the significance of adequate preparation before the event. This preparation must consist of availability of pediatric equipment, participation in pediatric continuing education, and frequent skill practice. Healthcare workers are in a prime position to develop strategic platforms to meet this need for pediatric patients, their families, and their communities. As a result, our community hospital's improvement processes include increasing the awareness of the need for PALS, use of a rapid response team and flexibility in the continuing education offerings.

#### **Nurse-Driven Standards of Unit-Specific Knowledge**

*Starkweather A. Washington State University Intercollegiate College of Nursing, Wash.*

**Purpose:** To determine whether teaching neurocritical care staff nurses how to use complex neurological assessment tools

would increase understanding, use of the tools, and communication between staff nurses and physicians. **Background/Significance:** Staff nurses in our multidisciplinary quality initiative meeting identified content in which they had never received formal training. This included how to use several complex assessment tools (Grading System of Fisher, Hunt and Hess Classification of Subarachnoid Hemorrhage, Seizure classification, House and Brackmann Scale, National Institutes of Health Stroke Scale). **Methods:** A pretest, posttest design was used. Following the pretest, the acute care nurse practitioner provided in-service training sessions to teach staff how to use the assessment tools appropriately, the implications and prognostic features, and how to document the tools. Posttests were administered to staff 2 weeks after the pretest and 6 months after the pretest to assess for short-term and long-term retention. In addition, staff nurses were interviewed about their use of the information from the educational sessions and how it affected their daily work. **Results:** Results from the pretest among the intensive care unit staff (N=28) was 50% or 11 out of 22 questions answered correctly. Posttest results were 100% or 22 out of 22 questions answered correctly. The floor staff (N=20; total N=38) pretest scores were 41% or 9 out of 22 questions answered correctly. Posttest scores on the floor were 95% or 21 out of 22 questions answered correctly. Nurses verbalized that this program was very useful and helped to increase their knowledge and skills in taking care of their patients. **Conclusions:** Establishing the learning needs of neurocritical care nursing staff who have various levels of experience and skills can be a tremendous undertaking. However, using a nurse-driven approach that gave staff nurses the ability to voice their opinion and have a part in the learning process made this project successful.

#### Accuracy of ScvO<sub>2</sub> Catheters in Critically Injured Trauma Patients

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**Purpose:** Describe differences in continuous central venous oxygen saturation (ScvO<sub>2</sub>) measured by Vigilance monitor compared with mixed venous blood gas values measured by co-oximetry. **Background/Significance:** ScvO<sub>2</sub> catheters have not been studied extensively in the trauma population. A clinically significant amount of variation was observed in the ScvO<sub>2</sub> when used during trauma resuscitation. The catheters' accuracy was questioned. **Methods:** A convenience sample of 14 critically injured adult trauma victims with an ScvO<sub>2</sub> catheter placed during resuscitation were studied. The ScvO<sub>2</sub> value from the Vigilance catheter and a simultaneously obtained blood specimen from the distal port of the catheter positioned in the vena cava were collected at 5 time points during the initial 36-hour period. The blood specimen was analyzed by co-oximetry. A difference greater than 3% between the Vigilance and co-oximetry ScvO<sub>2</sub> values was considered inaccurate. Data were analyzed using paired *t* test and Bland Altman plot. **Results:** A total of 33 pairs of data were collected. Adequate sample size was available at insertion (time 1) and time 2 (mean 9.4 [SD 3.8] hours after insertion). Co-oximetry values were 77% (SD 10%) for time 1 (range 58%-94%) and 80% (SD 9%) for time 2 (range 63-96%). Bias, precision, and confidence limits (CL) were as follows: at insertion (n=12 pairs; 3.4 ± 6.3%; CL=0.58,

7.42, *P*=.09) and at time 2 (n=11 pairs; 0.1 ± 13.9, CL=-9.2, 9.4, *P*=NS). A difference exceeding 3% was seen in 42% of pairs and 13 of 14 patients had a difference of more than 3% in at least 1 of 5 pairs. **Conclusions:** Vigilance ScvO<sub>2</sub> values were not accurate in 42% of pairs. Possible contributing factors included incorrect catheter placement and interference from the introducer. Use of ScvO<sub>2</sub> as an indicator of the adequacy of resuscitation in trauma victims needs further study. Studies should include larger sample size earlier in resuscitation, along with methods to verify catheter placement, and not using an introducer. **Sponsored by:** Edwards LifeSciences.

#### The Mind-Body Connection in Patients With Traumatic Injury: Prevalence of Psychiatric Disorders

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**Purpose:** This study ascertained the life history and prevalence of current psychiatric disorders in patients sustaining traumatic injury. **Background/Significance:** Traumatic injury and psychiatric disorders both rank in the top 10 contributors to the global burden of disease. Yet, patients with traumatic injury are not routinely screened for past or concurrent psychiatric disorders. **Methods:** Patients coming to the hospital for traumatic injury were randomly selected to participate in a longitudinal study evaluating the emergence of postinjury psychiatric disorders. The baseline psychiatric profiles of 230 patients with trauma are reported. Interviews were conducted using the Structured Clinical Interview for DSM IV Axis I and II disorders. Symptom severity was assessed by using the Hamilton Anxiety Rating Scale (HAM-A), Hamilton Depression Rating Scale (HAM-D), and the Impact of Events Scale (IES). The Injury Severity Score and Triage Revised Trauma Score were used to categorize injury. Frequencies were used to determine prevalence of past and current psychiatric disorders.  $\chi^2$  and one-way analysis of variance were used to compare groups. **Results:** The majority was male (52%), African American (56%), and single (54%). Mechanisms of injury were falls, motor vehicle crashes, and assaults. Nearly half of the sample (46%) met criteria for a past or current psychiatric disorder. Subjects with a current disorder scored higher on the HAM-A, HAM-D, and IES (*P*<.001) than all others, and subjects with a positive psychiatric history but no current disorder scored higher on the HAM-A, HAM-D, and IES (*P*<.001) than did those with a negative psychiatric history. **Conclusions:** Individuals sustaining traumatic injury bring significant past and current psychiatric problems to the injury event. This finding indicates the importance of conducting a holistic nursing assessment that includes an in-depth psychiatric history, in order to plan for optimal management of injured patients. **Sponsored by:** This research was funded by the National Institutes of Mental Health.

#### A Retrospective Review of Donation After Cardiac Death (DCD) in the United States: 1994-2004

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**Purpose:** This 11-year retrospective review (1994-2004) describes the changing status of donation after cardiac death (DCD) in the United States. **Background/Significance:** DCD

provides the opportunity to donate organs after the decision has been made to discontinue a patient's life support. Former US Secretary of Health, Tommy Thompson, through the Organ Donation Breakthrough Collaborative, brought national organizations (including the AACN), critical care staff, hospital administrators, and other health professionals together to focus efforts on increasing organ donation and the number of DCD donors. **Methods:** Data from deceased brain dead (BD) and DCD donors reported to the Organ Procurement and Transplantation Network/UNOS database between 1994 and 2004 were reviewed. DCD donor characteristics were identified and compared, and Kaplan-Meier survival rates for BD and DCD kidney and liver transplants were calculated. **Results:** Of the total 59 738 deceased organ donors, only 1569 (2.63%) were DCD donors. In 1994, there were 5362 deceased donors with 64 (1.2%) DCD donors; and in 2004, 7150 donors with 391 being (5.5%) DCD donors. In 1994, demographic data indicate that 255 were male and 136 female; 7 donors were under the age of 5; 34 donors were between 6 and 17; 98 donors between 18 and 34; 237 between 35 and 64; and 15 were over the age of 65. The major causes of death were head trauma (38.4%), cerebrovascular accident (27.6%), and anoxia (27.4%). There were 566 kidneys, 184 livers, 29 pancreata, and 10 lungs transplanted. Kidney graft survival rates for BD and DCD donors were not significantly different (78.3% and 76.5% at 3 years). However, liver graft survival rates from BD donors were significantly higher than from DCD donors (73.7% vs. 63.2% at 3 years). **Conclusions:** Despite a 610% increase in DCD donors since 1994, a considerable gap remains between the current number of DCD donors and the estimated potential. Continued efforts are necessary to identify patients who might be candidates for DCD. **Sponsored by:** This work is supported by the U.S. Department of Health and Human Services, Health Resources and Services Administration, Division of Transplantation.

### **Terminal Geriatric Patients in the Critical Care Unit: The Impact of a Palliative Care Team**

*Kelly J, Schwartz S, Kelly M, Radice P, Luck G. Boca Raton Community Hospital, Fla.*

**Purpose:** To characterize patients in our 2 critical care units and evaluate the impact of a newly developed palliative care team. Specifically, we were interested in do-not-resuscitate (DNR) status, estimated life expectancy, documented prognosis, length of stay, and discharge location. **Background/Significance:** The patient population in our hospital's critical care units consists primarily of terminal geriatric patients. Despite this, there was no coordinated approach to addressing end-of-life decision making. As a result, the needs of patients/families were not being met sufficiently. A palliative care team was developed to meet these needs. **Methods:** Data on the specific variables of interest was collected on 169 critical care patients referred to a newly developed consultative palliative care service. **Results:** The average age of patients was 76 years. Seventy percent of patients had an estimated life expectancy of less than 1 month; 62% had a documented poor prognosis; 22% had a prolonged length of stay in the intensive care unit (ICU); 53% (N=91) of patients did not have a code status. The involvement of the palliative care team had a number of significant clinical outcomes. The team assisted in obtaining a DNR in 78 of the 91 patients; affected withdrawal

from life prolonging therapies in 24% of cases; facilitated early transfer out of the ICU in 25% of cases; and facilitated a discussion about hospice care with 41% of patients/families. Of the critical care patients referred to the palliative care service, 48% died during the same hospital admission. A total of 23% of patients were transferred to hospice. **Conclusions:** A need for coordinated end-of-life decision making exists in our hospital's critical care units. The palliative care team assisted patients and their families in making difficult and important decisions related to comfort and quality of life at the end of life. We are now developing criteria for all patients to be screened for appropriateness of palliative care upon admission to the critical care unit so that more patients can benefit from our services.

### **Effect of a Workbook and Family Support Service on Emotional Distress, Need Satisfaction, and Resuscitation Decisions**

*Westphal C, Rustom M, Schwartz S, Daly G, Decamillo P. Oakwood Healthcare System, Mich.*

**Purpose:** Assess the impact of a family support service (FMSS) with or without an interactive workbook (IWB), on emotional distress, need satisfaction, and resuscitation decisions. **Background/Significance:** Critical illness and burdens of decision making may precipitate a crisis within the family. Few studies have examined the impact of methods of communication on outcomes. **Methods:** Subjects were 70 family spokespersons (34 male, 36 female) of adults admitted with life-threatening events. Medical record numbers were used to assign groups. Demographic data were obtained from medical records and interviews. Several tools were used to assess family resources, needs, emotional distress, and patients' medical complexity. Time spent in FMSS interactions was measured as care units (CU), care days (CD), and care intensity (CI=CU/CD). **Results:** The sample consisted of 4 assigned groups and 2 groups self-selected by crossover to the FMSS intervention: no FMSS/no IWB (N=5), FMSS/no IWB (N=8), FMSS crossover/no IWB (N=9), IWB only (N=12), IWB/FMSS (N=19), IWB/FMSS crossover (N=17). Groups did not differ in patient's medical history, mortality risk, medical complexity or mortality. Group differences in CU, CD, and CI ( $P < .01$ ) were noted. FMSS intervention, regardless of IWB or crossover, was associated with more decisions to limit resuscitation ( $P < .01$ ) with trends noted for decreased nursing home transfer ( $P = .09$ ), and increased hospice care ( $P = .07$ ). IWB exposure was not associated with changes in resuscitation decisions. Use of the IWB was 44%. Reading volume, lack of need, and lack of interest were equally cited as deterrents (10%-13%). Pre/post measures of emotional distress (ie, depression ( $P < .06$ ), anxiety ( $P < .001$ ), global distress ( $P < .001$ )) showed positive changes in the FMSS crossover group only. **Conclusions:** Preliminary analyses suggest that FMSS affected decision making and the IWB had limited use or effect. Data analysis is continuing. **Sponsored by:** AACN End-of-Life Research Grant.

### **Family-Witnessed Resuscitation in a Family-Centered Critical Care Unit**

*Wilson C, Anderson D, Toms S, Fleetwood J, Phelps J. St. Francis Hospital and Health Center, Ind.*

**Purpose:** The creation of the new family-centered Cardiovas-

cular Care Center (CVCC) at St Francis Hospital allows the patients' significant others to be with them at all times, if desired. A study was conducted to determine staff nurses' and chaplains' perception of witnessed resuscitation in the critical care unit (CCU), one unit of the CVCC. **Background/Significance:** Family-witnessed resuscitation is becoming more prominent as cardiovascular centers adopt a family-centered approach to patient care. Literature has addressed physician attitudes and nursing practices in the maternal-child and emergency department in regard to family presence during emergency care. However, perceptions of critical care nurses and chaplains who interact with family members during emergencies are lacking. **Methods:** A survey of open- and closed-ended questions modified from prior research was distributed to 55 CCU nurses and 7 chaplains. The items addressed experiences with and perceptions about family-witnessed resuscitation. **Results:** The response rate for nurses was 36% (N=20) and for chaplains 74% (N=5). Overall, 45% and 40% of the nurses and chaplains, respectively were positive about family presence at the bedside during resuscitation. This percentage increased to 80% for nurses and 100% for chaplains regarding family presence with terminal wean or do-not-resuscitate (DNR) patients. **Conclusions:** Family-centered units create the potential for family presence at the time of emergencies, resuscitation, or death. Critical care nurses and chaplains play key roles in providing support for family members in time of crisis. More knowledge and greater acceptance is needed by critical care nurses and hospital chaplains to align with the recommendations from the American Heart Association and the Emergency Nurses Association who support family-witnessed resuscitation.

#### **Development of a Hyperglycemia Protocol for Adult Intensive Care Units (ICUs)**

*Carter-Cole C, Simpson J. Moses Cone Health System, NC.*

**Purpose:** To assess the effectiveness and safety of an "ICU Hyperglycemia Protocol" in a 16-bed adult medical-surgical ICU. **Background/Significance:** Research supports the tighter control of hyperglycemia in the ICU setting. Van den Berghe et al and Krinsley showed a reduction in mortality and other ICU complications when blood sugars were maintained in a more normal range. Furthermore, the Surviving Sepsis Guidelines also recommend a glucose target of 8.3 mmol/L (150 mg/dL). **Methods:** A collaborative team was formed to create and pilot a protocol for the ICU setting. The 2-part protocol initiates a sliding scale every 4 hours; starts basal insulin when blood glucose levels are greater than 8.3 mmol/L (150 mg/dL); initiates intravenous insulin therapy using the Glucomanager (a bedside laptop computer program to regulate insulin infusion rates) when blood glucose level exceeds higher limit targets; and provides a method for transitioning patients back off intravenous therapy. Seventy-five patients followed by the critical care service, and experiencing hyperglycemia, were started on protocol. The protocol underwent four revisions during the pilot. Overall blood glucose target for this project was 80-150 mg/dL. **Results:** Sixty percent of the patients in this pilot had no previous history of diabetes. Version 1 patients demonstrated CBG's within goal range 47% of the time and by Version 4, 63% of patients were within target range. Median blood

glucose level decreased 17%. There was also a relatively low risk of hypoglycemia (0.010%). **Conclusions:** Our successes, however, went beyond just actual glycemic control. Through this collaborative project, hyperglycemia is no longer accepted as just a consequence of being critically ill. Both physicians and nurses are more aware of the ill effects of hyperglycemia and elevations in blood glucose level are treated aggressively. This project's successes will now be taken to all ICU's systemwide to help improve and increase awareness of glycemic control.

#### **Healthy Work Environments, Nurse/Physician Communication, and Patients' Outcomes: Making The Link**

*Manojlovich M. University of Michigan School of Nursing, Mich.*

**Purpose:** To examine the relationships between nurses' perceptions of their work environment, nurse/physician (RN/MD) communication, and patients' outcomes. **Background/Significance:** Miscommunication between RNs and MDs contributes significantly to adverse outcomes in the intensive care unit (ICU). In one ICU study, the most significant factor associated with excess hospital mortality was communication between RNs and MDs. Work environment factors are also important predictors of variation in patients' outcomes. Yet, how RN/MD communication interacts with work environment characteristics to affect outcomes has not been demonstrated. **Methods:** Using a nonexperimental, descriptive design, anonymous surveys were given to all nurses working in 25 ICUs in Southeast Michigan (n = 866). The Practice Environment Scale of the Nursing Work Index (PES-NWI), and the Conditions for Work Effectiveness Questionnaire-II (CWEQ-II) both measured work environment characteristics. RN/MD communication was measured by the ICU Nurse-Physician Questionnaire. Nurses also self-rated the frequency of adverse events in patients under their care. **Results:** A total of 456 nurses (53%) responded. Using multilevel modeling, 47% of the variance in RN/MD communication scores was explained by both practice environment (PES-NWI and CWEQ-II) scales ( $P = .001$ ). RN/MD communication was inversely related to nurses' perceptions of medication errors ( $R^2 = .11$ , log-likelihood -491), but interestingly, not to perceptions of ventilator-associated pneumonia or central catheter blood stream infections. Relationships varied significantly by type of ICU. **Conclusions:** Work environment characteristics strongly affect RN/MD communication. Not all patients' outcomes are equally affected by RN/MD communication, suggesting that other nursing processes should be investigated for their effect on outcomes. Findings provide compelling evidence of the importance of a healthy work environment for RN/MD communication. **Sponsored by:** Blue Cross Blue Shield of Michigan Foundation.

#### **Postoperative Monitoring of Patients With Obstructive Sleep Apnea (OSA): Is the Step-Down Unit Sufficient?**

*Essary J, Halloran T, Trottier S. St. John's Mercy Medical Center, Mo.*

**Purpose:** To help define an appropriate postoperative environment for monitoring patients with OSA or suspected OSA. **Background/Significance:** Recent literature suggests that postoperative OSA patients require closer monitoring because

of increased perioperative complications. However, data evaluating the level of monitoring required to safely care for this patient population is lacking. **Methods:** A prospective study describing the postoperative course of patients with OSA or suspected OSA admitted to an adult medical surgical step-down and intensive care unit (ICU) at a large community teaching hospital was conducted. Body mass index (BMI), use of postoperative continuous positive airway pressure (CPAP), clinically significant complications (myocardial ischemia, reintubation, oxygen desaturation [ $<90\%$  for  $>5$  minutes], arrhythmia) and step-down unit/ICU length of stay (LOS) were recorded. **Results:** A total of 106 patients (55 males and 51 females) with an average age of 52 (SD 10) years were observed. Eighty-four patients (79%) were admitted directly to the step-down care unit. Seventy-six patients (72%) had a BMI exceeding 35 and 78 patients (74%) were known to have had OSA diagnosed with a formal sleep study. General anesthesia was used on 103 patients (97%). Narcotics were used for postoperative pain control in 62% of patients. Postoperative CPAP was used by 36 patients (34%). Fourteen patients (13%) sustained complications. Twelve patients experienced transient desaturation responding to low flow oxygen, 1 patient had non-sustained supraventricular tachycardia, and 1 patient had a respiratory arrest requiring naloxone without intubation. The average LOS was 44 hours. **Conclusions:** Based on these preliminary data, postoperative patients with OSA or suspected OSA may be safely monitored in an environment capable of continuous pulse oximetry and telemetry. Admission to a formal medical surgical ICU to monitor this patient population does not appear to be necessary.

#### **Standardizing Use of Intravenous Infusion Concentrations to Decrease Variability in Concentrations and Medication Errors**

*Bullock J, Jordan D, Gawlinski A. UCLA Healthcare, Calif.*

**Purpose:** The purpose of this study was to determine whether the use of a standardized pediatric intensive care unit (PICU) intravenous (IV) infusion concentration list would result in reduced variability of IV infusion concentrations and medication errors. **Background/Significance:** Medication errors involving PICU patients have potential for serious harm, especially errors involving continuously infused medications or infusions. Inconsistency in following PICU standardized IV infusion concentrations can cause variability in practice that could lead to medication errors. **Methods:** This study used a pretest and posttest design. Data was gathered on a convenience sample ( $n = 49$ ) for 3 outcomes: (1) compliance with following standardized IV infusion concentrations, (2) frequency of a doctor's order stating the concentration, and (3) the number of medication errors related to improper dose and concentration. The intervention consisted of implementing a standardized PICU IV infusion concentration list, with education of all healthcare staff concerning the standardized concentrations. Posttest, the same 3 outcomes were measured ( $n = 51$ ). **Results:** Results showed a decrease in the percentage of patients without standard IV infusion concentrations used from 26% before the intervention to 13% after the intervention. A statistically significant decrease also occurred in the percentage of medication errors related to

improper dose from 52% before the intervention to 25% after the intervention ( $P < .05$ ), and a decrease in the percentage of medication errors due to improper concentration from 23% to 0% ( $P < .05$ ). In addition, there was a decrease in the percentage of patients without a doctor's order stating the IV infusion concentrations from 11% to 9%. **Conclusions:** This project promoted consistent use of standardized IV infusion concentrations. By decreasing variability in practice, the potential for serious medication errors can be reduced.

#### **Screening Tool Effectively Decreases Labwork, Improves Resource Utilization, and Decreases Patients' Waiting Time**

*Zaengle D, Vancamp L, Mcelroy D, Lourdesamy M, Harrison K. Duke University Health System, NC.*

**Purpose:** To determine if a screening tool could accurately and reliably predict the need for standard preprocedural labwork including activated partial thromboplastin time (aPTT) and prothrombin time/international normalized ratio (PT/INR) for patients undergoing elective cardiac catheterization. **Background/Significance:** Patient waiting time for same-day cardiac catheterization is often complicated by system barriers including obtaining laboratory results. We identified a need to streamline the process of patient flow from admission to completion of cardiac catheterization. To this end, we investigated the time required and the need for obtaining samples and running standard blood work. Our hypothesis was that a screening tool, designed to assess medical history and current medication use, would consistently predict which patients required measurement of aPTT and PT/INR for safe care. By differentiating necessary from unnecessary labwork, the healthcare team could better meet patient care needs, improve safety, reduce patients' waiting time, and decrease personnel and hospital laboratory costs. **Methods:** A screening tool was administered prospectively to 182 outpatients scheduled for an elective cardiac invasive procedure. Likelihood ratios and the Fisher exact test were used to evaluate the relationships between the screening tool item responses and corresponding laboratory results. **Results:** Of 178 patients, 31 (17.4%) reported being on warfarin therapy at the time of the survey; 147 (82.6%) were not. A significant relationship was found between screening tool responses and actual laboratory values ( $P < .001$ ). Therapeutic PT/INR values ( $>1.4$  IU) were obtained for patients responding yes to current warfarin therapy. Likewise, nontherapeutic PT/INR values ( $= 1.4$  IU) were obtained for patients responding no to warfarin therapy. **Conclusions:** Study results show that using a screening tool to assess coagulation history and current medication use is a safe and reliable approach for improving laboratory resource utilization, improving patients' satisfaction by decreasing waiting time for procedures and decreasing laboratory costs (\$46/test).

#### **Barriers to Certification**

*Abenojar P. Memorial Hermann Hospital, Tex.*

**Purpose:** Adapted from the 2002 AACN white paper on certification, the primary purpose is to assess the current perceptions and opinions among the intensive care nurses of Memorial Hermann Hospital. Specifically, the study identifies: (1) awareness and perceptions of certification for critical care nurses and (2) perceived need for, benefits of, and barriers to certification.

**Background/Significance:** The initial licensure examination for the registered nurse validates that the nurse has sufficient basic knowledge and skills for safe practice. Certification, like licensure, is a mechanism that tests the nurse to validate a standard of knowledge in critical care. **Methods:** A survey questionnaire was used with a total of 11 questions. The survey took place between June 10 and July 5, 2005. A total of 42% of the MHH nursing staff responded and 73% of the respondents had more than 2 years of total nursing experience and years in specialty area. **Results:** The primary driver (85%) for seeking certification is to show advance knowledge and competence. The main barriers to certification are (1) No time to study, and lack of institutional support/ reward (48%), (2) Cost of taking the examination (45%), and (3) cost of preparing for the examination (40%). Most of the nurses surveyed are familiar with certification and believe that it is important to validate their advanced clinical knowledge and skills through certification. Certification is not encouraged/ required in their respective unit. **Conclusions:** The 2002 AACN white paper on the value of certification emphasized the benefits of certification to critical care nurses, the institutions where they are employed, and the public. Overcoming the barriers would be the challenge.