

2002 National Teaching Institute Research Abstracts

Presented at the AACN National Teaching Institute in Atlanta, Ga, May 5-9, 2002.

RESEARCH ORAL PRESENTATIONS

Research Abstract Award Winner

A COMPARISON OF MUSIC TO MUSIC WITH MOTHER'S VOICE ON PHYSIOLOGICAL RESPONSES AND LEVEL OF SEDATION WITH CRITICALLY ILL INFANTS AND CHILDREN.

Shirk BJ, Stouffer JW, Polomano RC, Katzel J, Haack M, Lucking SE, Milton S. Hershey Medical Center, Pennsylvania State University College of Medicine, Hershey, Pa.

Purpose: To compare the effects of a blank audiotape, music alone (MA), and simultaneous music and mother's voice (MMV) on physiological variables and levels of sedation. **Background/Significance:** The systematic application of music mediates physiological and psychological responses to stress in both neonates and adults; however, little is known about the advantages of MMV. **Methods:** A repeated measures crossover design was used to evaluate the effects of a blank audiotape, MA, and MMV on physiological responses and sedation. Twenty-nine subjects (>3 months to 8 years) who required mechanical ventilation received all three treatments: blank audiotape, MA, and MMV for 2 consecutive trials each and in random order. Nurse raters and parents were blind to treatment conditions. The tapes were played for 20 minutes, and subjects monitored for 60 minutes. Baseline measurements of physiological parameters and level of sedation using the Sedation-Agitation Scale were obtained, and subsequent measurements taken at 5, 10, 20, 30 and 60 minutes. Repeated measures analysis of variance (ANOVA) was used to determine within-subject and between-group differences over time for physiological variables and levels of sedation. **Results:** No significant between-group differences were noted for heart rate, respiratory rate and diastolic blood pressure over time. MMV produced increased sedation levels ($P<0.05$) with a significant carryover effect to 60 minutes. ($P<0.01$) compared to the blank and MA audiotapes. A coinciding reduction in O_2 saturation levels ($P<0.001$) was also observed with MMV, but this clinically insignificant decrease can occur from increased sedation resulting in lower minute ventilation. Mean systolic blood pressure for both MA and MMV was lower than the mean value

for the blank audiotape sessions, and differences approached statistical significance ($P=0.06$ and $P=0.55$, respectively). **Conclusions:** MMV appears to be better than MA in maintaining desired levels of sedation with mechanical ventilation and has important implications for reducing the need for sedating agents. **Funding:** This research was supported by The Milton S. Hershey Medical Center and Pennsylvania State University College of Medicine, Children's Miracle Network and the Arthur Flagler Fultz Research Award, American Music Therapy Association.

CORRELATION OF DEPRESSION WITH PERCEIVED QUALITY OF LIFE IN THE CHRONIC HEART FAILURE PATIENT.

Draus C, Valencia G, Schwartz S, Moore R, Riba A. Oakwood Hospital, Dearborn, Mich; University of Michigan, Ann Arbor, Mich; St. John Medical Center, Detroit, Mich.

Background: Emotional distress has been related to poorer clinical outcomes in cardiac disease states such as myocardial infarction and sudden cardiac death. Little attention has been paid to the psychosocial aspects of care in HF, particularly depression. **Study Purposes:** The purposes of this study were to determine the prevalence of depression and anxiety in the chronic heart failure patient and determine if any correlation exists between the degree of depression and the patient's perceived quality of life. **Methods:** Over a 1-year period, 1170 patients (with NYHA II-IV classification) were screened for study eligibility, of which 369 were eligible and 119 (32.2%) agreed to be interviewed. A face-to-face interview was conducted utilizing the Hospital Anxiety and Depression Questionnaire (scores ≥ 8 = depression) and a Visual Analogue Scale (VAS). **Results:** Results showed that 38.7% were depressed with a score >8 , and 21% having a score >10 . In addition, there was a negative correlation with anxiety/VAS $-.215$ ($P=.019$) and depression/VAS $-.319$ ($P=.000$) and a trend toward a negative correlation between LOS and VAS ($-.169$ @ $P=.06$). **Conclusion:** We conclude that depression is highly prevalent in the chronic heart failure patient and may have a negative effect on quality of life and length of stay.

EFFECTS OF HEPARINIZED VS NONHEPARINIZED FLUSH SOLUTIONS ON PATENCY OF ARTERIAL AND CENTRAL PRESSURE MONITORING LINES IN THE POSTOPERATIVE CARDIAC SURGICAL PATIENT. Scherr K, Guenther C, Koshal A, Finegan B. University of Alberta Hospital, Edmonton, AB, Canada.

Purpose: To compare heparin to normal saline in flush solutions to maintain patency in arterial and central venous catheters in patients following cardiac surgery.

Background and Significance: Previous studies in the non-cardiac surgical population have shown increased patency rates in arterial lines flushed with heparinized solutions, but no difference in patency rates of pulmonary artery catheters between the two groups. Because administration of even low-dose heparinized solution has been associated with hypersensitivity reactions, transient increases in partial thromboplastin time, delayed fibrinolysis with platelet aggregation, and thrombocytopenia, efforts have been made to eliminate heparin exposure as much as possible. **Methods:** A randomized, prospective, double-blind study was carried out on 200 patients undergoing cardiac surgical procedures. Patients received either a standardized heparin flush solution or normal saline in arterial and central monitoring catheters (\pm pulmonary artery catheter). Line patency was assessed by square waveform tests, and free backflow and aspiration of blood were performed every 6 hours for 72 hours or until line removal. Statistical analyses were performed using a t-test or chi-square analysis with a level of significance of $P < .05$. **Results:** There was no significant difference in patency rates of arterial, central, or pulmonary artery catheters between the two groups. **Conclusions:** Though previous studies have shown that patency of arterial lines may be improved with heparinized flush solutions, this is the first study to show that patients undergoing cardiac surgical procedures have the same patency rates with heparinized versus saline flush solutions in arterial, central venous and pulmonary artery catheters.

A NATIONAL SURVEY OF CRITICAL CARE NURSES: USE OF COMPLEMENTARY/ALTERNATIVE THERAPIES. Tracy M, Lindquist R, Savik K, Watanuki S, Sendelbach S, Kreitzer M, Berman B. Fairview-University Medical Center and University of Minnesota School of Nursing, Minneapolis, Minn.

Purpose: This study determined critical care nurses' attitudes, knowledge, and use of Complementary/Alternative Medicine (CAM) for critically ill patients.

Background/Significance: Patient demand for access to

CAM is growing, requiring critical care nurses to address the integration of CAM into patient care. Critical care nurses hold a key role in integrating CAM therapies—yet nationwide there is a notable knowledge gap regarding critical care nurses' perspectives and practice of CAM.

Methods: A survey mailed to a random sample of nurses from AACN's national membership examined demographics, knowledge/training in CAM, CAM use (personal and in practice), attitudes toward CAM, perceived barriers to use, and degree of openness to CAM for 28 selected therapies. **Results:** The 300 respondents used an average of 9 CAM therapies in their practice; most frequently used were diet (94%), exercise (92%), relaxation (80%), and prayer (72%). A clear majority (89%) indicated they were "open" or "eager" to use CAM in practice. No significant associations were found between demographics and openness to CAM use. Respondents thought significantly more CAM therapies were legitimate than the number they used personally or in practice. They consistently required less evidence for use of CAM therapies than for orthodox treatments. Most believed that selected therapies offered potential benefits to critically ill patients. While many (mean = 7) perceived barriers to CAM use were reported, non-use of self-identified legitimate CAM was not related to the number of perceived barriers. **Conclusions:** Nationwide, critical care nurses are using CAM, are "open" to CAM use, and want more knowledge about these therapies. Overall, nurses believe known CAM therapies to be legitimate and of potential benefit. Research testing therapies and education regarding the use and efficacy of CAM in critical care will promote appropriate use and use of a broader range of CAM therapies for patient benefit. **Funding:** This study was supported by the Clinical Scholars Program of the Katherine J. Densford Center for Nursing Leadership at the University of Minnesota School of Nursing and the Genentech Research Award through the Greater Twin Cities Area Chapter of AACN.

COMPARISON OF TWO VENTILATOR WEANING PROTOCOLS IN AN ADULT CARDIOTHORACIC ICU. Casida J. Nursing and Respiratory Care Staff. The Heart Hospital of New Jersey Saint Barnabas Medical Center.

Purpose: The intent of this unit-based research was to (1) determine the differences in outcomes between 2 ventilator weaning protocols in the immediate post-operative cardiac surgery patients, (2) ease of use by direct patient care providers and (3) promote evidenced-based practice. **Background/Significance:** Patient-initiated weaning (automode) is one of the current technological advancements in mechanical ventilation.

It is a computer-controlled mode that allows a patient who is being weaned to switch between control and support ventilation during the time the patient's condition changes (eg, periods of apnea). Thus, it achieves patient-ventilator synchrony, therefore no further ventilator manipulation or intervention is required. Certain research on automode has shown successful outcome in neonates, pediatrics and adult neurosurgical patients. However, to date there is no such research related to adult cardiac surgery. **Methods:** A random retrospective review of 92 medical records of non-complicated cardiac surgery patients (both with and without use of cardiopulmonary bypass) from July 2000 to July 2001 was completed. Data collection included patients' demographics, postoperative clinical characteristics (ie, hemodynamic values, arrhythmias, bleeding, etc), intubation time, CT-ICU length of stay and chest radiograph results. In addition, RNs and respiratory therapists were surveyed on their perceptions of the 2 weaning protocols. Student's t test, contingency table and chi-square were used to evaluate outcomes. **Results:** Neither of the 2 protocols demonstrated significant differences on overall weaning outcomes, including patient's comfort. A majority of the staff surveyed (91.6%) were in favor of using "automode" versus "synchronized intermittent mandatory ventilation (SIMV)/continuous positive airway pressure (CPAP)" as a more easier approach in weaning patients ($P=0.001$). **Conclusion:** The findings support that patient-initiated weaning (automode) is another weaning strategy in liberating adult patients from mechanical ventilator post-cardiac surgery. However, prospective randomized studies with a population regardless of preoperative comorbidities and postoperative hemodynamic stability are warranted.

Research Abstract Award Winner

DEVELOPMENT OF A SHORTENED STATE ANXIETY SCALE FOR PATIENTS RECEIVING MECHANICAL VENTILATORY SUPPORT. Chlan L, Savik K, Weinert C. University of Minnesota School of Nursing, Minneapolis, Minn.

Purpose: The purpose of this instrument development study was to devise a shortened, less burdensome anxiety scale for mechanically ventilated patients (MVPs) from the state portion (SAI) of the Spielberger State-Trait Anxiety Inventory. **Background/ Significance:** Anxiety is a common experience for MVPs. Documentation of the effectiveness of various interventions to reduce anxiety is hampered by significant measurement challenges due to fatigue, item meaning confusion, and the inability of MVPs to concentrate on lengthy instrument scales. There is an absence of

psychometrically sound instruments to measure anxiety in MVPs that balance response burden associated with these paper and pencil tools. **Methods:** A convenience, purposive sample of 200 alert, adult MVPs were recruited from 9 ICUs in the urban Midwest. Eight SAI items were identified by multiple subjects as problematic and were removed. Exploratory factor analysis with the principal components method was used to further reduce the remaining 12 SAI items. Factor models were assessed using the following diagnostic tests: Kaiser-Myer-Olkin, multicollinearity, Bartlett's test, and screen plot inspection. Varimax rotation assisted in factor interpretation. An item was considered to belong to a factor if it loaded at 0.5 or greater. Criteria for accepting a shortened scale as equivalent to the original SAI were that the amount of explained variance was equivalent to the 20-item scale, the individual items loaded on the same 2 factors, alpha levels remained high, with a high correlation between the shortened scale and original scale. **Results:** An 8- and a 6-item scale were realized that accounted for 60% and 65% of the variance, and correlated to the original SAI 0.95 and 0.92, respectively. **Conclusions:** Further work is needed to verify the factor structures via confirmatory factor analysis with another sample of MVPs. It is anticipated that the shortened SAI scales will be less burdensome for MVPs to complete. **Funding:** Funded in part by the Graduate School Grant-in-Aid, the President's Faculty Multicultural Research Award, and the Center for Excellence in Critical Care, University of Minnesota.

SUCTIONING TECHNIQUES AND AIRWAY MANAGEMENT PRACTICES (STAMP): A MULTI-SITE SURVEY OF INSTITUTIONAL POLICIES. Sole ML, Byers JF, Ludy JE, Banta C, Zhang Y. University of Central Florida College of Health and Public Affairs, Orlando, Fla.

Purpose: This study described institutional policies and procedures related to closed-system suctioning (CSS) and airway management of intubated patients. **Background and Significance:** Ventilator-associated pneumonia (VAP) commonly occurs in critically ill patients, and is often associated with microaspiration of secretions. Suctioning and airway management practices may relate to VAP. **Methods:** A multi-site survey of sites that routinely use CSS devices was conducted using network sampling, similar AACN's Thunder® projects. Requests to participate were sent electronically. Site coordinators completed the 45-item STAMP: Institutional Policies and Data survey. **Results:** Thirty sites agreed to participate; 3 withdrew related to time constraints, and one is pending. Twenty-six sites

participated. Institutional sizes ranged from 84 to 960 beds; 60% had 500 beds or higher. Critical care personnel resources included clinical nurse specialists (73%), unit-based nurse educators (54%), and respiratory therapy (RT) educators (50%). Up to 20% of policies are written separately by nursing and RT. Policies denote that RTs change CSS devices (96%); recommended CSS practices include hyperoxygenation (89%), normal saline instillation for thick secretions (77%), and glove use (69%). A single suction canister and tubing setup is used for both CSS and oral suctioning (81%). Oral suctioning is performed with reusable tonsil suction devices, such as a Yankauer (89%); rinsing, changing, and storing the Yankauer are not usually addressed. Endotracheal tube cuff pressures are to be measured every 8 (38%) to 12 (50%) hours; a minimal leak technique is used for inflation (52%). Oral care was addressed in only 50% of policies, and oral suctioning in 39%. **Conclusions:** Policies vary widely and do not always reflect research-based practices. "Routine care" such as oral care and suctioning are often not addressed. It is important to develop and implement collaborative research-based policies to ensure best practices for intubated patients. **Funding:** Study funded in part by a Clinical Practice Grant from the American Association of Critical-Care Nurses and an unrestricted grant from Smith Industries.

SUCTIONING TECHNIQUES AND AIRWAY MANAGEMENT PRACTICES (STAMP): A MULTI-SITE SURVEY OF REGISTERED NURSES' AND RESPIRATORY THERAPISTS' PRACTICES. Sole ML, Byers JF, Ludy JE, Zhang Y, Brummel K. University of Central Florida College of Health and Public Affairs, Orlando, Fla.

Purpose: This study investigated practices of registered nurses (RN) and respiratory therapists (RT) regarding closed-system suctioning (CSS) and airway management of intubated patients. **Background and Significance:** Ventilator-associated pneumonia (VAP) commonly occurs in critically ill patients and is associated with microaspiration of secretions. Suctioning and airway management practices may relate to VAP. **Methods:** A descriptive-comparative, multi-site study was conducted. Twenty-six sites throughout the United States were recruited via network sampling. Coordinators distributed the STAMP: Individual Survey, a 32-item tool, to 2948 RN and RT staff members that routinely use CSS devices. **Results:** Fifty-five percent of staff (n=1609) participated; most were RNs (72%). The typical respondent had at least 6 years' experience with ventilated patients (61%), and a baccalaureate degree or higher (56%). The majority

(78%) stated CSS to be as effective or better than open suctioning. CSS practices reported "most of the time" or "always" included wearing gloves (89%), hyperoxygenating patients (82%), rinsing the device (76%), suctioning the mouth after CSS (66%), and instilling saline (33%). Sixty-three percent (63%) stated that they suction patients' mouths and use oral swabs (53%) every 4 hours; however, 53% stated they "rarely or not at all" brush patients' teeth. Frequency of measuring endotracheal tube (ET) cuff pressures varied: every 8 hours (25%) or 12 hours (24%). Suctioning above the ET cuff prior to repositioning tubes was reported by 72%. RTs instill saline and rinse the CSS more often than RNs. RNs provide more oral care and suctioning than RTs; RNs were not aware of ET cuff pressures. **Conclusions:** Findings note variation in practice. Consistent performance of practices such as wearing gloves for CSS, oral suctioning and care, and maintaining ET cuff pressures need to be evaluated for effectiveness in reducing VAP. Nurses and RTs need to collaborate on practices to ensure consistency of practice. **Funding:** Study funded in part by a Clinical Practice Grant from the American Association of Critical-Care Nurses and an unrestricted grant from Smith Industries.

THE CAM-ICU: A QUICK AND RELIABLE DELIRIUM ASSESSMENT TOOL. Truman B, May L, Ely W, Larsen P.

Purpose: To evaluate the reliability and clinical utility of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU). **Background/Significance:** Due to multisystem illnesses, comorbidities, the use of psychoactive medications, and advanced age, ICU patients are at great risk for delirium. Delirium is associated with prolonged hospital stay, institutionalization, and death. No tool existed for ICU delirium assessment, so we created the CAM-ICU. The CAM-ICU is a modified version of the Confusion Assessment Method (CAM) (Inouye et al., *Annals of Internal Medicine*. 1990; 113: 941-8.) for use with nonverbal (ie, ventilated) patients. The CAM-ICU evaluates four features: 1) alteration in mental status or fluctuating course, 2) inattention, 3) disorganized thinking, and 4) altered level of consciousness. The objective measures to evaluate each feature include the Richmond Agitation Sedation Scale, the Attention Screening Exam and standard definitions of levels of consciousness. We have previously shown its sensitivity and specificity to be 96% and 93%, respectively (Ely, et al., *CCM* 2001; 29:1370-9). In order for a bedside assessment tool to be useful for ICU nurses, it must be quick to use and reliable. **Methods:** A prospective cohort study was

performed with 96 consecutive, mechanically ventilated patients in a medical ICU. Two ICU study nurses (using the CAM-ICU and blind to one another's ratings) followed them daily for the development and persistence of delirium. Time to complete each assessment and confidence levels were recorded. Results: The CAM-ICU had high inter-rater reliability ($\kappa=0.96$, 95% C.I. 0.92 to 0.99). The average length of time to complete the CAM-ICU assessment was 1.8 minutes. The mean confidence level from 1 (least) to 3 (most) was 2.98. **Conclusions:** Not only is the CAM-ICU a valid tool for measuring delirium, it has high inter-rater reliability among nurses and is quick to clinically perform. **Funding:** Am Fed Aging Research (AFAR) and GRECC

EVALUATION OF SYMPTOMATIC HYPOTENSION AND VITAL SIGN FREQUENCY IN CARDIAC SHORT-STAY PATIENTS ON NITROGLYCERIN PASTE. Baker J, Human L, Carlson E. University of California Davis Medical Center, Sacramento, Calif.

Purpose: The purpose of this study was to describe changes in blood pressure and the development of untoward symptoms in cardiac short-stay patients receiving nitroglycerin paste. **Background and Significance:** Cardiac short-stay patients are admitted to rule out a cardiac event. Their length of stay is generally less than 24 hours. Vital sign assessments are ordered a minimum of every 4 hours based on the known hypotensive effects of sublingual and intravenous nitroglycerin. With limited data on the hypotensive effects of nitroglycerin paste, the need for frequent vital signs was questioned. Improving the quality and efficiency of care while decreasing costs is important. Therefore, identifying the optimal frequency for assessing vital signs is critical. **Methods:** This was a descriptive study of one hundred cardiac short-stay patients admitted to a large University teaching hospital. Variables of interest included demographic data, past medical history, medications, changes in blood pressure, and the development of adverse side effects. Data was collected beginning with admission to emergency department and continued throughout the stay. **Results:** Of the 100 cardiac short-stay patients, eight patients were subsequently admitted to the cardiac service. The other patients were either discharged ($n=88$) or admitted to other services in the hospital ($n=4$). Repeated measures ANOVA showed a statistically, although not clinically significant, decrease between the triage systolic blood pressure and the first systolic blood pressure and between the first systolic and the

second systolic blood pressure after administration of nitroglycerin paste. Thirteen patients complained of untoward side effects, with complaints of headache being the most common. **Conclusions:** Based on the results of this study, it does not appear that nitroglycerin paste has a clinically significant impact on blood pressure or the development of untoward side effects. Therefore, frequency of vital sign assessments should be based on the patient's condition.

ORAL HEALTH STATUS: EFFECT ON VAP. Munro C, Grap MJ, Hummel R, Elswick RK, Sessler C. Virginia Commonwealth University, Richmond, Va.

Purpose: To describe the effect of oral health status (OHS) on the development of ventilator-associated pneumonia (VAP). **Background/Significance:** VAP is a significant cause of morbidity and mortality in critically ill adults. OHS may influence the number of potential VAP pathogens in the oral cavity. Little is known about OHS in mechanically ventilated patients. **Methods:** The longitudinal, descriptive design enrolled 66 mechanically ventilated subjects (mean age 55 years, 58% male). Risk of VAP was quantified using the Clinical Pulmonary Infection Score (CPIS). OHS included biological measurement of local oral immunity (salivary lactoferrin and IgA), oral microbial culture, and oral health assessment. Data were obtained on days 1, 4, and 7. Forty (61%) subjects were intubated through Day 4 and were included in the data analysis. **Results:** Mean CPIS increased from Day 1 (3.97) to Day 4 (4.11) and fell on Day 7 (3.88). Six of the 40 subjects analyzed (15%) developed VAP (CPIS ≥ 6 or greater). In both groups, dental plaque increased over time, salivary volume decreased over time ($P=.20$), and lactoferrin and IgA declined over time. Subjects who had VAP had lower lactoferrin levels on Day 1 and 4 and lower IgA levels on Day 1 than subjects who did not. Oral health assessment between groups was not significantly different. The number of organisms present in oral cultures increased from Day 1 to 4, and remained high on Day 7. Potential VAP pathogens were identified in oral cultures of 6 subjects prior to or concurrent to appearance in tracheal aspirate culture. **Conclusions:** These data support a link between OHS and the development of VAP, and suggest that lactoferrin and IgA change in critical illness and may differ in subjects who develop VAP. Results suggest that the OHS of critically ill patients deteriorates over the first 7 days. **Funding:** NINR # 1R15 NR04730-01, PI Dr. Grap, and VCU A.D. Williams grant to Dr Munro.

OUTCOMES AFTER SEVERE BRAIN INJURY: ICP, CPP, AND GOS TODAY. Winkelman C. Case Western Reserve University and MetroHealth Medical Center, Cleveland, Ohio.

Purpose: This research examined patient outcomes associated with concurrent management of intracranial pressure (ICP) and cerebral perfusion pressure (CPP) in patients with severe brain injury. The research questions (RQ) were: (RQ1) Are treatment goals of ICP <20 torr and CPP >70 torr reflected in better outcomes? (RQ2) Are the number of episodes of intracranial hypertension and cerebral hypoperfusion related to outcome? **Background/Significance:** There are few data about whether changes in the practice environment such as improved diagnostic tools and dissemination of the 1995 guidelines for treatment of severe brain injury (Bullock, et al., 1995) have affected patient outcomes. **Methods:** This was a retrospective chart review of all patients admitted with severe brain injury at two urban teaching hospitals. All ICP, CPP values were collected; the Glasgow Outcome Score (GOS) was used to measure outcomes. **Results:** Eighty-five charts were retrieved. The average ICP was 14.3 torr and average CPP was 75.3 torr for patients with "good" GOS. Adverse outcomes were associated with an ICP average of 24 torr and a CPP of 62 torr. The number of episodes of intracranial hypertension and cerebral hypoperfusion were the same across outcomes. For RQ1, the results of MANOVA support that between-subject factors of ICP values <20 torr and CPP values >70 torr affect outcome (FICP = 20.14, $P=.000$; FCPP = 10.92, $P=.001$; power .98). For RQ2, there was no correlation between the number of episodes of abnormal ICP or CPP and GOS. **Conclusion:** Practice environment changes over the last decade, at least in these two urban settings, have done little to alter the outcomes of severe brain injury. Current guidelines suggest that a CPP of 60 torr is acceptable practice. The data from this study indicate that a CPP >70 torr is needed to achieve good outcomes. **Funding:** The Alpha Mu chapter of Sigma Theta Tau provided funding for this project.

BACKREST ELEVATION: EFFECT ON VAP. Grap MJ, Munro C, Hummel R, Elswick RK, Sessler C. Virginia Commonwealth University, Richmond, Va.

Purpose: To describe the relationship of backrest elevation on the development of ventilator-associated pneumonia (VAP). **Background/Significance:** Intubation and mechanical ventilation (MV) greatly increase the risk of VAP. Supine position, frequently used by nurses in ICUs to manage problems associated with unstable hemodynamic status, increases the risk of VAP. Although the Centers for Disease Control and Prevention (CDC) recommends the use of higher backrest positions (30-45

degrees) in mechanically ventilated patients, the relationship between backrest elevation and ventilator-associated pneumonia has not been completely described. **Methods:** Non-experimental, longitudinal, descriptive design. VAP was measured using the Clinical Pulmonary Infection Score (CPIS). Backrest elevation was measured continuously using a transduced measurement system, and data were obtained from the laboratory results and the medical record from initiation of mechanical ventilation up to 7 days. **Results:** Sixty-six subjects (mean age 55 years, 58% male) were monitored up to 7 days for a total of 201 patient days. Overall backrest elevation over the entire study period was 21.50. Subjects were at backrest elevations lower than 30 degrees 72% of the time and lower than 10 degrees 39% of the time. There was no difference in backrest elevation across study days. Mean CPIS increased from Day 1 (3.97) to Day 4 (4.11) and fell on Day 7 (3.88). Six of the 40 subjects analyzed (15%) developed VAP (CPIS = 6 or greater), but amount of time spent at low backrest positions or APACHE score on admission was not related to the score on the CPIS. **Conclusions:** These mechanically ventilated subjects spent the majority of time at backrest elevations less than the CDC recommendation (>30 degrees); however, the consequences have not been clearly delineated. **Funding:** NINR # 1R15 NR04730-01, PI Dr. Grap, and VCU A.D.Williams grant to Dr Grap.

NURSE-INITIATED TRANSFER AFTER CORONARY ARTERY BYPASS GRAFT PROCEDURES: REDUCING COSTS WITHOUT INCREASING COMPLICATIONS. Bose S, White Winters J. All Saints Healthcare, Racine, Wis.

Purpose: The purpose of this study was to evaluate the efficacy of a nurse-initiated transfer protocol on intensive care unit (ICU) length of stay (LOS), overall postoperative LOS, complication rates, and ICU readmissions. **Background/Significance:** Approximately 553 000 coronary artery bypass graft (CABG) procedures are performed annually in the United States. Rising healthcare costs demand scrutinization of expenditures associated with this procedure. ICU-related expenses for CABG surgeries are staggering. Reducing ICU LOS should provide a clear mechanism to curb these costs. In order to address this issue, a nurse-initiated transfer protocol was developed. Transfer criteria included: (a) at least 4 hours post-endotracheal extubation; (b) hemodynamic, respiratory, and neurologic stability; and (c) tolerance of activity progression. If implementation of this protocol could shorten ICU LOS, without increasing complications or ICU readmissions, a compelling case would be made for utilization of this protocol. **Methods:** A retrospective database review of

records from 100 patients who underwent off-pump CABG procedures at a Midwestern hospital was performed. Half of these patients were transferred via physician order, while the others were transferred under the nurse-initiated protocol. **Results:** ICU LOS was significantly shortened in the nurse-initiated transfer group, reflecting a reduction of approximately 10 hours. No differences in overall hospital LOS, ICU readmission rates, or significant complications were revealed. However, a slightly higher incidence of renal insufficiency, in the absence of renal failure, was observed in the early transfer group. Cost data presently are not available. **Conclusions:** Implementing this nurse-initiated transfer protocol resulted in a significant reduction in ICU LOS, without a concomitant increase in complication rate or ICU readmissions. Although specific cost data are not available at this time, utilization of this type of protocol should translate into significant cost savings.

TIME TO FIRST DEFIBRILLATION: SURVIVAL TO DISCHARGE FOLLOWING IN-HOSPITAL CARDIO-PULMONARY ARREST. Truitt T, Mancini M, Carey S, Kaye W, Nadkarni V, Copes W, Ornato J, Peberdy M, Hirschhorn C, & Cason C. American Heart Association National Registry of CPR Investigators, American Heart Association, Dallas, Tex.

Purpose: This study examines the influence of reported time to first defibrillation (TFD) on survival to discharge for adult patients experiencing cardiopulmonary arrest (CPA) with an initial rhythm of ventricular fibrillation (VF) or pulseless ventricular tachycardia (P-VT). **Background/Significance:** Although studies have identified TFD as predictive of survival in out-of-hospital settings, large in-hospital studies have not been reported. The National Registry of CPR database captures in-hospital CPA data from 108 institutions of varying size and permits study of variables associated with survival. **Methods:** Data extracted from the database for this descriptive study included TFD and survival to discharge of ICU (n=526) and non-ICU (n = 628) patients who were defibrillated for VF or P-VT. Non-ICU events were divided as monitored/witnessed (M/W, n=353) and non-monitored/non-witnessed (NM/NW, n=104). **Results:** VF/P-VT was the initial rhythm in 26% of CPA events (n=5030). TFD was reported on 1154. Regardless of setting, survival improved ($P<0.05$) when TFD was <3 minutes (84% of cases, 37% survived) than when >3 minutes (27% survived). More non-ICU patients (40%) survived than did ICU patients (31%). Among non-ICU patients, survival was greater when M/W (50%) than when NM/NW (13%). In 83% of M/W events, TFD was <3 minutes and 53%

survived. In 81% of NM/NW events, TFD was <3 minutes and 14% survived ($P<0.001$). When TFD was >3 minutes, 37% of M/W patients and 5% of NM/NW patients survived ($P<0.05$). **Conclusions:** Although survival appears higher in non-ICU settings, comorbidities and other complications of ICU patients likely contributed to these differences and were not evaluated in this study. M/W events had significantly higher survival rates, likely due to increased surveillance and early identification of dysrhythmias. Despite known weaknesses in self-reported time, the link between TFD and survival of CPA is evident. Standardization of methods to measure/report time would strengthen research findings.

Research Abstract Award Winner

AN OUTCOMES MODEL FOR ASSESSING THE EFFECTS OF AN INVASIVE PERIOPERATIVE GLYCEMIC CONTROL PROTOCOL FOR PATIENTS WITH DIABETES UNDERGOING CABG. Eddinger V, Vora A, Polomano R, Gabbay R, Hollenbeak C, Martin D, Milton S. Hershey Medical Center, Pennsylvania State University College of Medicine, Hershey, Pa.

Purpose: The purpose of this study was to test the effectiveness of interdisciplinary clinical practice guidelines for intensive perioperative glucose management and to develop an outcomes model for diabetic patients undergoing coronary artery bypass graft (CABG). **Background/Significance:** Because the mortality rate for diabetics undergoing CABG surgery is double that of all non-diabetics and the risk of deep sternal wound (DSW) infection is 2.7 times higher, an outcomes model was employed to evaluate clinical outcomes and costs. **Methods:** Outcomes from a retrospective cohort of patients with diabetes undergoing CABG surgery at the Milton S. Hershey Medical Center from January 1999 to December 1999 (pre-insulin protocol, n=81) were compared to patients (n=107) managed by an Intensive Glycemic Control Protocol (IGCP) from January 2000 to December 2000. IV insulin infusion with glucose monitoring was initiated to maintain glucose levels between 120-200 mg/dl. Primary outcome measures included average blood glucose levels, cost of hospitalization, length of hospital stay (LOS), and DSW infections. Differences in glucose levels were tested between patients receiving the ICGP using repeated measured analysis of variance. Univariate comparisons of LOS and costs were tested using Student's t test with multivariate comparisons to determine the incremental effect of increased glucose levels on costs and LOS. Differences in proportions of patients with DSW infections were tested using a Chi-square. **Results:** There

was a non-significant trend towards reduction in cost of care for patients receiving the IGCP. A histogram for glucose levels pre- and post-IGCP suggests better control and lower glucose values with the ICGP. Even though the average number of glucose measurements was almost 3 times greater for the IGCP, there was a non-significant decreasing trend towards reduction in cost of care, LOS and DSW infections for this group. **Conclusions:** Interdisciplinary practice guidelines for intensive glycemic control resulted in revenue-neutral improved perioperative outcomes.

CREATIVE SOLUTIONS

GETTING THE WORD OUT—SILENCE IS GOLDEN. Petersen D. Memorial Hospital, Gulfport, Miss.

Purpose: To improve communication within our department while having to disseminate large volumes of information. **Description:** As in any healthcare facility, we are constantly required to pass information on to our staff regarding changes in policies, procedures, practices, and processes. Staff meetings are sporadically attended and there is only so much room to post flyers on bulletin boards and on bathroom walls. Looking for innovative methods to “get the word out” has resulted in some fun and successful methods of communicating with staff. Blooming trees, chattering lab coats, lapel lips, candygrams, “two for one” educational exercises, an “Information Team” and a variety of other innovations were added to traditional methods of information dissemination. Small amounts of information are distributed at a time enhancing attention and, therefore, retention. Less time is spent by the leadership team “dictating” changes to staff which improves reception of the intended messages. **Evaluation:** Our bulletin boards and bathroom walls are virtually void of unread flyers and notices. Our success with our alternative methods of “getting the word out” was demonstrated with our recent JCAHO visit as our staff members throughout the cardiac division demonstrated an unseen level of preparation regarding even some of the most recent and complex changes made by our organization. Family members and staff from other departments became engaged as some of the methods served as conversation pieces when in use. **Outcomes:** Communication among staff members and between management and staff has improved as well as accountability for receiving information. The “fun factor” has made staff less resistant to the seemingly constant bombardment of information. These methods have been adopted in other departments as well as other facilities in our area.

IMPLEMENTATION OF A PROTOCOL FOR ACUTE CORONARY SYNDROMES THROUGH THE USE OF ACUTE CARE NURSE PRACTITIONERS. Sullivan J, Rabbani L, Bergmann S, LaMarca C, Hurley E, Miesner B, Pia R. Columbia University and New York-Presbyterian Hospital Columbia Presbyterian Center, New York, NY.

Purpose: The goal of this program was to increase quality of care and decrease length of stay (LOS) for patients who present to the Emergency Department (ED) with chest pain and/or acute coronary syndromes (ACS). More specifically, the aim was to ensure that patients are not only ruled out for ACS, but also ruled out for underlying coronary artery disease (CAD) by either cardiac catheterization or stress myocardial perfusion imaging (MPI). **Description:** An ACS protocol was written to classify all patients who present to the ED with chest pain into one of four levels. Classification is based on factors such as symptoms, history, labs, and EKGs. Implementing this protocol is a multidisciplinary team consisting of members from nursing, medicine, administration, cardiology, and emergency medicine among others. Acute care nurse practitioners (ACNP) evaluate chest pain patients in the ED and coordinate the project. Based on the protocol, the ACNP orders appropriate testing, including cardiac catheterization or stress MPI within 24 hours. The ACNP is responsible for problem solving and is also involved in education of the nurses, attending physicians, and residents. **Evaluation and Outcomes:** An average of 350 patients present to the ED with chest pain monthly and are placed into the protocol. After the first 5 months of the project, LOS decreased by 1.5 days for this population. In addition, there was a 45% increase in the number of level 2 patients (unstable angina and/or non ST-segment elevation MI) who underwent cardiac catheterization and a 42% increase in the number of level 3 patients (atypical chest pain with normal or nondiagnostic EKG) who received stress MPI. Taken together, this data suggests that implementation of an ACS protocol and ACNP program results in a significant decrease in LOS and in enhanced quality of care for patients with chest pain.

CRITICAL CARE NURSING OUTSIDE OF THE ICU: A CALL FOR ACTION. Larsen L, Robinson T, Hupp P, Pugh T, Kuzava B, Orlandi J. University of California Davis Medical Center.

Purpose: Rapid and unpredictable changes in patient acuity and hospital census can stretch the resources of a hospital. In order to address these unpredictable needs,

the Critical Care Action Team was developed. Action Team nurses provide additional resources during times of short staffing, high census or high acuity. **Description:** The Critical Care Action Team was formed approximately 4 years ago and since that time our role has continued to evolve. We have developed specific policies and protocols, tools for assuring continuous quality improvement and an orientation manual for nurses new to the team. We serve as a resource for the medical-surgical nurses and are called on to evaluate patients and make recommendations to physicians. If a patient needs a higher level of care, we provide that care while awaiting the transfer to an ICU. Conscious sedation is one area where action nurses may provide assistance either by answering questions or by taking over and providing care. Action nurses are dispatched to provide assistance throughout the hospital. For example, when a multiple casualty trauma occurs, we assist in the ER resuscitation rooms; when the PACU is overwhelmed, we may be called on to recover patients; and when the neonatal ICU experiences multiple admits, we are asked to respond there. Currently, our nurses have an average of 12 years of critical care experience, possess excellent assessment and priority setting skills, as well as clear, concise communication skills. **Evaluation:** The Critical Care Action Nurse is a valuable member of the healthcare team providing expertise and support when needed. We are advocates for patient care and a resource to staff nurses providing care to complex patients. The value of our role is best reflected in the often-asked question, "What did we do before there was an Action Nurse?"

IMPLEMENTING RESEARCH UTILIZATION IN CRITICAL CARE. Larsen L, Bagley M, Santiago M, Hodge M, & the OPCCS Committee. University of California Davis Medical Center, Sacramento, Calif.

Purpose: The purpose of this project is to assure that when possible, all critical care procedures are based on current research findings. The impetus for this project was a concern that current policies and procedures were, in part, based on tradition rather than science and did not always reflect rapid changes in critical care, including use of new equipment, new treatments, and new findings. **Description:** The Operations & Practice Critical Care subcommittee (OPCCS) was formed at the grass-roots level by clinical nurses committed to science-based practice. This committee is unique in that it functions as part research journal club and part policy and procedure committee. All members of the committee attend an extensive research utilization class learning to read and critique research. Members of the committee include staff nurses from each critical care

unit, the emergency department and the post-anesthesia care unit. During bi-monthly meetings, individual procedures are revised based on a review of the literature and after extensive debate by the committee. References are rated according to the level of evidence they provide, with Level 1 evidence, representing the strongest evidence for change. In order to assure that changes become a part of practice, critical care competencies are then revised and staff nurses are educated on the revisions. **Evaluation:** As a result of this project, there have been a number of positive outcomes; policies & procedures have been revised based on scientific evidence and new research questions have been generated based on gaps in the literature. In addition, there has been an increase in the number of clinical nurses involved in reviewing and revising procedures, critical care nurses are excited about research, share findings with colleagues and look for ways of improving practice. Finally, this project has served as a model for hospital-wide change.

YOU AREN'T THE WEAKEST LINK: NEW GRADS IN THE PEDIATRIC ICU. Pate M, Beardsley S. Oregon Health and Science University, Portland, Ore.

Purpose: In response to the nursing shortage, recent graduates are now being hired directly into the Pediatric Intensive Care Unit (PICU). This innovation led the unit's leadership group to carefully reassess the orientation process. **Description:** To address this new practice, the PICU's leaders modified the existing orientation program to provide a multifaceted approach to learning. The revised orientation process includes 1) Internship Classes: Classes are held on Mondays for 12 hours. The first part of the day is focused on common PICU patient types; the latter part is directed at skill acquisition and practice. New graduates then work two 12-hour shifts with their assigned preceptor during the remainder of the week. 2) Coffee Talk: This gathering occurs Monday mornings before class, allowing time for orientees to share experiences and voice concerns. 3) New Kids on the Block: On the first morning of class, graduates from the previous internship program come and candidly discuss how to navigate the orientation process. Later that day, the PICU staff hosts a potluck luncheon. This allows current employees to meet and welcome the new orientees. 4) Survival Guide: An experienced nurse developed a pocket-sized "Survival Guide" for new staff members. This booklet contains references specific to the patient population and information about procedures, lab work, etc. 5) Charge Nurse Roundtable: Since the majority of orientees begin their work career on the night shift, an opportunity is provided to meet with the night charge nurses before

moving to that shift. This is a time for charge nurses and new orientees to get acquainted, ask questions, and clarify expectations. **Evaluation/Outcome:** Graduates of the PICU nursing internship program are positive about the orientation process. They especially like having classes on Mondays and then reinforcing the material on the following clinical days with actual hands-on experiences.

ONE FOR ALL AND ALL FOR ONE: INCORPORATING TEMPORARY STAFF INTO TODAY'S WORKFORCE. Boggs P, McKenzie R, Charlton, F, McCready J, McKenna K, Whitt T, Ellis M, Shearin H, Dickerson L. The Duke Heart Center, A Service of Duke University Health System. Durham, NC.

Purpose: Increasing acuity and volume of patients as well as the impending nursing shortage have caused us to take different avenues to increase our nursing resources on extremely busy cardiac surgical units. The lack of adequate resources as well as experienced nurses may impact quality patient care, staff satisfaction, turnover, length of stay (LOS), and hospital costs. The utilization of travel nurses has become a necessary component of the staffing plan in many units. We are met with significant challenges to develop a cohesive team that includes permanent staff nurses as well as transitory personnel. Travel nurses reported feeling underutilized and undervalued, leading to a less than collaborative practice. **Description:** Travel nurses have been incorporated into our staffing plan for 3- to 6-month increments. They are hired based on cardiac surgical experience, and their orientation ranges from 1-2 weeks. Each travel nurse completes the same orientation pathway required for permanent staff and are expected to meet the same unit expectations. A questionnaire was developed by the leadership team in order to obtain feedback on their orientation experience, appropriateness of assignments, and their perceptions of relationships with permanent staff. In order to enhance teamwork among both groups, travel nurses are eligible for unit-based perks and incentives, such as equally challenging patient assignments, educational opportunities, committee participation, flexible scheduling, and unit give-a-ways (ie, sweatshirts, t-shirts, ice cream passes). **Outcomes:** Successful integration of travel nurses into our team has been demonstrated by an increase in their overall satisfaction through caring for challenging patients, participating in educational offerings, and increased involvement in unit activities. Because of these efforts to develop a cohesive team, many travel nurses extend contracts or become permanent members of our staff, allowing us to maintain the nursing resources necessary for providing quality patient care.

VIRTUAL NURSING: READY, SET, GROW! Hynes-Gay P, Hidalgo N. Mount Sinai Hospital, Toronto, Canada.

Purpose: Information technology is a potentially rich educational resource for nurses; however, it is not well integrated into the continuing education objectives of most institutions. In today's rapidly changing healthcare environment, the need for comprehensive yet cost-effective education challenges us to explore delivery modes and approaches to learning not traditionally engendered in the classroom setting. The purpose of this project was to determine the feasibility of an Internet-based nursing education site by tracking utilization, successful completion, and nurse-reported satisfaction with a time-limited [4-week] on-line critical care skills tutorial. **Description:** The Critical Care Skills Tutorial is an Internet-based education site developed collaboratively with the Center for Academic Technology at the University of Toronto. It presents the theory and skills needed to competently care for patients requiring invasive hemodynamic and ECG monitoring in a medium that emphasizes interactive functions such as the bulletin board, on-line self-tests, and e-mail communication. The tutorial was designed to support the learning of nurses in both critical care and intermediate care areas, to promote collaborative practice between clinicians in both settings, and to engage nurses in information technology. Permission to monitor nurse participation [number and distribution of hits, participation in interactive forums] was granted by the internal ethics review board. **Evaluation and Outcomes:** A certificate of participation was issued to all nurses who enrolled in the tutorial, completed a post-test, and demonstrated clinical competency in the acquired skills. An on-line survey to elicit information on computing comfort pre- and post-tutorial and feedback on the site in general revealed a high level of nursing satisfaction with the on-line experience. The possibility that the acquisition of highly technical skills may be facilitated using web technology, although not widely explored to date, should be considered.

DEMONSTRATION OF COMPETENCY AT THE BEDSIDE. Gowan V. The Critical Care Credentialing Workgroup. Providence, St. Vincent Medical Center, Portland, Ore.

Purpose: Traditionally, verification of competencies in the critical care areas has been done in the skills lab. Because the credentialing process occurred away from the patient's bedside, skills were isolated from the other components of patient care. Incorporation of the skills at the bedside often resulted in a lack of compliance with expected standards. There was a need to maintain the

expected level of performance at the bedside as well as in the skills lab. **Description:** A Workgroup composed of critical care nurses and a critical care clinical nurse specialist identified an expert nurse in each skill area. The expert nurse, along with other team members, identified expected performance criteria for bedside evaluation of competence. Clinical experts, identified by the charge nurses in each unit, went through a training session which included instruction on expected performance criteria, the acceptable range of performance behaviors, and the process for additional assistance when standards were not met. The clinical experts were available on all shifts and on all units to provide mandatory credentialing. **Evaluation and Outcomes:** The bedside credentialing process was instituted with positive results. The staff enjoyed being able to credential on work time rather than on a special day, compliance with standard improved, and staff could more easily locate an appropriate expert nurse for further instruction or direction. An unanticipated benefit was reduced cost, as the staff nurses do not need to be scheduled for additional hours for credentialing.

RESEARCH POSTER PRESENTATIONS

TOBACCO DEPENDENCE CURRICULUM IN ACUTE CARE NURSE PRACTITIONER EDUCATION. Heath J, Andrews J, Thomas S, Kelley F, Friedman E. Georgetown University School of Nursing & Health Studies, Washington, DC.

Purpose: The study was conducted to assess tobacco education in the curriculum of acute care nurse practitioner (ACNP) programs in the United States. **Background/Significance:** Tobacco dependence is the country's leading preventable cause of death, and yet there is increasing evidence that healthcare professionals are not adequately educated on how to help patients break the deadly cycle of tobacco dependence. **Methods:** A survey with 13 multiple-choice items was distributed to the coordinators of 72 acute care nurse practitioner programs in the United States. The survey was replicated and modified from previous research about tobacco dependence curricula in undergraduate medical education. **Results:** Fifty (83%) ACNP programs responded to the survey. Twelve ACNP programs out of the initial 72 were identified as no longer existing. Overall, during an entire ACNP course of study, 68% of the participants reported that less than 3 hours of content on tobacco dependence was covered. The majority of the respondents (78%) reported that it was not required for students to teach smoking cessation techniques to patients, and 94% do not provide opportunities for students to be certified as smoking

cessation counselors. Over half of the respondents (60%) reported that the national guidelines for smoking cessation from the Agency for Healthcare Policy and Research (AHCPR) were not used as a curriculum reference for tobacco content. **Conclusions:** The majority of acute care nurse practitioner programs participating in this study are briefly teaching tobacco content to students. The authors believe that more in-depth coverage is required to impact tobacco reduction. Acute care nurse practitioners are in a prime position to intervene with tobacco dependence, especially when patients are facing life-threatening events. National recommendations for core tobacco curricula and national certifying boards to include tobacco questions on board exams should be developed and implemented. **Funding:** This research was funded by a Data-Driven Clinical Practice Grant from the American Association of Critical-Care Nurses.

NURSING CARE AND CRITICAL CARE OUTCOMES: A TRIANGULATED APPROACH. Mark D. Brooke Army Medical Center, San Antonio, Tex.

Purpose: The purpose of this study was to evaluate the discharge health status of critical care patients as a function of nursing experience and nurses' self-ratings of the level of care provided. **Background and Significance:** Intensive care accounts for approximately 20-30% of all hospital costs and contributes 1% to the U.S. gross domestic product (Knaus, Wagner, Zimmerman, & Draper, 1993). Unfortunately, there is scant evidence indicating that the care provided in intensive care units improves either survival or morbidity (McAllister & Howard Fee, 1997). Also, highly skilled nursing resources are mismanaged and viewed as interchangeable (American Nurses' Association, 2000). Therefore, the challenge becomes matching the needs of patients to the level of nursing competency. This study attempted to address these concerns by examining the impact of nursing care on patient outcomes. **Methods:** A triangulation design was chosen for this study. The correlational quantitative portion of this study examined the effect of nursing experience and the nurses' self-ratings of the level of nursing care provided by 87 critical care nurses on the 109 surgical intensive care unit patients' discharge health status. Patients completed the SF-36 Health Survey upon hospital discharge. The APACHE III was used for risk stratification. Data were analyzed using correlational and regression statistics. The qualitative portion of this study involved interviewing 34 patients and five critical care nurses. The data were analyzed using thematic content analysis. **Results:** Nursing experience and the level of nursing care provided failed

to impact the health status of the patients. However, nurses and patients spoke about nursing interventions that they felt improved patient outcomes. **Conclusions:** Measuring health status yields little in the way of definitively capturing nursing's influence. However, qualitative inquiry with nurses and patients reveals how nurses make or fail to make a difference in patient outcomes.

PROCESS IMPROVEMENT: CARE OF THE PATIENT WITH HEART FAILURE. Liles L. Saint Joseph's Hospital, Atlanta, Ga.

Purpose: Develop and implement improvements in the care of the patient with heart failure. **Background:** Congestive heart failure is a significant cause of mortality and morbidity. According to American Heart Association statistics, the incidence approaches 10 per 1000 population after age 65. Therefore, as the population ages, the incidence of heart failure is expected to grow. The American College of Cardiology and the American Heart Association (ACC/AHA) have developed joint guidelines for care of the patient with heart failure to improve quality of care, but several published reports indicate that adherence to the guidelines is suboptimal. **Methods:** A retrospective chart audit of patients admitted to St. Joseph's Hospital in March and April 2000 whose discharge diagnosis was congestive heart failure was performed, and the care documented was compared to the ACC/AHA guidelines. Using a modified version of the medical records abstraction tool developed by the Collaborative Quality Improvement Partnership, data concerning medication profiles, patient education, length of stay, performance of daily weights, and advance directives were collected and compared to national data. Results were presented to multidisciplinary teams, including nurses, physicians, pharmacists, patient care technicians, patient education, respiratory therapists, and management. **Results:** Although performance at St. Joseph's Hospital was better than the national data, several areas for further improvement were determined. Multiple staff education initiatives were undertaken, including a class for patient care technicians and a Cardiology Day devoted exclusively to heart failure. New nursing care plan, patient education tool, and order sets were developed. A process improvement team composed of cardiologists, internists, hospitalists, nephrologists and nursing has been formed to further improve compliance to the standards and to monitor performance improvements.

A COMPARISON OF TWO METHODS OF OBTAINING IV FLUID INTAKE VOLUMES. Olson D, Meek L, Barnes P, Dafler A. *Cheek D. Duke University Health System, Durham, NC. * University of North Carolina at Chapel Hill, School of Nursing.

Purpose: The purpose of this study was to compare the Intravenous (IV) fluid intake volume as recorded on the computerized flow sheet versus the practice of reading the total infused volume as recorded on the IV infusion device. **Background and Significance:** Current practice in our intensive care unit is such that during the patient's stay, the amount of IV fluid a patient receives is charted hourly on a computerized flow sheet, with a running total. This total may lead to an inaccurate reflection of the patient's fluid status, since throughout the patient's stay in the ICU the IV pump rate may be changed, the pump may be stopped for periods of time, and IV piggyback medications may be infused. **Methods:** We monitored 105 continuous 24-hour IV infusions. For each infusion, the IV pump "Total Infused Volume" was set to "zero" at 7 a.m. and a repeat reading was taken at 7 am the following day to obtain a 24-hour total infused volume. The corresponding computerized record was also examined at 7 a.m. and the total recorded fluid volume was obtained. **Results:** There was extreme variability of the 105 observations, all observation were included in the data analysis, which demonstrated no significant difference between the recorded and pump data (Student's t-test, $P>0.6$ and Wilcoxon Signed Rank, $P>0.25$). The results demonstrate the extreme variability due to small sample size. **Conclusions:** The computerized account of the patient's IV fluid intake is an adequate reflection of the actual volume of infusate the patient receives. This preliminary study supports the need for a more conclusive study in the future.

PREDICTORS OF PROLONGED MECHANICAL VENTILATION IN MEDICARE RECIPIENTS AFTER CORONARY ARTERY BYPASS GRAFTING SURGERY. Bezanson J, Kinney M, Weaver M, Veledar E, Weintraub W. Scientific Research Solutions, Inc., Roswell, Ga.

Purposes: To develop and validate a predictive model for prolonged mechanical ventilation utilizing selected presurgical patient characteristics. **Background:** Prolonged mechanical ventilation after CABGS contributes to increased morbidity, mortality, and utilization of limited financial resources for Medicare recipients. **Methods:** Data from 548 Medicare recipients ($>$ or equal to 65 years of age) undergoing CABGS during 1998 were obtained from an existing data base at a major cardiac center. The

sample was stratified based on extubation time (Group 1, n=204; < or equal to five hours mechanical ventilation. Group 2, N=343; >5 hour mechanical ventilation.). Estimation (N=276) and validation (n=272) samples were randomly derived from each stratum. **Results:** The logistic regression model based on the 276 subject estimation sample could not be externally validated in the 272 subject validation sample. The entire sample of 548 subjects was used to develop an exploratory logistic regression model. Predictors of late extubation included: (a) age of 80 years or older (odds ratio [OR] 2.991, $P=0.0029$), (b) female gender (OR=1.765, $P=0.0110$), (c) hypertension (OR=1.598, $P=0.0178$), (d) urgent or emergent preoperative clinical status (OR=3.044, $P=0.0018$), and (e) prior CABGS (OR=2.143, $P=.0089$). **Conclusions:** The exploratory model developed provides a preliminary indication of factors placing Medicare recipients at risk for late extubation, but requires further development and testing.

ACUTE CARE NURSE PRACTITIONER EDUCATION: ENHANCING PERFORMANCE THROUGH THE USE OF CLINICAL SIMULATION. Scherer Y, Graves B, Erdley S, Bruce S, Neary MA. University at Buffalo, the State University of New York, Buffalo, NY.

Purpose: To describe the use of clinical simulation as a teaching strategy to enhance learning of Acute Care Nurse Practitioner students in the management of a patient in hypovolemic shock. **Background/ Significance:** Patient simulators are utilized to enhance learner performance through experience in assessing and managing situations they may encounter in their work environment. Since experiences of students can vary, simulation can provide a uniform opportunity to learn to assess and manage specific clinical events in a structured and non-threatening environment. **Methods:** A Simulation Anesthesia Mannequin (SAM) was used to provide students with clinical experience in managing hypovolemic shock. SAM is computer driven to demonstrate physiologic and pathophysiologic processes that respond to pharmacological and clinical interventions. A case study and physiologic parameters were programmed into SAM to simulate hypovolemic shock. The event took place in a fully equipped mock ICU and was videotaped. Each student was then given the opportunity to diagnose and treat SAM. Once specific learning objectives were achieved, the event was terminated. A debriefing occurred immediately following the event to review the videotape, identify areas of weakness, and ask questions. **Results:** Advantages: (1) experiential practice in a clinical situation that may not be experienced during clinical

practicum, (2) provided an opportunity to problem solve and crisis manage situations specific to their work environment, and (3) video for later review provided good feedback on managing a specific event. Disadvantages: (1) high cost of simulators and technical assistance, (2) large amount of faculty time to prepare case scenarios, and (3) student fear and intimidation associated with using a new technology. **Conclusions:** Simulation is an appropriate educational tool to enhance the learning of students, and has the potential for educating nurses working in critical and acute care settings. Research is needed to determine the impact of simulation on student knowledge and performance.

THE PROCESS BY WHICH CRITICAL CARE NURSES OBTAIN HEMODYNAMIC MONITORING SKILLS: A GROUNDED THEORY STUDY. Hart L. Jacksonville University, Jacksonville, Fla.

Purpose: The major objective of this study was to discover the process through which nurses attain competence in one area of acute practice. A theoretical framework is developed for the process of obtaining hemodynamic monitoring skills and the integration of this knowledge into practice by critical care nurses. **Background/Significance:** Physicians and nurses have demonstrated deficiencies in knowledge of the pulmonary artery catheter (PAC). Hemodynamic monitoring is an integral part of patient care and management in many critical care areas. **Methods:** The research method used in this study was grounded theory. A combination of interviews with critical care nurses and observation of practice in the clinical area formed data for generation of the theoretical framework. **Results:** The process of attaining hemodynamic skills in the intensive care unit (ICU) environment of today involves joining theory and reality through the relationship of the following influences: 1) the dynamic ICU environment, 2) what the individual brings into the environment, 3) the meaning of the PAC to the nurses, 4) The perception of value of readings to physicians/practitioners, 5) perceptions of interdisciplinary collaboration, 6) variation in the educator and educational process, 7) variation in mentors, 8) variation in exposure, 9) and the process of assimilation. **Conclusions:** This theoretical framework identifies factors that facilitate and hinder the attainment of PAC skills. The following implications evolved from this study. Nursing orientation programs should be tailored to meet the needs of individual nurses. Courses offered on PAC skills are more effective if they are presented in an organized manner. The material presented in these courses should be introduced in a series of steps, including advanced concept classes for nurses with

advanced competencies. The amount of exposure in practice will also influence the development of PAC skills. The amount of exposure should therefore be evaluated in individual unit settings. **Funding:** This research was sponsored in part by an AACN Clinical Inquiry Grant.

SUCTION PRESSURE AND EVACUATION EFFICIENCY OF SUBGLOTTIC SECRETIONS WITH VARYING VISCOSITIES OBTAINED FROM MECHANICALLY VENTILATED ADULTS.

O'Neal PV, Grap MJ, Munro C, Sessler C. Virginia Commonwealth University, Richmond, Va.

Purpose: To describe the relationship between the level of suction pressure and the evacuation efficiency of three types of subglottic secretions (watery, thick, and gel-like) in a lab model. **Background/ Significance:** Subglottic secretion (SS) removal has been shown to reduce the incidence of ventilator associated pneumonia (VAP). The efficiency of secretion removal may be affected by suction pressure and secretion viscosity. However, the appropriate suction pressure to remove SSs with varying viscosities is unknown. **Method:** A simulated trachea model was intubated with a 8.0 fr Hi-Lo Evac® endotracheal tube and placed in a 20 ml conical tube to provide a closed system. This model was positioned at a 30° angle and placed in a water bath at 37°C to replicate clinical positioning of a mechanically ventilated patient, normal body temperature, and humidification. Because little is known about the process of SS removal, a variety of pooled human secretion viscosities (watery, thick, and gel-like), volumes (2000 ul, 4000 ul, and 6000 ul), and suction pressures (20, 30, 40 and 50 mmHg) were examined. **Results:** The level of suction pressure was not related to evacuation efficiency ($r_s = -.022$; $P = .898$). Significant secondary findings included: SS viscosity and amount of secretions retained above the cuff (SRet), ($r_s = -.765$; $P = .000$); SS volume and amount of secretions removed (SRem), ($r_s = .822$; $P = .000$); SRem and SRet, ($r_s = -.361$; $P = .030$); SS volume and SRet, ($r_s = -.326$; $P = .05$). **Conclusions:** Suction pressure alone does not contribute to evacuation efficiency, but other factors to consider are SS viscosity and volume. The Hi-Lo evac tube is a reliable mechanism to provide SS removal, and this specific endotracheal tube is recommended to be used in the clinical setting. **Funding:** Supported by NINR 1 F31 NRO 7491-01 to P.V.O.

CRITICAL CARE NURSES' ABILITY TO ACCURATELY ASSESS SUBGLOTTIC SECRE-

TION VISCOSITY. O'Neal PV, Grap MJ. Virginia Commonwealth University, Richmond, Va.

Purpose: To identify the ability of critical care nurses to differentiate between three categories of subglottic secretion viscosity: watery, thick, and gel-like. **Background/Significance:** Critical care nurses are instrumental in maintaining patent airways of mechanically ventilated clients and implementing clinical interventions to efficiently and effectively remove secretions. The tenaciousness of subglottic secretions may require vigilant suctioning to optimize efficient removal. **Methods:** Twenty-two nurses in a medical respiratory intensive care unit at a large teaching hospital were surveyed in this descriptive study to assess visual identification of subglottic secretions in a conical tube as thin (like water), thick, or gel-like (glob appearance). The secretions were transported to a lab, and viscosity was measured by identifying the transit time. Watery viscosity was defined as those secretions that had a transit time of 00.00.00-00.00.99 and appeared thin and ran like water. Thick secretions had a transit time of 00.01.00 – 00.99.00 seconds and appeared dense and viscid. Gel-like secretions had a transit time of greater than a minute (01.00.00) and appeared solidified and congealed. **Results:** Subjects were primarily BSN prepared (68.2%), had been a nurse greater than five years (54.4%), and most (58.9%) had spent greater than 2 years in critical care. The nurses' description of the subglottic secretions were significantly correlated with the laboratory categorization ($r = .803$; $P = .000$). **Conclusions:** These results demonstrate that critical care nurses can clinically differentiate between thin, thick, and gel-like secretions. Thus, they are now able to base their clinical actions of increasing suctioning pressure to remove viscous secretions on empirical evidence.

PILOT STUDY: BACKREST ELEVATION AND POSITION RELATED TO SUBGLOTTIC SECRETION ACCUMULATION. O'Neal PV, Grap MJ. Virginia Commonwealth University, Richmond, Va.

Purpose: To describe the relationship between the volume of subglottic secretions accumulated over time (5-, 10-, 15-, 30-, 60-, 90-, and 120-minute intervals) at backrest elevations (BE) of 10, 25, 45 degrees, and supine and lateral positions (right and left). **Background/Significance:** The Centers for Disease Control (CDC) recommendations for prevention of ventilator associated pneumonia (VAP) include elevation of the head of the bed (HOB) at an angle of 30 degrees to 45 degrees. Critical care nurses have been found to use low backrest elevations (<30 degrees) in clinical practice.

Subglottic secretion (SS) accumulation has been related to the incidence of VAP. The effect of backrest elevation on SS accumulation among mechanically ventilated subjects is unknown. **Methods:** A quasi-experimental study was conducted in the medical respiratory intensive care unit (MRICU) of a large teaching institution. IRB approval was obtained. Sample included 13 subjects who were intubated with the Hi-Lo evac tube, which promotes SS removal. SSs accumulation was monitored at 5-, 10-, 15-, 30-, 60-, 90-, and 120-minute intervals for each BE and position, which extended to be a 10-hour study. Objective and specific descriptions for each position were used. SS volume was measured in microliters and viscosity was measured by transit time down an angled slide. **Results:** The sample was primarily white (85%) and primarily female (54%). Respiratory distress and failure (54%) were the primary reasons for intubation. A total of 301 collections occurred with volumes varying from 0 to 1.6 ml. The viscosity ranged from thick (.62 sec and .74 sec) to gel-like (taking greater than 30 minutes to run down the slide). Less than 1% of the time were secretions accumulated during the study period. **Conclusions:** Sparse SS accumulation occurred during a 10-hour time period in the clinical area when a mechanically ventilated patient is turned every 2 hours. This study raises further questions about the need for continuous subglottic suctioning versus intermittent and the need to identify other factors contributing to SS accumulation and removal.

FACTORS ASSOCIATED WITH SUBGLOTTIC SECRETION ACCUMULATION AND REMOVAL AMONG MECHANICALLY VENTILATED ADULTS. O'Neal PV, Grap MJ, Munro C, Sessler C, Minick P. Virginia Commonwealth University, Richmond, Va.

Purpose: To describe the relationship between subglottic secretion (SS) volume and patient volume status (PVS) and to describe the relationship between SS viscosity and PVS. **Background/Significance:** Potentially pathogenic SSs pool above and leak around the folds of the endotracheal tube cuff during intubation and predispose the patient to ventilator-associated pneumonia (VAP). Identifying factors associated with SS accumulation and removal may delay and prevent VAP occurrence. Over 90% of mechanically ventilated patients acquire nosocomial pneumonia, VAP adds as many as 10 additional hospital days and increases mortality rates by as much as 71%. **Methods:** Seventy SS samples were collected from 15 subjects initially intubated with the Hi-Lo Evac® endotracheal tube. SSs were obtained by continuous suction from the subglottic suction port of a Hi-Lo Evac® endotracheal tube. SS volume was

measured in microliters per 24 hours. SS viscosity was measured in vitro by secretion transit time across an angled glass slide. Patient volume status was defined by 24-hour fluid balance, change in daily weight, BUN/creatinine ratio, salivary flow (assessed by visual analogue scale), and measured salivary volume. **Results:** A significant relationship was found between SS volume and one measure of PVS, BUN/creatinine ratio, ($r=.326$; $P<.01$) and SS viscosity and salivary volume, ($r=-.241$; $P=.207$). **Conclusions:** Only one measure of PVS was associated with SS volume or SS viscosity, indicating that other factors, not tested here, influence SS accumulation viscosity. This study is pioneering work in the area of identifying a comprehensive understanding of factors associated with SS accumulation and removal. **Funding:** Supported by NINR 1 F31 NRO 7491-01 to P.V.O.

METHODS OF TEMPERATURE MEASUREMENT. Hanneman S, Jesurum J, Bickel D. The University of Texas Health Science Center at Houston, Houston, Tex.

Purpose: The study purpose was testing, in vitro and in vivo, linearity, bias, precision, and response time of pulmonary artery, urinary bladder, tympanic, femoral artery and rectal methods of temperature measurement. **Background/Significance:** Literature comparing methods of temperature measurement is extensive; however, few studies have measured continuous temperature with a time series design across varying conditions of physiologic stability. This approach permits evaluation of sensitivity to change in body temperature (response time differences [RTD]) that has not been reported for times >1 hr. Critically ill patients are at risk for thermal imbalance from sedation, immobility, invasive procedures, and medical complications. Comparison of clinical temperature methods for sensitivity to change is needed. In vitro experiments were conducted with precision-controlled water bath and laboratory-certified thermometer for temperatures 34°C - 42°C. Following IRB approval, in vivo experiments were conducted over 40-168 hr in an ICU with four, 69-80 kg, domestic farm pigs. Temperatures were measured every 1-5 sec. Pearson's r was used to test linearity; Bland-Altman method, augmented with bootstrapping, was used to test bias and precision. Moving averages (in vitro) and cross-correlation analysis with aligned time series (in vivo) were used to test RTD. In vitro results were nearly perfect linearity, accuracy and precision for all probes, with RTD of 75-120 sec. In vivo results showed variable linearity for the tympanic and excellent linearity for other methods. Bias and precision were excellent for the femoral artery but did not consistently

meet the a priori specifications with other methods. RTD varied from 7 sec with the femoral to 4.7 min with the tympanic method. **Conclusions:** Bioinstrumentation error sources are many. Although probes had acceptable in vitro performance, in vivo performance was acceptable for only pulmonary and femoral artery methods. Intravascular monitoring of temperature produces accurate, precise and responsive measurement under varying conditions of physiologic stability. **Funding:** Funded by the National Institute of Nursing Research (R15 NR-04488) and UT-Houston School of Nursing PARTNERS.

THE EFFECT OF A CHRONIC SUPPORT GROUP ON HEALTH LOCUS OF CONTROL.

Walblay A, Draus C, Westphal C. Oakwood Hospital and Medical Center, Dearborn, Mich.

Background: The literature suggests that a positive relationship exists between internal locus of control and physical well-being. **Purpose:** We decided to evaluate the effect of participation in a chronic support group may have on locus of control in both the client and caregiver. **Methods:** Participants in a Partnering for Wellness support group were asked to complete a brief questionnaire (using the Health Locus of Control tool) at the initial program, and again 10 months later. **Results:** Results showed that the overall locus of control score for the clients (n=7) decreased (36.9 to 35.5), showing a trend toward less emphasis on an external locus of control. The caregivers (n=6) overall score, however, increased (33.7 to 37.6), exhibiting a trend toward a higher emphasis on external control. **Conclusion:** These data suggest that the support group may facilitate the clients in attaining a greater degree of confidence in managing the chronicity of their illness, thereby being more effective in meeting the needs of the client rather than the caregiver. In conclusion, the concept and tool appear to be effective ways of measuring support group effectiveness and need to be studied with larger numbers.

POSTOPERATIVE OPEN-HEART SURGERY PAIN MANAGEMENT. Metersky S, Dickerson L, Shipley M, Clark K, Scott J, Scarrett D. Grant Medical Center, Columbus, Ohio.

Purpose: To evaluate effectiveness of current pain management practices in the immediate postoperative open-heart surgery patient. **Background:** Postoperative open-heart surgery patients were "waking up" earlier and experiencing increased levels of pain. This required the nursing staff to contact anesthesiologists and

surgeons for pain management since the current standing orders were inadequate. Pain control became a dissatisfier for both the patient and the nursing staff. **Methods:** Pain management data were collected beginning in surgery through the immediate postoperative phase. Data from 50% of open-heart surgery patients (n=15) from December 2000 was compared to baseline pain management data from the previous 6 months. **Results:** Confirmation of patients waking up earlier and requiring more pain medication was established. The data showed a 29% decrease in narcotic utilization intra-operatively when compared to baseline data. Narcotics were being administered primarily upon induction only, contributing to increased pain and earlier awakening. Patients were waking up 54 minutes earlier; once awakened, they utilized 19% more narcotics than in the previous period. More patients required narcotics prior to extubation as was evident by a 16% increase in narcotic administration overall. Utilization of narcotics for pain management was ineffective 21% of the time, requiring a call to the surgeon for additional pain management medication. **Conclusions:** The nursing staff influenced practice in pain management by developing a research-based pain management protocol that was incorporated into pre-printed physician orders. The new orders increased the allowable frequency and dosage of narcotics and added Ketorolac (Toradol). The presentation of this data, sharing of research literature on current pain management practices, and collaboration between surgeons, anesthesiologists, pharmacy, and nursing allowed the team to implement this change despite previous resistance.

CREATING A STANDARD OF CARE: ACUTE CORONARY SYNDROME . Gorman B, Metersky S. Grant Medical Center, Columbus, Ohio.

Purpose: To improve standard of care for Acute Coronary Syndrome (ACS) patients in our organization. **Background:** Our practices were not in compliance with American College of Cardiology (ACC) and American Heart Association (AHA) 1999 guidelines for the management of patients with ACS. This was evidenced by low medical regime compliance with aspirin, beta blocker, lipid-lowering agents and ACE inhibitors, below standard documentation of smoking cessation counseling and LV function, and a high average length of stay. **Methods:** A multidisciplinary team was formed to address the need for a systematic change in the management of ACS patients. A team charter was created which included a physician sponsor, outcomes manager and multidisciplinary staff. Through this work team the current ACS process was identified

utilizing a flow chart and the following process gaps were identified: a delay in ED triage and treatment time and a lack of physician and staff knowledge of current assessment tools and treatment guidelines. An action plan was developed and the following initiatives were implemented: a fast track triage system, a ED chest discomfort unit, a risk stratification program, a critical pathway and pre-printed order sets. Data was collected through electronic query and manual review, with manual validation of data. **Results:** Appropriate medication utilization increased by: 18% in beta blockers, 39% in aspirin and 17% in ACE inhibitors. Documentation increased by: 11% for LV function and 11% for smoking cessation counseling. LOS decreased by 1 full day (5.1 to 4.1 days) with no increase in rate of Hospital Readmission within 31 days. **Conclusions:** Research-based National guidelines influenced our practice standards and created an increased level of quality care within our organization.

QUALITY OF LIFE OF ADULTS WITH CONGENITAL HEART DISEASE. Simko LC. Duquesne University, Pittsburgh, Pa.

Purpose: The purpose of this study was to describe the Quality of Life (QOL) perceived by adults with Congenital Heart Disease (CHD) and their healthy counterparts. **Background/Significance:** Adults with CHD are a growing population of patients. Medical and surgical advances, while increasing the number of adults with CHD, may create QOL issues not previously considered. **Methods:** This study used a case-control design with a QOL assessment tool, the Sickness Impact Profile (SIP), and a demographic questionnaire. A sample of 124 adults with CHD and 124 matched healthy controls participated. Thirteen patients had single ventricle (SV) physiology, 43 had cyanotic lesions with 2 ventricle repairs, and 68 had acyanotic CHD. The scores for the SIP were hand scored. The Stata 6.0 statistical software system was used for data analysis with the exception of the Chi-squared tests which were computed in StatExact. **Results:** The total SIP scores for the study group were: 9.98 (mild disability), 4.61 (mild disability), and 3.76 (no disability) for the SV, cyanotic lesions with 2 ventricles, and acyanotic groups, respectively. Compared to matched controls, there was a significant difference in the total SIP score, the physical and psychosocial dimension scores, and all category scores ($P<.05$). The areas of life reported to be most affected were work and sleep and rest. There was no significant difference between those with cyanotic anomalies versus acyanotic anomalies. However, individuals with SV had higher scores than those with acyanotic anomalies (SIP of 9.98

vs 3.76) ($P<.05$). **Conclusions:** Adults with CHD did not see themselves as having physical limitations; their self perceptions and individual expectations are normal. Participants with single ventricle physiology saw themselves as having the poorest QOL. Implications for nursing include the development of appropriate information, counseling, and anticipatory guidance for this new patient population. **Funding:** This study was supported by a grant from Sigma Theta Tau, Epsilon Phi Chapter and a Dean's Dissertation Seed Grant from the School of Nursing, Duquesne University.

SUBJECT RECRUITMENT IN CRITICAL CARE: A COMPLEX TASK IN A COMPLEX ENVIRONMENT. Munro C, Grap MJ. Virginia Commonwealth University, Richmond, Va.

Purpose: To describe subject recruitment issues and outcomes in funded study in a medical respiratory intensive care unit. **Background/Significance:** Subject recruitment can be difficult especially in the critical care environment. The level of stress experienced by the patient's family may decrease interest and enrollment in clinical studies. Inadequate recruitment can reduce the ability to detect treatment differences, and result in the study's abandonment. While causes of recruitment difficulties have been documented in medical trials, little is known concerning recruitment in critical care nursing studies. **Methods:** All patients admitted to a medical respiratory ICU were reviewed daily for study eligibility. Inclusion criteria for the funded study were initiation of mechanical ventilation (MV) within the previous 24 hours and expectations for MV for at least 4 days. Reasons for ineligibility and failure to consent were documented. **Results:** During a 6-month period, 331 patients were reviewed for eligibility; 24 (7%) were enrolled; 268 (81%) were not eligible and not enrolled, and 39 (12%) were eligible but not enrolled. Of those who were reviewed for study enrollment, 50% were male; 60% were African American, and 37% were Caucasian. Of those who were eligible but not enrolled, 67% were due to family unavailability for consent and 33% were due to families unwilling to consent. In comparing those who did consent and those who did not, there were no significant differences in patient's gender or ethnic background. Reasons for not providing consent were primarily related to the family's inability to deal with any more information or decisions." **Conclusions:** Conducting clinical studies in the critical care environment, enrolling subjects and obtaining consent may be complicated by the critical nature of the patient's illness, and researchers must be aware of these issues for study success. **Funding:** National Institute of Nursing Research, R15 NR04730-01.

PREDICTORS OF LEVEL OF BACKREST ELEVATION IN MRICU, STICU, AND NSICU.

Grap MJ, Munro C, Ashtiani B, Bryant S. Virginia Commonwealth University, Richmond, Va.

Purpose: To describe the level of backrest elevation and position and identify factors associated with positioning decisions in medical, surgical-trauma and neuroscience ICUs. **Background/Significance:** Patient positioning is a key component of nursing care. Use of low backrest and supine positions are associated with an increased mortality, incidence of ventilator-associated pneumonia, and occurs frequently in the ICU. However, data are not available across ICU settings about the level of backrest position used and its relationship to enteral feeding and hemodynamic status. **Methods:** Data were collected at randomly selected times, in each of the 3 units over a 6-week period, resulting in 506 observations for 170 patients. Backrest elevation was determined by electronic bed read-out or bed frame elevation gauge. BP, HR and enteral feeding status were retrieved from the patient's ICU flow sheet. **Results:** Mean backrest elevation was 19.2 degrees, and 70% of subjects were supine. No difference in backrest elevation among units was found. Significant correlations between backrest elevation and systolic BP ($r=.15$, $P=.006$); and backrest and diastolic BP ($r=.13$, $P=.02$) were found. There was no difference in backrest elevation between patients being fed and not being fed. Differences in backrest elevation for intubated versus nonintubated patients approached significance ($P=.07$), with intubated patients at lower backrest elevations. Seventy ICU nurses from the same units reported using backrest elevations of 30-45 degrees more than 67% of the time (intubated patients) and more than 58% of the time (nonintubated patients). **Conclusions:** Use of higher backrest elevations (>30 degrees) is minimal, is not related to feeding, and is minimally related to hemodynamic status. Nurses underestimate the level of backrest elevation and the frequency of use of higher elevations. Strategies to meet CDC recommendations for backrest elevation (30-45 degrees) must include repeated feedback about nurse's use of backrest elevation and estimates of elevation. **Funding:** Virginia Commonwealth University Undergraduate Research Award.

ORAL CARE INTERVENTIONS IN CRITICAL CARE.

Grap MJ, Munro C, Ashtiani B, Bryant S. Virginia Commonwealth University, Richmond, Va.

Purpose: To describe oral care intervention frequency and interventions reported by nurses in medical, surgical and neuroscience ICUs. **Background/Significance:** Oropharyngeal colonization is associated with venti-

lator-associated pneumonia (VAP) and may be alterable by oral care. There are little data about oral care interventions in the critically ill, and no data to prescribe methods and frequency of oral care to reduce associated risks. **Methods:** Unit nursing staff (n=170) received oral care surveys and second and third reminder surveys. Oral care interventions (frequency and type of solution) were recorded, from flow sheets, for the previous 24 hours for all ICU patients at 5 randomly selected times over a 1-month period. **Results:** Response rate was 45% (n=77) and represented the 3 ICUs. Respondents were RNs (97%) with a BSN (70%) and average ICU nursing experience of 8.4 years. The majority (75%) reported providing oral care 2 or 3 times per day for nonintubated patients, and more than 5 times per day for intubated patients. No differences in normal saline, mouthwash, H₂O₂ or chlorhexidine use between nonintubated and intubated patients were found. However, reported use of toothpaste ($P<.0001$) and a toothbrush ($P<.0001$) was significantly greater in nonintubated patients, and use of a sponge toothette was significantly greater in intubated patients ($P<.0001$). Nurses' mean rating (1-lowest to 100-highest) of oral care priority was 53.9. However, in 170 ICU patients, mean documentation of oral care over the previous 24 hours was 1.2 times per patient. **Conclusions:** Oral care interventions were significantly different in intubated and nonintubated patients. While only tooth brushing may alter oral flora on dental plaque and its associated risks, the use of toothbrushes and paste in patients at greatest risk (ie, intubated) is minimal. Nurses report frequent oral care interventions, but actual documentation is low. **Funding:** Virginia Commonwealth University Undergraduate Research Award.

DROTRECIGIN ALFA (ACTIVATED) DISPLAYS UPTAKE AND CLEARANCE CHARACTERISTICS THAT ARE RELATED TO BODY WEIGHT AND CONSISTENT WITH A SHORT HALF-LIFE.

Swindell BB, Brown P, Derchak, Pa.

Purpose: To determine the pharmacokinetic characteristics of drotrecogin alfa (activated) in patients with severe sepsis. **Background/Significance:** Drotrecogin alfa (activated) has demonstrated, in a Phase III randomized placebo-controlled trial, to reduce mortality in severe sepsis (Bernard, et al. NEJ 2001). Drotrecogin alfa (activated) is a recombinant homologue of plasma human Activated Protein C with a recommended infusion rate of 24 (g/kg/hr for 96 hours. **Methods:** Pharmacokinetics were examined in patients with severe sepsis as part of a Phase III trial (843 samples from 326 drotrecogin alfa [activated] patients). **Results:** Median steady state concentration (C_{SS}) in patients with severe sepsis was 43.5 ng/ml (mean 51.5 ng/ml) and was

achieved within 2 hours of starting drug infusion. Median plasma clearance (Clp) was 40.1 L/hr (mean 41.8 L/hr). Plasma concentrations were below quantitation within two hours of ceasing infusion. Clp depended on actual body weight. Small effects of age, gender, renal impairment, hepatic function, and disease severity on weight-adjusted Clp were observed within the range of variability. Thus, the only factor to consider in dosage adjustment is body weight. Drotrecogin alfa (activated) has antithrombotic and profibrinolytic properties, which increase bleeding risk during invasive procedures. The short half-life requires that infusion be stopped only 2 hours before a procedure. Infusion can resume 12 hours after a major procedure or when hemostasis is achieved. **Conclusions:** Drotrecogin alfa (activated) should be dosed according to weight, reaches CSS quickly, and is eliminated within 2 hours of stopping infusion.

DECREASING BARRIERS TO RESEARCH UTILIZATION BY USING ELECTRONIC MAIL IN THE ACUTE CARE SETTING. Bobo CM. University System of Georgia, Gordon College.

Purpose: To decrease nurses' perceptions of barriers to research utilization. **Background/Significance:** Consistent and timely use of research findings at the clinical level has encountered barriers to implementation. Decreasing these barriers will ultimately improve research utilization. Healthcare professionals must be knowledgeable about current validated research in order to continually improve patient care. Research utilization is nowhere more vital than in the critical care setting. There is a vital link between nursing as a profession, the quality of client care, and the utilization of nursing research. Ultimately, nurse professionals can and should be held legally responsible for providing care based on current knowledge gained by research. **Methods:** The design for this study involved a pre-test and post-test design with treatment and control groups. The intervention process methodology consisted of identification of problems or areas of interest by the clinical staff, research committee evaluation of current research addressing those issues, formulation of a 1-page research synopsis, submission for evaluation and approval to the hospitals nursing executive committee and then dissemination via the hospital E-mail system. Sample size consisted of 20 control and 20 intervention subjects randomly chosen from hospital staff. The pre- and post-test instrument, BARRIERS scale (Funk, et al., 1991), which identifies 4 barrier factors, was utilized to evaluate changes in nurses perceptions of barriers to research utilization. **Results:** ANOVA data analysis revealed statistically significant decrease in three of the

barrier factors; Adopter ($P=0.05$), Communication ($P=0.001$) and Organization ($P=0.01$), suggesting that the study was successful and effective in decreasing the nurses' perception of some barriers. **Conclusion:** Implementing the study methodology to distribute current nursing research decreased nurses' perceptions of barriers to research utilization. The methodology used in this study provides the basis for improving research utilization. Decades of unsuccessful efforts to solve this problem should be considered unacceptable by nursing professionals.

PULSE OXIMETRY ACCURACY AND PERFORMANCE DURING COMBINED MOTION AND LOW PERFUSION. Cook CM, C-C Wun, Mannheimer PD, Bebout DE. Nellcor Oximetry, Tyco Healthcare, Pleasanton, Calif.

Purpose: This study investigated the effects of combined motion and low perfusion on the accuracy and performance of a new pulse oximeter (Nellcor N-595) compared to conventional pulse oximetry (Nellcor N-200). **Background and Significance:** Several pulse oximetry signal processing methodologies have been recently introduced for the continuous and accurate reading of saturation (SpO_2) during patient motion. This study evaluated the Nellcor N-595 pulse oximeter that was designed to improve performance over conventional pulse oximetry during the more challenging conditions of combined motion and low perfusion. **Methods:** With IRB approval and informed consent, 12 healthy adult volunteers were studied. To induce peripheral vasoconstriction and low perfusion, subjects were acclimated for 45 minutes prior to study to the laboratory, which was maintained at 58-62°F throughout the study. The motion protocol consisted of rubbing and scratching motions (2-3 minutes each) during stable normoxia, transient hypoxia and stable hypoxia. Two N-595's and two N-200's were attached to the fingers of the motion hand and were compared to like instruments on the non-motion hand. SpO_2 performance measures included bias, precision, root mean square of the differences (RMSD) and Receiver Operator Characteristics (ROC) parameters (eg, area under the curve). Probability values were obtained using parametric linear mixed model analysis (bias, precision, RMSD) and generalized linear model analysis (ROC parameters). **Results:** Compared to the N-200, the N-595 showed significantly better accuracy and performance evidenced by $\geq 50\%$ improvements in bias (5 ± 3 vs. 11 ± 7 ; $P<0.001$), precision (5 ± 3 vs. 10 ± 7 ; $P<0.001$), and RMSD (7 ± 4 vs. 15 ± 10 ; $P<0.001$), and greater AUC (0.900 ± 0.077 vs. $0.838.067$; $P<0.005$). **Conclusions:** We conclude the new N-595 pulse

oximeter shows significant improvements in accuracy and performance compared to conventional pulse oximetry during the more challenging conditions of combined motion and low perfusion.

COMPARISON OF FAMILY STRESSES, STRENGTHS, AND OUTCOMES AFTER TRAUMA AND SURGERY. Leske J. University of WI-Milwaukee, Milwaukee, Wis.

Purpose: The purpose of this study was to compare family stresses, strengths, and outcomes after motor vehicle crashes (MVC), gunshot wounds (GSW), and cardiac surgery (CABG). **Background and Significance:** The consequences of trauma and surgery are major social, psychological, and economic problems for families after critical care. Prior research suggests that optimal patient recovery may be associated with family strengths and positive family adaptation. **Methods:** A multivariate descriptive design based on the adaptation phase of the Resiliency Model of Family Stress was used. A convenience sample of family members (n=127) participated within 2 days of admission to the critical care unit. Family stresses were measured by the Family Inventory of Life Events and the APACHE III. Family strengths were measured by the Family Hardiness Index and the Family Crisis Oriented Personal Evaluation Scale. Family adaptation outcomes were measured by the Family Member Well-Being Index and the Family Adaptation Scale. **Results:** Family members ranged in age from 18-80 years (X=42 years). Patients ranged in age from 19-78 years (X=44 years). After controlling for family member age, income, and education, multivariate analysis of variance indicated that family members of patients with trauma and surgery reported no significant differences in family strengths of hardiness and family outcomes of well-being and adaptation. However, family members of GSW patients reported significantly more stress (F=4.0, $P<.01$) and less use of coping strategies (F=4.33, $P<.01$). **Conclusions:** Interventions that address family stress and develop or mobilize coping are needed for selected families.

PRELIMINARY FINDINGS TO A MULTIDISCIPLINARY APPROACH TO REDUCTION OF ATRIAL FIBRILLATION WITH THE ADMINISTRATION OF IV MAGNESIUM SULFATE. Walsh E, Luckeroth P. Providence St. Vincent Medical Center, Portland, Ore.

Purpose: To determine if administration of IV magnesium before and after cardiac surgery reduces

occurrence of atrial fibrillation (AF). **Background:** AF is one of the most common complications after cardiac surgery. AF requires anticoagulation, lengthens hospitalization and increases the cost of cardiac surgery. In a recent study by Toramen et al in Istanbul, Turkey, 200 consecutive patients undergoing bypass were prospectively randomized into groups. Magnesium group received 1.5 g MgSO₄ the day before surgery, just after cardiopulmonary bypass, and daily for 4 days after surgery. Control group received only NaCl. Results of study revealed AF occurred significantly less in magnesium group compared to control group, 2% vs. 21%, respectively. **Methods:** A multidisciplinary team designed a replication of the Turkish study. Beginning April 2001, all patients having cardiac surgery at PSVMC receive 2 g MgSO₄ before surgery, immediately after surgery, and daily for 3 days after surgery. The incidence of AF in post-cardiac surgery patients was measured for the years 1999 and 2000. Concurrent data collection by chart review in 2001. **Results:** In 1999 (n=988) and 2000 (n=969), AF occurred in 20.5% patients having cardiac surgery, 16.5% patients having CABG surgery and 36% patients having CABG-valve combination surgeries. In 2001 (n=316), after initiation of magnesium, AF occurred in 19% of patients having cardiac surgery, 16% of patients having CABG surgery and in 20% of patients having CABG-valve combination surgery. **Conclusion:** Preliminary data show that administration of IV MgSO₄ has not made a significant reduction in the occurrence of postoperative AF in patients having CABG surgery or CABG-valve combination surgery. However, administration IV MgSO₄ has significantly reduced the occurrence of postoperative AF in valve surgery patients.

POST-ANESTHESIA CARE UNIT ANTIEMETIC PILOT STUDY. Feider L, Nolte J. Tripler Army Medical Center, Honolulu, Hawaii.

Purpose: To validate the efficacy of Anzemet, compared to Zofran, as a cost-effective therapy in the prevention of postoperative nausea and vomiting. The hypothesis was patients who received Anzemet would not require further antiemetic interventions for postoperative nausea and vomiting. **Background/Significance:** Postoperative nausea and vomiting is the most common side effect seen in a surgical recovery room. Zofran, a selective 5HT₃ receptor antagonist, has been the first-line antiemetic in the operating room (OR) before coming to the post-anesthesia care unit (PACU) for prevention of postoperative nausea and vomiting. Anzemet, also a selective 5HT₃ receptor antagonist, is approximately one third the cost of Zofran. Previous studies have only compared Anzemet to Zofran in

oncology patient trials. **Methods:** The pilot study was conducted in a 256 bed Military Treatment Facility. The average number of OR cases per month was approximately 500. A descriptive data collection tool was developed to provide prospective data on the use of Anzemet and Zofran and clinical outcomes. The primary outcome was to have postoperative nausea and vomiting controlled in the PACU. All patients received an antiemetic by anesthetic provider's preference prior to arrival in the PACU. Descriptive analysis of the data collection tool was completed. **Results:** Sixty patients (23 males and 37 females) were involved in the study. Of the sixty patients in the study, 57 received general anesthesia, two received combined general and epidural anesthesia, and one patient received spinal anesthesia. Anzemet demonstrated a 70% success rate in the prevention of postoperative nausea and vomiting. **Conclusion:** Anzemet, at three-fifths the cost of Zofran, is a logical and cost-effective way to manage postoperative nausea and vomiting. This saved the hospital \$27 000 for effective postoperative nausea and vomiting control. Further study is needed to confirm these pilot study results.

BRAIN ATTACK PATHWAY IMPLEMENTATION.

Feider L. Tripler Army Medical Center, Honolulu, Hawaii.

Purpose: To streamline the care of the brain attack patient population and to demonstrate a decrease in LOS and cost to the hospital while providing quality and access to care from the ER to critical care and discharge. **Background/Significance:** Brain attack is the 3rd leading cause of death in the U.S. At our facility, it was the #1 DRG outlier with a LOS of 10.6 days compared to the national average LOS of 6.1 days. There is a national push to increase public and provider awareness of the signs and symptoms of stroke to ensure patients are treated in a timely manner, thereby decreasing the risk of permanent disability and/or death from stroke. **Methods:** Pathway development was completed using a team approach over a 9-month period, with subject matter experts including a clinical nurse specialist, neurologist, intensivist, dietician, occupational, and physical and speech therapists. The clinical nurse specialist and the neurologist were the champions of the clinical pathway, facilitating hospital-wide education to all staff members and implementation of the pathway. Utilization management tracked the pathway outcomes. **Results:** Eighteen patients were placed on the brain attack pathway since 1 February 2001. 45% are male, 55% female, with a mean age of 64 years and age range from 38-92 years. The average time frame for ER admit

to CT completion was 1.28 hours. No patients qualified to receive tPA. Ninety percent of consults were sent from period one of the pathway. The LOS decreased to 6.5 days. **Conclusion:** The brain attack pathway demonstrates effectiveness for increasing access to care and a significant decrease in LOS by 4.1 days. Current cost avoidance is \$60 000 and projected annual cost savings to the hospital at \$180 000 annually.

NURSE-SENSITIVE OUTCOMES IN AMBULATORY SURGICAL PATIENTS. Yellen E. Texas A & M University-CC, Corpus Christi, Tex.

Purpose: 1. To explore the influence of selected variables on the satisfaction of patients admitted to a South Texas hospital. 2. To improve the reliability and validity of the instrumentation of patient satisfaction. **Background:** Patient satisfaction data are used by hospital administrators to allot rewards and incentives for individual personnel or units and to design interventions to improve scores. Texas is moving toward a widespread statistical comparison of quality among hospitals. Patient satisfaction, a nurse-sensitive outcome, will be included in that comparison. Present methods of collecting patient-satisfaction data contain few nursing items and have little published evidence of reliability and validity (McBride, Anderson & Bahnson, 1999) (<http://www.pressganey.com>). **Methods:** A descriptive correlational study was conducted with a convenience sample of 189 patients in the ambulatory surgical unit (IRB approval was granted). The patients completed the Patient Satisfaction Instrument (PSI) (n=109) or the Press Ganey (PG) (n=80) satisfaction measurement and the Patient Data Form immediately before discharge. Descriptive statistics, a stepwise multiple regression analysis, reliability analysis, Spearman rank-order and Pearson correlation were performed on the data. **Results:** The patient sample (N=186) had a mean age of 46 years (SD=21); 49.5% were Caucasian and 41.6% were Hispanic. Male patients made up 58.4% of the sample, with urology procedures of greatest frequency. Race of the patient ($r_s=.21, P=.00$), and nurses' helpfulness with pain relief ($r=.22, P=.00$) were significantly correlated with patient satisfaction. The regression analysis was not significant. The alpha coefficient on the PSI for this sample was .94, and the PG was .97. **Conclusion:** This study suggests that Hispanic patients are less satisfied in the ambulatory surgery department. Patients who rate the nurses' helpfulness with pain relief higher will rate their satisfaction higher. The PG and PSI produced comparable reliabilities. **Funding:** This study is supported by a 2001 AACN Data Driven Clinical Practice Grant.

McBride JS, Roger MA, Anderson T, Bahnson JL. Using a hand-held computer to collect data in an orthopedic outpatient clinic. *Medical Care*. 1999; 37:647-651.

INNOVATIVE CHANGES IN TELEMETRY MONITORING. Perkins L, Viggiano E. Cardiology Telemetry Unit, Providence St. Vincent Hospital, Portland, Ore.

Purpose: For many years, the telemetry unit functioned with a traditional monitoring model. The system was limited to heart rate alarms. The model included 2 monitor technicians (MT) to observe up to 60 patients' rhythms and alert the nursing staff when a patient's rhythm changed. The MT ran EKG strips, measured tracings and identified rhythms. A new system was purchased with arrhythmia and rate alarms. During the initial process design, it was determined that monitoring would continue in a centralized location with one MT. An elaborate system was designed to alert the RN staff of patient rhythm changes by the MT and communication back to the MT that the RN had responded. Stat pagers were added at a later date. The RNs wore the pagers that alerted them of patient rhythm changes within 6 seconds, and they started responding directly without notification from the MT. **Description:** A group of expert nurses decided a course of action. They conducted benchmark surveys and site visits at hospitals with the same monitoring and stat pager system. Data and information gained was shared within the group who developed an AIM for the unit, identified specific changes in the RN and MT role and measurement outcome to test the new design. **Evaluation and Outcome:** The data demonstrated that hospitals using our monitoring and stat pager system no longer used MT. RNs did not know EKG rhythms or have adequate knowledge about their patient's rhythms when MTs were used. When the new system was put into place, RNs were assessed, re-educated and now knew EKG rhythms, had more knowledge about their patient's and felt that they were intervening earlier and had better outcomes. The MTs no longer sit in a room. They now assist unit secretaries and the nursing staff on the unit.

A CASE STUDY REVIEW OF ORAL HYGIENE NURSING PRACTICE IN A PEDIATRIC BURN ICU. Gordon M, Jaco M, Marvin J. Shriners Hospitals for Children, Galveston, Tex.

Purpose: This study was conducted to describe oral hygiene nursing practice in a critically ill burned child.

Research questions included: 1) Did nursing assess the need for and document the effectiveness of oral hygiene? 2) Was the oral antifungal prophylaxis and oral hygiene protocol followed? 3) Was oral candidiasis prevented? **Background/Significance:** Stressors that damage oral mucosa include oral breathing, intermittent suction, NPO, drug therapy (ie, antibiotics, antidepressants, diuretics, narcotics, antipsychotics, antihistamines, anticholinergics), and oxygen therapy. **Methods:** A retrospective case review was done on a 4-year-old boy with a 98% TBSA burn injury, with an initial hospital stay of 104 days. Data elements were selected that described compliance with the unit policy and the outcomes of practice. **Results:** Oral stressors included a tracheostomy tube and dobhoff & NG tubes in place for 72% of the days with episodes of emesis 43% of the hospital days. In addition, antibiotics were given 87% of the days. The drugs listed in Background section were also given during hospitalization. The physical assessment of the mouth was documented 94% of the time, and mouth care was documented 7.7% of the hospital stay. Mycostatin, oral antifungal prophylaxis protocol, was prescribed 89% of the total days. The ordered dosage was 5 cc either TID (63%) or QID (26%), and "swish and swallow" route was ordered 84% of the days. Mycostatin doses were given 65% of the prescribed time. There was no incidence of oral candidiasis during his hospital stay. **Conclusions:** As a result of these findings and a review of the most recent evidence-based oral hygiene nursing literature, we have added an improved oral assessment tool and a computerized method of documenting mouth care.

A REVIEW OF BENZODIAZEPINE NURSING PRACTICE IN A PEDIATRIC BURN ICU. Jaco M, Gordon M, Marvin J. Shriners Hospitals for Children, Galveston, Tex.

Purpose: This study was conducted to describe nursing practice related to benzodiazepines in a critically ill, burned child. Research questions were 1) Did nursing assess the need for and document the effectiveness of benzodiazepine drugs? 2) Were the drugs ordered and administered according to the pain and anxiety management policy? **Background/Significance:** Benzodiazepines are frequently used for sedation. Children with burn injuries receive scheduled doses of lorazepam and/or diazepam as the recommended treatment of background anxiety. Procedural anxiety is managed with lorazepam and midazolam. **Methods:** A retrospective review was done on a 4-year-old boy who sustained a 98% total body surface area burn and was hospitalized for 104 days. Data elements were selected that described compliance with hospital policy and

outcomes of practice. **Results:** Benzodiazepine drugs were given for 95% of his hospital stay. The orders written for frequency of benzodiazepine administration were 58% scheduled and 39% prn. Anxiety assessment was documented by nursing 67% of the time as a subjective note, and effectiveness of the drug intervention 41% of the time, also documented as a subjective note. There was no connection between an increase in lorazepam dose and any assessment notation. Another finding was that emesis occurred when the daily lorazepam dose was decreased by 3.7 mg. There was no emesis when the daily dose was decreased less than 1 mg. **Conclusions:** This study prompted an educational program covering the use and documentation of benzodiazepines. The nurses instituted the use of a fear scale to objectively measure anxiety levels of the children. The physicians instituted measurement of benzodiazepine levels as a guideline in the use and withdrawal of these drugs. The results of this study confirm the published literature concerning the rapid decrease of benzodiazepines and the occurrence of withdrawal symptoms.

PREDICTION OF TERMINAL STATUS AND PRESENCE OF ADVANCE DIRECTIVES FOR ADULT MEDICINE PATIENTS. Counsell C, Smith J. Shands Hospital at the University of Florida, Gainesville, Fla.

Background and Significance: Regulations require that information be provided to patients upon admission to the hospital on advance directives. Forms are completed to indicate a patient's end of life decisions. Once the information is obtained, the advance directive is placed in the medical record. The conversation to ask the patient about his advance directive comes from the nursing staff during the time of the patient's admission. Often, this is a chaotic period when the patient may be preoccupied. There has not been a mechanism to identify high-risk patients and further clarify their intent with advance directives. **Purpose:** With this study, we intended to improve the clarity of the advance directive in the adult medicine patient. Once the nursing staff of two nursing units (74 medicine and the medical intensive care unit) deemed the patient to be at risk for experiencing a terminal event, a focused interview by the research team occurred. Specifically, charts of adult medicine patients who have been identified by the nursing staff were obtained and reviewed by the research team. A patient interview occurred to further clarify the advance directive by a member of the research team. This information was used to determine if further clarity in the advance directive could be obtained for this patient

population. **Methods:** Medical record reviews and patient interviews occurred with 30 adult patients who were deemed terminal by the nursing staff to determine and clarify and intent of their advance directive. **Results and Conclusions:** Information from this study will be used to evaluate the impact of a patient interview to clarify individual treatment options for end of life care and to determine if and what further interventions are required to ensure that advance directives can be executed as meaningful documents. **Funding:** AACN Clinical Inquiry Grant.

COMPARISON OF ELECTRONIC TEMPERATURE AND ORAL CHEMICAL DOT TEMPERATURE METHODS IN ORALLY INTUBATED PATIENTS. Davis S, Schallom L, Potter P, Sona C. Barnes-Jewish Hospital, St Louis, Mo.

Purpose: The electronic thermometer is the standard for temperature measurement with elimination of mercury in hospital waste. The mercury-in-glass thermometer, previously the gold standard, is being eliminated. The concern with the use of shared electronic thermometers in isolation is infection transmission. The low cost, ease of use, and low risk of infection transmission offers the chemical dot thermometer as a viable alternative. **Background:** Research has shown that oral temperature measurements are valid in patients who are orally intubated but lack the clinical studies investigating the accuracy of chemical dot thermometer in orally intubated patients. **Methods:** A convenience sample of orally intubated ICU patients from an 18-bed surgical/trauma and a 20-bed neuroclinical was obtained, $n=75$ per ICU, 150 total. Patients served as their own control, and the sequence of measurement (electronic-chemical or chemical-electronic) was alternated with each successive patient enrolled in the study. There was a 5-minute interval between each temperature measurement to ensure the area of measurement was physiologically stable. The sublingual pocket opposite the endotracheal tube was used for both temperature measurements. **Results:** Oral readings in intubated patients with the two temperature measurements correlated highly ($r=.92$) at a .01 level of significance. The correlations of $r=.933$ for the surgical ICU and $r=.91$ for the neuroclinical ICU were also significant at the .01 level. The difference between electronic versus chemical readings varied between -1.9°C to $+1.2^{\circ}\text{C}$. Despite this wide variation, of the 150 measurements, only 45% (68) had underestimations or overestimations of 0.3°C or more. **Conclusions:** Chemical thermometers provide a viable option for accurate temperature measurement, when compared with the electronic thermometer. The results from this

study do raise concern that wide variations between electronic and chemical readings can occur. In a practice setting where multiple nurses are assessing temperature, the degree of variation might be even greater.

REGIONAL CITRATE ANTICOAGULATION (RCA) FOR CONTINUOUS VENOVENOUS HEMODIA-FILTRATION (CVVHDF): INITIAL EXPERIENCE. Laselva CR, Moura Jr D, Durão Jr M, Monte JCM, Pereira Jr VGP, Santos BF, Cendoroglo M, Santos OFP, Knobel E. Hospital Israelita Albert Einstein, São Paulo, São Paulo, Brasil.

Purpose: In the intensive care setting, most of patients have acute renal failure (ARF). In this scenery, continuous renal replacement therapies (CRRTs) are used to treat them. One of the biggest drawbacks of CRRT is anticoagulation. Excessive anticoagulation determines bleeding complications while circuit clotting decreases dialysis effectiveness and increases blood losses and transfusion necessities. The risk of bleeding may be minimized by using RCA. Citrate reduces ionized calcium (Ca_i^{+2}) by chelation. Therefore, we decided to establish RCA in ICU. **Methods:** Eleven patients (mean APACHE 25, 18-35) with ARF were treated by CVVHDF. They used vasoactive drugs and under hemodynamic monitoring and mechanical ventilation. CVVHDF: Q_b , 100 ml/min, Q_d , 1 to 2 L/h, minimal UF-600 ml/min. RCA protocol (UCLA-San Diego, EUA): 4% trisodium citrate (arterial line), CaCl_2 - 1 mEq/L (central venous line), dialysate Na^+ - 117, K^+ - 4, Cl^- - 122.5, and Mg^{+2} - 1.5 mEq/L, no Ca_i^{+2} and alkali and replacement solution (0.9% saline). The goal was post filter Ca_i^{+2} from 0.25 to 0.35 mmol/L. **Results and Conclusions:** Citrate and calcium rate infusion changed from 150 to 190 mL/h and from 40 to 90 mL/h, respectively. It has been performed 1194 hours of treatment (110 h/patient), and 21 filters (mean filter life 57 hours) have been used. Mean during treatment serum Ca_i^{+2} was 1.11 and 1.10 mmol/L, respectively. Ca_i^{+2} post filter was 0.29 mmol/L. Filter performance measured by dialysate urea/pre-filter ratio was 0.91. Two hypocalcemia ($\text{Ca}_i^{+2} < 0.90$ mmol/L), 2 significant hypercalcemia ($\text{Ca}_i^{+2} > 1.35$ mmol/L) and hypernatremia ($\text{Na}^+ > 150$ mEq/L) episodes occurred. Metabolic alkalosis ($\text{HCO}_3^- > 30$ mEq/L) was presented in 2 situations. We have not any bleeding episodes related to RCA. RCA is viable but demands constant metabolic control (4 to 6 times/day). Post filter Ca_i^{+2} measurement, instead activated clotting time, can be used to guide citrate rate infusion. Filters showed good performance during this study.

Secular trends in the survival of patients with dialytic acute renal failure (ARF) in an Intensive Care Unit (ICU). Laselva C, Moura Jr D, Oliveira M, Cendoroglo M, Durão Jr M, Monte JCM, Pereira Jr VG, Santos BC, Santos OFP, Knobel E. Hospital Israelita Albert Einstein, São Paulo, São Paulo, Brasil.

Purpose: On 1997, we started performing CVVH/HD in our ICU, which allowed us to improve the metabolic control of our dialysis patients. In that year, we also started a Quality Assurance Program in Intensive Care Nephrology. Outcomes from ARF patients on dialysis in the ICU have been followed since then. Actions have been taken in order to improve outcomes (continuous education of nurses, development of new treatment protocols, etc.). We sought to investigate the trends in mortality rates of ARF patients treated in our ICU from January 1992 to December 1998. The APACHE II score and risk of death of all patients (n=10723, age = 61+18 years, 62% males) and of patients with ARF submitted to dialysis therapies (n=256, age = 61+18 years, 70% males) were as follows: 1992 1993 1994 1995 1996 1997 1998. Patients with dialytic ARF 34 22 27 39 38 55 41 APACHE II score 24.5 25.9 27.6 25.9 26.6 25.4 24.7 Risk of death (%): 45 51.4 52.4 47.1 53.3 43.7 44.7. ICU mortality (%): 67.6 59.1 66.7 53.8 63.2 52.7 42.5 All patients 1343 1432 1428 1545 1691 1589 1695 APACHE II score 13.7 13.3 14.3 14.3 14.0 14.3 11.3 Risk of death (%) 19.7 18.7 19.3 19.3 19.3 20.3 14.7. ICU mortality (%): 11.3 11.3 10.7 10.0 9.3 9.3 8.0 In 1998, for the first time, the mortality in the ARF population was lower than the expected mortality (risk of death). This trend was sustained in 1999 and 2000 (data not shown). Comparing the 1992-1996 period with 1997-1998, there was no reduction in the expected mortality (49% versus 44%, $P=0.46$), but there was a significant reduction in the ICU mortality (62% versus 48%, $P=0.04$). This improvement in survival could be due to an overall improvement in our standards of care or in the dialytic therapy.

The AACN Research Work Group would like to acknowledge the members of the 2001 Research Abstract Review Panel (below) for their thoughtful reviews of the NTI research abstracts.

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