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RESEARCH ORAL POSTER PRESENTATION AWARD WINNERS

RES4 Attitudes and Perceptions of Multidisciplinary Team Members Toward Family Presence at Bedside Rounds

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Purpose: To describe the current attitudes and perceptions of managers, critical care physicians, fellows, nurses, and allied health care providers toward the presence of family members at bedside rounds and to compare responses among health care providers. **Background/significance:** Traditionally, family members of patients in intensive care units (ICUs) have not been invited to be present at bedside rounds, and few ICUs have formal policies on this issue. Little has been published on the topic; the American College of Critical Care Medicine Task Force considers family presence at bedside rounds to be one of the least studied issues. The task force acknowledges the desire of families to play a larger role in decision making and underscores the benefits of family participation in rounds. Although desirable, the practice is met with ambivalence. The specific reasons for this ambivalence have not been well delineated. We conducted a self-administered survey of health care practitioners to ascertain their attitudes and perceptions toward family presence at bedside rounds. **Method:** We developed, tested, and administered a questionnaire to the multidisciplinary staff of a medical-surgical ICU using mainly ordinal response formats. We compared responses among health care provider groups by using the χ^2 test. **Results:** A total of 160/221 (72.4%) persons completed the questionnaire. Comparing physicians (MDs) and registered nurses (RNs) with others, we found that significantly more MDs and RNs strongly disagreed that family members should be present at bedside rounds more than 48 hours after ICU admission ($P = .007$), with more RNs than MDs strongly or somewhat disagreeing with family members being present during the initial 48-hour period ($P = .004$). Compared with less experienced RNs, more experienced RNs strongly disagreed that family members should be given the option to attend bedside rounds within ($P = .02$) and beyond 48 hours ($P = .03$) of ICU admission and strongly agreed that family presence would constrain how negative medical information was conveyed early in the ICU stay ($P = .02$). **Conclusions:** We found significant differences among health care providers toward family presence at bedside rounds, with RNs—especially more experienced RNs—expressing the greatest reservation. The research is novel in exploring the attitudes and perceptions of staff toward family presence at bedside rounds in an adult ICU. Additional research is required to explore reasons why health care providers, specifically experienced RNs, express reservations regarding family presence at bedside rounds. santiagoc@smh.toronto.on.ca

RES26 Pain Management of Postoperative Open Heart Surgery Patients Utilizing Preemptive and Multimodal Analgesia

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Purpose: To compare baseline, intervention I, and intervention II pain management protocols to determine the effectiveness of preemptive and multimodal analgesia on adult postoperative cardiac surgery patients. Postoperative pain control affects all aspects of care of cardiac surgery patients. The variables measured are pain scores (numeric rating scale), daily opioid use (intravenous morphine equivalence), and incidence of adverse effects (sedation). **Background/significance:** Our baseline pain management immediately following surgery used a single opioid agent. Research was conducted to determine the best medications for preemptive and multimodal analgesia protocol. Intervention I revealed that gabapentin-related sedation caused a considerable number of doses to be withheld and that a dosage reduction was warranted. Intervention II decreased the total dosage of gabapentin, maintained patient-controlled administration of morphine or dilaudid and oxycodone when the patient-controlled analgesia was stopped. **Method:** This descriptive correlational study included 193 chart reviews. The baseline (n = 64), intervention I (n = 64), and intervention II (n = 65) groups consisted of sternotomy patients. Patients in the intervention I and intervention II groups received preoperative gabapentin and acetaminophen. Following surgery in the intervention II group, patients received gabapentin and acetaminophen (both lower doses) and patient-controlled analgesia. The charts were reviewed for pain scores, daily opioid use (intravenous morphine equivalence), adverse effects (sedation), and length of stay in the intensive care unit and hospital. **Results:** Baseline mean pain scores on days 1 and 2 were 7.52 and 7.39, respectively. The intervention II mean pain scores for days 1 and 2 were 4.28 and 5.58, respectively. Pain scores were essentially unchanged from the intervention I and II group. There was a reduction in parenteral morphine equivalent (PME) use on day 1 in both intervention groups over the baseline group. Baseline means for PME on days 1 and 2 were 57.42 and 27.19, respectively. Intervention I means for PME on days 1 and 2 were 20.28 and 11.47, respectively. Intervention II means for PME for days 1 and 2 were 17.65 and 18.48, respectively. Intervention II had less sedation, with 12.3% doses withheld compared with 32.8% in the intervention I group. **Conclusions:** Pain management in this population of patients is a challenge. The concept of preemptive treatment and use of multimodal treatment has lead to a significant reduction in pain. Reduction in pain improved patients' mobility and their participation in breathing exercises and decreased length of stay in the intensive care unit. From baseline to interventions I and II, patients maintained low pain scores on the numeric rating scale and decreased opioid use with fewer adverse events. mfuller@wellspan.org

RES27 Parental Presence During Invasive Procedures and Resuscitation: Thematic Analysis of Parental Comments After Intervention

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Purpose: To evaluate parents' perceptions and experiences of being present during invasive procedures and resuscitation. **Background/significance:** Family presence during invasive procedures and resuscitation is a relatively new practice in the acute care pediatric setting. We sought to evaluate the impact of parent presence during invasive procedures and/or resuscitation after implementation of formal practice guidelines and multidisciplinary education. **Method:** In September 2004, a multiphase longitudinal interventional study titled "Parental Presence During Invasive Procedures and Resuscitation" was initiated throughout the cardiovascular and critical care programs at Children's Hospital, Boston. In 2008, a postimplementation instrument was distributed to families throughout the cardiovascular and critical care programs. Of 138 families surveyed, 75 parents provided open-ended comments on the practice of providing parents the opportunity to be present during invasive procedures and resuscitation. A thematic analysis of parent comments from the postpractice survey was performed to evaluate the impact on parents' perceptions and experiences with this practice. **Results:** Four major themes were identified and operationalized in the analysis: choice, contribution, acknowledgment, and help. Parents wanted a choice to be present. The theme of contribution was identified from comments on parents as having a role in the health care process, making a difference in the child's experience, and the desire to provide unique instrumentality in their child's recovery. Additionally, parents identify themselves as the expert in their child's care and believe that their knowledge of their child should be acknowledged to optimize care. Parents with less experience in the acute care setting require help by detailed

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explanation and preparation before the procedure. **Conclusions:** Parents desire the option to remain present at the bedside during invasive procedures and resuscitation. Contributing to their child's care was a priority of the parents surveyed. Nurses are in the distinctive position to help families be present. Parent presence is one vehicle that strengthens the unique role parents have in the lives of their children during the critical illness trajectory. kristan.natale@tch.harvard.edu

RES36 Substandard Quality of Electrocardiographic Monitoring in Current Clinical Practice: Baseline Results of the PULSE Trial

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Purpose: Although electrocardiographic (ECG) monitoring is the cornerstone of care in hospital cardiac units, no studies have evaluated its quality. The purpose of our study is to examine the quality of ECG monitoring by evaluating electrode placement, leads displayed on the monitor, accuracy of rhythm interpretation, and use of ischemia and QTc interval monitoring when indicated. **Background/significance:** ECG monitoring is exclusively within the domain of nursing practice. It is the independent responsibility of nurses to place electrodes in the proper position, determine goals of monitoring for each patient, select the leads to be displayed, select arrhythmia alarm parameters, choose whether to activate ST segment monitoring and determine alarm parameters, and decide whether to monitor the QTc interval. Evidence suggests that monitoring practices are inconsistent and often inadequate. **Method:** The Practical Use of the Latest Standards for Electrocardiography (PULSE) trial is a 5-year multisite randomized clinical trial evaluating the effect of implementing the practice standards for ECG monitoring from the American Heart Association/American Association of Critical-Care Nurses on nurses' knowledge, quality of care, and patients' outcomes. We analyzed baseline data of the PULSE trial, which included 1821 patients on cardiac units in 17 hospitals (15 in the US, 1 in Canada, and 1 in Hong Kong) from July 2008 to July 2009. Research nurses reviewed current medical records and observed patients for electrode placement and leads displayed on the monitor. They compared arrhythmias stored in the monitor's memory with documentation by unit nurses. **Results:** Patients had a mean age of 65 (SD, 15) years, 58% were male, and 80% were white. Electrodes were frequently incorrectly placed: 15%-27% of the time for limb electrodes, 76% when 1 chest electrode was used, and 30%-58% with >1 chest electrode. When the derived EASI system was used, electrode placement was wrong 78% of the time. On most patients, 5 lead wires were used (76%) and lead II was the most frequently displayed (71%). Nurses documented occurrences of arrhythmias correctly only 51% of the time. Of the patients with an indication for ischemia monitoring, 41% were monitored for ST-segment changes. Only 20% of the patients with an indication for QTc monitoring had a QTc value documented by nurses. **Conclusions:** Our findings revealed substandard ECG monitoring, including incorrect electrode placement, inaccurate rhythm interpretation, underuse of ischemia monitoring, and failure to monitor for QTc prolongation when indicated. The next phase of the PULSE trial will test whether an online ECG monitoring education program and strategies to implement and sustain changes in practice will enhance nurses' knowledge and the quality of ECG monitoring, ultimately leading to improved outcomes for patients. marjorie.funk@yale.edu

RESEARCH POSTERS

RES1 A Randomized Controlled Trial of a Discharge Nursing Intervention to Promote Self-regulation of Care for Early Discharge

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Purpose: To compare medication adherence, patient satisfaction, use of urgent care, and illness perception in patients with cardiovascular disease (CVD) undergoing interventional revascularization procedures who receive usual care and patients who receive a discharge nursing intervention (DNI). The Common Sense Model (CSM) of illness representation provided the theoretical foundation for this study. The CSM is a cognitive parallel processing model that draws relationships between illness representation, coping methods, and illness outcomes to help explain the process by which people make sense of their illness. Intervention research aimed at lifestyle changes to reduce secondary events after treatment for CVD is needed to guide evidence-based care. Treatment for CVD has shifted from surgical repair with prolonged hospitalizations to interventional procedures requiring shorter hospital stays. This trend reduces nursing time to monitor complications and provide education about medication management and lifestyle changes. Patients recover in short stay areas and return home within hours or 1 to 2 days of the procedure. Cardiac disease is then managed as a chronic but often stable condition. With this change in the delivery of care, several trends have emerged that have implications for quality nursing care and patient outcomes: (a) the burden of care shifts from the hospital setting to home, (b) patients are discharged without extensive education about complications and disease management, (c) the occurrence of secondary events and disease progression remain a valid threat, and (d) nurses with expert practice are in a unique position to assist patients and families with CVD management. This study addressed the following questions.

1. Do patients receiving the nursing intervention differ significantly from those receiving usual care on medication adherence?
2. Do patients receiving the nursing intervention differ significantly from those receiving usual care on patient satisfaction?
3. Is there a significant difference in the utilization of urgent care between those patients receiving the nursing intervention when compared to those patients receiving usual care?
4. Does a difference exist between the patients receiving the nursing intervention and those patients receiving usual care on illness perception, as measured by 7 components of the revised Illness Perception Questionnaire: time line (acute and chronic), consequence, personal control, treatment (cure) control, illness coherence, timeline (cyclical), and emotional representations?

Background/significance: As a result of the new era of angiodynamics, the care trajectory following a cardiac event has changed dramatically. The traditional care of extended bed rest, surgery, prolonged hospitalizations, and the support of cardiac rehabilitation classes and educational support groups is no longer the standard; that care trajectory is now reserved primarily for unstable or severely compromised patients. Today's cardiac patients are more often fast tracked through rapid care protocols. Interventional procedures are provided within hours of the acute event. Patients recover in short-stay areas and return home within hours or 1 to 2 days of the procedure. Cardiac disease is then managed as a chronic but often stable condition, as patients continue their recovery at home. The occurrence of secondary events and disease progression after a cardiac event remains a valid health threat for more than 70% of CVD patients. More than 40% to 50% of these patients will need additional treatment because of restenosis of ballooned and stented coronary vessels or progression of vascular disease. Despite advances in technology, patients with cardiac disease must continue to manage a chronic condition. Care aimed at lifestyle changes and the reduction of secondary events is needed to improve patients' outcomes. Nursing care of patients with CVD is occurring in very different settings as recovery from acute care moves from the hospital to home. Attention to "after care" of short-stay patients requires new models of discharge care that are evidence-based and focused on engaging the patients to self-manage their disease. **Method:** Purposive sampling was

used to select a sample of patients admitted for interventional procedures at an academic teaching hospital. One hundred fifty-four patients were randomized into control and experimental groups. Final analyses included data from 129 patients. Sixty-four participants in the experimental group received the DNI, which included (1) additional written information about taking medications, (2) a medication pocket card, (3) a list of 3 cardiac Internet sites, and (4) a phone call, 24 hours after the procedure, from an expert cardiac nurse to review discharge instructions. Sixty-five participants in the control group received usual care. **Results:** Analyses on 4 outcome measures—medication adherence, use of urgent care, patient satisfaction, and illness perception—revealed 1 statistically significant result. Participants in the experimental group, receiving the DNI, scored significantly higher than the control group on 1 measure, the timeline (acute/chronic) component of illness perception ($P = .006$), indicating a greater appreciation of the chronicity of their disease. Otherwise, there were no significant differences between groups. This study provides support for nursing intervention research guided by self-regulation theory that examines the patient's perception of illness. Patients with cardiac disease who received the DNI were significantly more likely to acknowledge that their illness would last a long time. This awareness may improve adherence to a prescribed regimen of medication and lifestyle modification. **Conclusions:** Nursing interventions guided by an understanding of patients' belief that their cardiovascular disease is chronic will add to the body of knowledge that informs providers about decisions patients make concerning medication adherence and lifestyle modifications. However, the results underscore the limitations of adding additional discharge care to this population of patients to improve medication adherence, use of urgent care, and patient satisfaction. Future research should include a longitudinal study to examine how patients who perceive their disease to be chronic in nature managed their medications and care decisions at home. gouldkc@bc.edu

RES2 Achieving Sedation Goals of Physiological Stability and Comfort at Various Sedation Levels in Patients Receiving Mechanical Ventilation

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Purpose: To examine effects of various levels of sedation on specified sedation outcomes of physiological stability and comfort. **Background/significance:** A majority (85%) of patients in the intensive care unit (ICU) receive sedatives to ameliorate the pain and agitation that occur with mechanical ventilation (MV). Excessive levels of sedation increase the duration of MV and ventilator-associated pneumonia, whereas inadequate sedation increases risk for unplanned extubation and hemodynamic instability. Validated sedation scales are used to assess levels of sedation, but how successfully the goals of physiological stability and comfort are met at these various levels is unknown. **Method:** A total of 110 ICU patients receiving MV were continuously monitored for 24 hours, with data recorded every 12 seconds. Sedation levels were measured by using the SEDLine (processed electroencephalogram), and physiological stability was measured by heart rate (HR), respiratory rate (RR), and oxygen saturation (Spo_2). Comfort was evaluated by using arm and leg actigraphy to measure patients' movement. For this analysis, 210 total hours of data (1.9 hours per subject) were downloaded and analyzed for the percentage of time spent outside of clinically normal ranges for HR (60-100/min), RR (12-20/min), Spo_2 (>95%), and actigraphy (based on validated data for each sedation state). Sedation level was categorized via the Patient State Index (PSI) as deep (PSI, <60), mild (PSI, 60-80), or alert (PSI, >80). **Results:** Patients were 57% male, had a mean age 52.6 years, and were from the cardiac surgery ICU (13%), medical respiratory ICU (52%), and surgical trauma ICU (35%). They spent a mean of 45% of the time in deep sedation, 35% in mild sedation, and 20% alert. The probability of normal HR was greatest during deep sedation (0.74), followed by mild sedation (0.60) and alert status (0.51). The probability of normal RR was greatest during the deep sedation state (0.55) and was lower in mild (0.45) and alert states (0.46). The probability of normal findings on actigraphy was high during all sedation states (>0.99), as was Spo_2 (0.96-0.98), but highest during the deep sedation state. **Conclusions:** Although physiological stability goals of HR, RR, and Spo_2 within normal range were primarily achieved in deep levels of sedation, lighter levels of sedation met these goals about half of the time. Because the goals of sedation were met at most 74% of the time, and were lower during mild sedation and alert states, current methods of evaluating sedation may not be adequate to assess all domains of sedation efficacy. mjgrap@vcu.edu

RES3 Activity Restriction After Removal of Temporary Epicardial Pacing Wires: Does It Matter?

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Purpose: To assess the complication rate related to patient activity level after removal of temporary epicardial pacing wires in cardiac surgery patients. Specifically, the study examined complications in patients randomized to either 30 minutes of bed rest or no bed rest restrictions after wire removal. In phase 1, only patients who were not taking heparin or warfarin were included in the study. Phase 2 mirrored the first phase but included patients taking only warfarin. **Background/significance:** Patients undergoing cardiac surgery routinely have epicardial pacing wires placed during surgery for postoperative monitoring of dysrhythmias and to provide temporary pacing if needed. Registered nurses (RNs) routinely care for patients with these wires and remove the wires before discharge. Theoretically, removal of epicardial wires can result in dysrhythmias, bleeding, or cardiac tamponade. RNs based activity level after removal on "the way they were taught" instead of on scientific data, resulting in inconsistent practice. **Method:** A prospective experimental design was used to answer the research questions. In phase 1, all adult patients who were not taking warfarin/heparin were invited to participate in the study. After consent was obtained, patients were randomized to a group that got 30 minutes of bed rest or a group that got no bed rest. Specially trained cardiac care nurses removed the epicardial wires per standard protocol. Cardiac rhythm monitoring continued after removal of the wires. Patients were assessed for bleeding, dysrhythmias, or signs of cardiac tamponade. After collection and analysis were completed for phase 1 and safety was ensured, phase 2 was started, using the same protocol on patients who were prescribed warfarin. **Results:** A sample of 59 people were recruited for phase 1 and the groups did not differ significantly in age, weight, or height ($P > .05$). In the first phase, only 2 patients had possible complications and both were in the bed rest group. One patient complained of nausea before and after wire removal, and a second patient reported slight dizziness. No patients in the immediate mobilization group reported an adverse event. In phase 2, sixty subjects were randomized to bed rest or no bed rest. Sample demographics were similar to those in phase 1 but all patients were taking warfarin and the mean international normalized ratio was 1.8. No adverse events occurred in any of the patients in phase 2. **Conclusions:** Because there were no adverse effects in either phase of the study, a new evidence-based protocol was developed that included no limitation of activity after removal of epicardial pacing wires. With a process in place that is supported by RNs and physicians, patients receive consistent quality treatment with no decrease in safety or outcomes. A secondary result of the study was a decrease in length of stay. Six months after initiation of the protocol, no adverse effects have been reported. judith.schofield@thechristhospital.com

RES5 Benefits to Providing Acute Stroke Education

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Purpose: Stroke education and communication are linked and

affect patients' adherence to medical recommendations. Educators assume that education delivered is equal to education obtained and should translate into improved outcomes for patients. This study explores the relationship between the education/communication that stroke patients receive and clinically relevant outcomes (medication persistence, rehospitalization, and physician follow-up appointment) by using data from the Adherence eValuation After Ischemic stroke Longitudinal (AVAIL) registry. **Background/significance:** In the United States, stroke is the third leading cause of death. The Joint Commission-Stroke certified hospitals offer stroke education early in the patient's stay. Often, education to prevent secondary stroke begins in the intensive care unit (ICU), yet data on the impact of education on stroke prevention medication persistence and outcomes are limited. Understanding the implications of education on stroke outcomes will promote new interventions that may improve both outcomes and education during the patient's recovery. **Method:** AVAIL is a multicenter registry of 2898 stroke patients enrolled via a voluntary subset of 101 US hospitals participating in the American Heart Association's Get With The Guidelines (GWTG) Stroke program. Baseline data came from GWTG and medical record review; 3- and 12-month data were obtained through telephone interviews by trained interviewers. Socioeconomic status (SES) was dichotomized as high or low SES based on self-reported response to income meeting basic needs. Individual and composite scores of stroke education and perception of communication with health care providers were determined for each patient. **Results:** Overall, medication persistence was high (78%); the majority (93%) of patients had follow-up appointments within 3 months, and rehospitalization was modest (19%). In the low-SES cohort, higher medication persistence was associated with clear explanation of discharge medications ($P = .001$) and a higher composite score for education and communication ($P = .01$). Rehospitalization was associated with more medication instruction in both the high-SES (82 vs 71%) and the low-SES groups (77 vs 66%). In the high-SES group, higher rates of follow-up appointments were associated with the perception that health care providers listened to them and involved them in their health care decisions ($P = .002$). **Conclusions:** Stroke education and communication are important and may result in greater understanding of new stroke symptoms and appropriate rehospitalization. Although this study demonstrates that education and communication efforts are successful, only univariate analyses were performed for this abstract, and a multivariate model could be explored. The results can be used to help further refine stroke education and patient communication patterns in the early acute phase of stroke treatment. olson006@mc.duke.edu

RES6 Cardiogenic Oscillation and Ventilator Autotriggering in Brain Death: Implications for Organ Donation

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Purpose: To determine incidence of cardiogenic oscillation and ventilator autotriggering in a prospective case series of brain-dead patients in a large tertiary care referral center. Secondary purpose was to analyze impact on length of stay in the intensive care unit (ICU) and related financial and clinical implications as well as timing of brain-death determination and organ recovery for transplantation. **Background/significance:** Ventilator autotriggering occurs in brain death from interaction among a hyperdynamic cardiovascular state and compliant lung tissue causing gas movement in the patient-ventilator system and cardiogenic oscillations in airway pressure and flow waveforms. When cardiogenic oscillations exceed ventilator trigger sensitivities, ventilator breaths are triggered and misinterpreted as intrinsic respiratory drive delaying brain death determination, increasing ICU days and limiting transplantable organs. **Method:** A prospective series of 26 patients following catastrophic brain injury, loss of neurological function, and apnea. Four of 26 patients (15%) had measured respiratory rate above ventilator set rate. Reexamination confirmed loss of neurological function and respiratory drive. Ventilator waveform analysis revealed oscillations in pressure and/or flow waveforms matching the cardiac cycle and exceeding ventilator trigger sensitivities. Collaborative practice optimized ventilator trigger mode and sensitivity, eliminating autotriggering. Downloading data from the Servo-I ventilator enabled retrospective analysis of waveform data in context with neurological assessment findings. **Results:** Cardiogenic autotriggering was confirmed in 15% of patients in this series. Cardiogenic flow deflections measured 1.5 to 12.0 L/min. Cardiogenic pressure deflections measured 1 to 9 cm H_2O. Hyperdynamic cardiovascular states with elevated blood pressure and high stroke volume was strongly associated with greater amplitude of cardiogenic waveform deflections and likelihood of autotriggering in the absence of intrinsic respiratory drive. Autotriggering ended instantly when flow and pressure trigger sensitivities were increased beyond cardiogenic waveform amplitudes. This optimized timing of brain death protocols, decreased ICU length of stay, and increased organ availability for transplantation. **Conclusions:** Cardiogenic autotriggering may be far more common than is realized and may significantly delay determination of brain death, increase family stress, and restrict availability of donor organs. Collaborative practice with scrutiny of neurological status and patient-ventilator interaction makes possible early recognition of autotriggering. Recognition and titration of ventilator triggering facilitates brain death determination, minimizes the ICU experience for families, and increases donor organ availability. richnrs@aol.com

RES7 College Student Organ Donation Study (CO-ORGAN): Phase I Results

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Purpose: In our state, registration to be a designated organ donor is low. The CO-ORGAN program was an educational intervention developed by transplant nurses to increase awareness of organ donation needs, disperse common myths associated with donation, and increase the number of registered organ donors in our state. The study focused on students 18 to 25 years old, a target population whose ability to substantially increase the donor pool is well documented. **Background/significance:** Currently, 2876 people in North Carolina are awaiting organs, many dying unnecessarily due to the shortage. Factors related to low donor registration include cultural beliefs, sex, age, knowledge, and unwillingness to discuss donation with family. Efforts to develop interventions have focused on educational strategies; however, these strategies have been limited and unsuccessful in increasing organ availability. This study expands on these strategies by offering on-site registration and a focus on family communication. **Method:** Transplant nurses and their team created an intervention designed to address factors known to influence rates of donor registration, focusing on communication with family regarding wishes. Students at 5 local college campuses watched a video of nurses, physicians, and family members caring for transplant candidates. They participated in group discussions with their peers and had the opportunity to ask questions of nurse professionals who regularly care for transplant patients, both before and after organ receipt. Students then had an opportunity to sign donor cards. In addition, they were asked to complete a brief questionnaire regarding knowledge and family communication. **Results:** Of 403 participants in phase I, 292 (72%) were "unsure" or "very unsure" of the recommended steps to becoming a donor. In spite of this, the majority of students were designated organ donors. Of those who were "unsure," most were "very willing" to talk with family members about becoming an organ donor, but they were "unsure about how" to discuss their decision. When asked "Do you feel students could play an important role in teaching others?" most (n = 381; 95%) responded "strongly agree," yet were uncomfortable talking to others about donation. These findings suggest that students feel strongly about the importance

of donor registration, yet lack confidence to communicate the commitment. **Conclusions:** Our findings show that a majority of college students are committed to being organ donors, but most have not communicated these wishes to family members. One reason for low rates of communication was lack of confidence in discussing the process of donation. In addition, most students were uninformed regarding the severity of the organ donor shortage and the valuable contribution they could make as individuals to improve community awareness through conversations with family and peers. disena4@gmail.com

RES8 Comparative Evaluation of Minimally Invasive vs Noninvasive Hemodynamic Monitoring vs Pulmonary Artery Pressures

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Purpose: To evaluate the clinical usefulness of 2 hemodynamic monitoring devices: the minimally invasive FloTrac/Vigileo (Edwards Lifesciences, Irvine, California) device based on analysis of radial artery waveforms, and the noninvasive NICOM (Cheetah Medical Inc, Indianapolis, Indiana) based on chest bioreactance. Continuous thermodilution cardiac output (COtd) measured via a pulmonary artery catheter (PAC) was used as the reference. **Background/significance:** The PAC is the clinical reference for measuring cardiac output. However, it is invasive, insertion carries inherent risk, and clinical outcomes have not been clearly demonstrated. Additionally, markers available in these less invasive devices (eg, stroke volume variation [SVV], and pulse pressure variation [PVV]) are reliable predictors of fluid responsiveness. Furthermore, noninvasive monitoring has the added benefit in that it may be used in clinical areas outside the intensive care unit. **Method:** A prospective 1-sample paired experimental design was used to study immediate postoperative open heart surgery patients with PACs as compared with the FloTrac (n = 2) or NICOM (n = 1) devices. Cardiac output (CO) and cardiac index (CI, calculated as cardiac output in liters per minute divided by body surface area in square meters) data sets (n = 57) were collected. All devices were calibrated at regular intervals and with changes in patient status before initiation of the readings. The various phases of the study were discussed at our staff nurse clinical practice committee meeting. **Results:** A paired *t* test showed a significant difference between the minimally invasive device and the PAC and between the noninvasive device and the PAC ($P < .01$). Mean CO was 4.04 L/min for the PA catheter vs 4.53 L/min for the FloTrac; mean CI was 2.11 for the PAC vs 2.44 for the FloTrac for patients in sinus rhythm and sinus tachycardia (n = 11). Mean CO was 5.22 L/min for the PAC vs 5.11 L/min for the FloTrac; mean CI was 6.44 for the PAC vs 3.31 for the FloTrac for patients with atrial flutter (n = 18). Mean CO was 4.77 L/min for the PAC vs 5.13 L/min for the NICOM; mean CI was 2.10 for the PAC vs 2.25 for the NICOM for patients in sinus rhythm and sinus tachycardia (n = 28). **Conclusions:** The measurements obtained from the PAC differed significantly from measurements obtained with either the FloTrac or the NICOM. However, as all measurements were within the normal reference ranges, clinical significance remains to be determined. Limitations include the small sample size. Further research is needed with a larger sample size, device randomization, and expanded populations to measure if a significant difference exists between the devices as compared with the PAC. joya.pickett@swedish.org

RES9 Comparison of High-Frequency Chest Wall Oscillation and Chest Physiotherapy on Pain and Preference After Lung Transplant

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Purpose: To evaluate the efficacy of chest physiotherapy (CPT) versus high-frequency chest wall oscillation (HFCWO) on measures of patient's pain and preference among postoperative lung transplant (LT) recipients in an acute cardiothoracic hospital. **Background/significance:** Conventional CPT and HFCWO are used routinely in LT recipients to facilitate the removal of bronchial secretions. To date, no studies have been done that investigate which therapy is more comfortable and less painful for post-LT patients. This is an important clinical question for LT recipients, because patients who have less pain will mobilize secretions more frequently, require fewer medications, and are apt to heal and recover faster. **Method:** In a 2-group experimental study conducted on postoperative day 3, thirty-seven post-LT patients (21 single [SLT], 16 bilateral [BLT], 70% male, mean age, 57 years) were assigned randomly to either CPT first (10 AM and 2 PM) followed by HFCWO (6 PM and 10 PM; n = 18) or vice versa (n = 19). Outcome measure of pain was assessed by the Verbal Numeric Pain Scale (VNPS) and collected before, immediately after, and 15 minutes after treatment. At the end of the treatment sequence, a 4-item patient survey assessed treatment preference regarding pain and effectiveness. Data were analyzed with χ^2 tests, *t* tests, and repeated-measures analysis of variance. Open-ended survey responses were analyzed for meaning and themes. **Results:** Among BLT, patients favored HFCWO over CPT (75% vs 25%); whereas among SLT, CPT was favored (40% vs 55%; $P = .07$). Most patients reported HFCWO as less painful than CPT (50% vs 38%); 12% reported as equivalent. Across time points, a 3-way interaction was found between the preferred treatment being less painful by survey, treatment method, and VNPS score ($F = 3.55$, $P = .02$). Less painful ratings were consistent with VNPS scores during the preferred treatment method. SLT and BLT patients reported preferences toward HFCWO as an effective treatment due to improved airway clearance, longer length of treatment, and comfort. Those who preferred CPT cited the effectiveness of the treatment as more directed and less technical. **Conclusions:** The findings of this study indicate BLT patients prefer HFCWO over CPT. Overall, HFCWO was perceived as less painful than CPT. HFCWO may provide targeted clinical benefit in the BLT population. Further investigation is warranted in a multicenter, comparative study to elucidate treatment preferences and pain after LT. spsommer@yahoo.com

RES10 Comparison of Point-of-Care and Laboratory Glucose Values in Cardiothoracic Surgery Patients

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Purpose: This descriptive quality improvement study aimed to determine the difference between blood glucose values from point-of-care (POC) glucometers and laboratory blood glucose values in cardiothoracic surgery patients, particularly in comparison with hematocrit values. **Background/significance:** Protocols for tight glycemic control (80-110 g/dL) have become standard practice in many intensive care units (ICUs). Subsequent results on this practice have been variable, and recently some have demonstrated that POC glucometers have variable accuracy, particularly if hematocrit values are less than 25%. At our institution, adult ICU insulin infusion protocols may result in hypoglycemia as we base our therapy on POC glucometer results that may be significantly different from laboratory values. **Method:** Our sample included cardiac surgery patients on postoperative day 0. Study participants had to have an arterial catheter in place and have ordered morning laboratory tests, including a renal function set and a complete blood cell count. A single sample of arterial blood was collected and analyzed both by the nurse at the bedside with the Precision XCeedPro glucometer to obtain a POC glucose value and in the OHSU hospital's laboratory with the Beckman Coulter DXC 800 and LH 780 machines. The POC glucose value, the laboratory glucose value, and the hematocrit data were recorded along with demographic data. Data analysis included descriptive statistics, a paired *t* test to compare the mean differences, and Spearman correlation. **Results:** In our preliminary analysis, data were collected from 41 adults; mean age was 61.2 years (SD 13.2), 39 (95%), were white, 27 (66%) were male, and 28 (68%) had undergone coronary artery bypass grafting. Mean hematocrit was 27.4 (SD 4.9),

mean POC glucose was 110.3 mg/dL (SD, 29), and mean laboratory glucose was 97.2 mg/dL (SD, 25.1). The mean difference between POC and laboratory glucose was 13.2 mg/dL (SD, 9.8), with POC glucose the higher value. Difference scores ranged from 33 mg/dL to -7 mg/dL. A paired *t* test revealed $t = 8.6$, $P < .001$. Nonparametric correlation was used because hematocrit was not normally distributed; the Spearman rho correlation between the difference scores and hematocrit was -0.36, $P = .02$. **Conclusions:** These findings demonstrate that substantial differences may occur with POC and laboratory testing of blood glucose on identical samples, raising concerns about the safety and appropriateness of tight glycemic control in postoperative cardiothoracic surgery patients. The difference between POC and laboratory measurements of glucose was inversely related to hematocrit, suggesting that patients with postoperative anemia are at greater risk for hypoglycemia. denfeldq@ohsu.edu

RES11 Comparison of the Use of a Compression Assist Device vs Manual Compression After Arterial Sheath Removal

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Purpose: To determine if use of a compression assist device was superior to manual compression in the areas of clinician hand fatigue and confidence/satisfaction in achieving hemostasis after removal of arterial sheaths. Incidence of complications was also studied. **Background/significance:** Achieving optimal hemostasis after arterial sheath removal is important in the prevention of complications such as hematoma formation, bleeding at the puncture site, and loss of distal arterial pulses. The current practice in our cardiac catheterization laboratory is to apply pressure with 2 or more fingers over the arterial site. Maintaining proper finger placement and the correct amount of pressure can be tiring and painful for clinicians. **Method:** A posttest-only comparisons design was used. Patients (n = 89) undergoing removal of 4F arterial sheaths were randomized into the compression assist or the manual compression group. Compression times were the same. The ComfortPress Manual Compression Assist Device was used for patients in the compression assist group; the manual compression group used the current practice of using fingers only. Staff were trained on the use of the ComfortPress device and completed an 8-item Likert posttest survey measuring clinician hand fatigue and confidence/satisfaction of achieving hemostasis. Complications were recorded. Independent sample *t* tests were used to determine outcome differences. **Results:** No statistically significant difference in clinician hand fatigue or confidence/satisfaction in achieving hemostasis was found between the 2 groups. However, statistical significance was found for hematoma formation. There was less hematoma formation in the group in which the ComfortPress Manual Compression Assist Device was used (mean, 1.88; SD, 0.31) than the group using manual compression alone (mean, 2.00; SD, 0.00; $t_{89} = 2.55$, $P < .001$). One hematoma was found in the ComfortPress group and 4 hematomas were found in the manual compression group. **Conclusions:** Removal of a 4F arterial sheath requires relatively short compression times, which may account for the finding of no significant difference between the groups in hand fatigue and confidence/satisfaction of achieving hemostasis. Recognizing this as a limitation, a second phase of this study that uses larger sheath sizes is currently under review by the institutional review board. The ComfortPress device is a safe alternative to manual compression and is now used in the cardiac catheterization laboratory. bjd3823@bjc.org

RES12 Critical Care Nurses' Knowledge and Perception of Fever Assessment and Management

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Purpose: To understand critical care nurses' perceptions and knowledge of fever, including the definition of fever, use of protocols, interventions and rationale, methods of temperature measurement, and need for cultures. **Background/significance:** Essential to critical care nursing practice is measurement of body temperature and identification of fever, yet little is known about nurses' perception and knowledge of temperature measurement, fever assessment, and fever management. National and regional trends of fever management practices by neuroscience nurses were identified through a survey of members of AANN. Only 12% of respondents used a nonspecific patient fever protocol. **Method:** We used a descriptive, exploratory design to study nurses' perceptions with a survey developed from a review of the literature and content experts confirming minimal content validity. The sample consisted of registered nurses working in a variety of critical care units at 2 hospitals in northern New Jersey and members of New Jersey chapters of the American Association of Critical-Care Nurses (AACN). **Results:** A total of 25 nurses identified fever as a specific temperature, 23 offered a verbal explanation, and 5 nurses answered with a combination of a specific temperature and verbal explanation. The next most common explanation focused on the body's response to a variety of situations including infection, bacteria, fungus, a virus, inflammation, or increased temperature. The most common method for monitoring patients' temperature in practice settings of respondents was the oral route (n = 17), followed by use of the tympanic membrane (n = 12) and axilla (n = 11). Twenty-five respondents identified patient's body temperature as the major determinant for cultures. The most frequent temperature cited was >38.5°C. **Conclusions:** Most nurses associate fever with an infective process that requires cultures to be obtained. Body temperature is most often measured by the oral and tympanic route, yet these routes were not identified as being the most accurate. Most nurses in this study managed fever by a variety of interventions not based on a protocol. The findings from this study support the need for education and integration of clinical practice guidelines regarding fever assessment and management. leatonmb@optonline.net

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RES13 Dangerous ST-Segment Depression Associated With Occlusion of the Left Main Coronary Artery

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Purpose: Acute cardiac global ischemia is associated with high-grade occlusion of the left main coronary artery or occlusions in multiple coronary arteries, and it is defined as non-ST elevation myocardial infarct (NSTEMI). The purpose of our study was to investigate the electrocardiographic (ECG) pattern and diagnostic ECG criteria for acute cardiac global ischemia from a large population with acute coronary syndrome (ACS). **Background/significance:** STEMI and NSTEMI are regarded as dangerous conditions with poor prognosis and similar mortality. However, NSTEMI patients undergo less and later reperfusion therapy than do STEMI patients. Researchers have recently found that massive ST-segment depression in defused leads is often associated with acute high-grade occlusion in the left main coronary artery or equivalent multivessel occlusion. ACS patients with evidence of acute cardiac global ischemia require immediate reperfusion therapy. **Method:** We collected 12-lead ECG records from patients with suspected ACS presenting to the emergency department at Long Beach Memorial Medical Center. Excluding individuals with known ECG confounders, the test set (N = 778) included 29 patients with angiographically confirmed occlusion of the left main coronary artery or high-grade occlusion in 3 main coronary arteries, individuals without acute MI (n = 571) or with acute MI but catheterization findings of a single culprit artery (n = 178). ECGs from age-, sex-, and ACS-matched patients without a discharge diagnosis of acute MI were collected as a control group (N = 1107). The ECG criteria applied included ST-segment depression >100 μV in more than 6 leads and ST-segment elevation greater than 70 μV in lead aVR. **Results:** On the basis of the ECG

criteria applied, we obtained a sensitivity of 62% (95% confidence interval (CI), 44%-77%) and a specificity of 100% (95% CI, 99%-100%) for the detection of acute cardiac global ischemia. The positive predictive value and negative predictive values in this test set were 90% (95% CI, 70%-97%) and 99% (95% CI, 97%-99%), respectively. **Conclusions:** Acute cardiac global ischemia is a relatively new finding and poses a high risk in ACS patients. Early recognition of this clinical condition in emergency departments and cardiac care units can shorten the time to reperfusion and improve the clinical outcome. A diagnostic 12-lead ECG can be very useful to recognize acute cardiac global ischemia so those patients can receive more aggressive perfusion therapy. vbarbara@memorialcare.org

RES14 Deficiencies in Nurses' Knowledge of Electrocardiographic Monitoring: Baseline Results of the PULSE Trial

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Purpose: To evaluate nurses' current knowledge related to electrocardiographic (ECG) monitoring and determine if any characteristics of the nurses are predictive of their knowledge of ECG monitoring. **Background/significance:** Despite major advances in ECG monitoring technology, monitoring practices are inconsistent and often inadequate. It is unclear whether this is partly due to knowledge deficits of nurses. We designed the Practical Use of the Latest Standards for Electrocardiography (PULSE) Trial to evaluate the effect of implementing practice standards for ECG monitoring from the American Heart Association and the American Association of Critical-Care Nurses on nurses' knowledge, quality of care, and patients' outcomes. **Method:** This study is part of the initial phase of the PULSE trial, which is a 5-year multisite randomized clinical trial. We examined baseline knowledge of 1739 nurses working on adult cardiac units in 17 hospitals (15 in the US, 1 in Canada, 1 in Hong Kong) from September 2008 to June 2009. Nurses completed an online demographic form and a 20-item knowledge test that covered essentials of ECG monitoring and arrhythmia, ischemia, and QT-interval monitoring. The test was developed by the investigators, pilot tested on 124 nurses, and revised on the basis of an item analysis. Scores can range from 0 to 100, with higher scores indicating greater knowledge. **Results:** The sample was 89% female, 72% white, with a mean age of 38 (SD, 11) years; 74% had a bachelor's degree or higher. The mean test score was 48 (SD, 12; range, 6-90). Of the 4 subsections, nurses had the highest mean score (52; SD, 16) on the essentials of ECG monitoring and had the lowest mean score (36; SD, 23) on ischemia monitoring. Mixed modeling treating hospital as a random effect revealed that the following factors were predictive of higher scores: older age ($P = .04$), male sex ($P < .001$), white race ($P = .03$), education at a bachelor's level or higher ($P = .009$), longer time working as a nurse ($P = .02$), longer time working on a cardiac unit ($P < .001$), working in a critical care unit ($P < .001$), and having had a rhythm interpretation course ($P = .005$). **Conclusions:** Test scores, especially related to ischemia monitoring, indicated that nurses' knowledge about ECG monitoring can be improved. Education should particularly target less experienced nurses. The online education program on ECG monitoring in the next phase of the PULSE trial was designed to improve nurses' knowledge and, ultimately, the quality of ECG monitoring and patients' outcomes. marjorie.funk@yale.edu

RES15 Descriptive Evaluation of Patients' Perception of Advance Directives

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Purpose: In our ICU, the presence of an advance directive (AD) is assessed on admission; however, few patients have an AD and patients' understanding of the issues is unclear. The purpose of this prospective, qualitative descriptive study was to evaluate current practice of informing patients about ADs. Our aims were to determine if patients understand ADs, have a health care power of attorney (HC POA), and have discussed their end-of-life wishes with that HC POA. **Background/significance:** The Patient Self-Determination Act (PSDA) includes informing patients of the right to a natural death and the right to prepare an AD. Though ADs are offered to all adult patients, completion rates are <50%. At our hospital, the PSDA requirement is operationalized by nurses who ask patients on admission, "Do you have a North Carolina AD?" We recognized that poor patient understanding of ADs may contribute to poor completion rates and result in indeterminate choices for care at the end of life. **Method:** A prospective, descriptive qualitative study of adult patients (n = 626) admitted to our cardiac care unit in an 850-bed teaching hospital was conducted. Data were collected in compliance with the federal PSDA, HIPAA, and state regulations for HC-POA. Patients were asked a standard question regarding AD status and 3 additional clarifying statements to assess understanding of HC-POA. Descriptive statistics were reported for age, sex, and race. The relationship between understanding of ADs and satisfaction with designated HC-POA was analyzed using a χ^2 test for categorical differences and a t test for continuous variables. Patients' responses were analyzed by using content analysis. **Results:** Of 625 patients enrolled, 179 already had an AD and 116 were deferred due to inability to communicate. Of the remaining 330 patients, 72 (16%) were asked if they wanted to complete an AD, but answered no, yet when asked "Do you know what an AD is?" also answered no. Discordance between AD completion and understanding represents being uninformed, the sentinel theme of these findings. In addition, 248 (75%) were happy with their legal HC-POA, but when asked "Have you discussed your end-of-life wishes with your HC POA?" 157 (63%) stated no, further contributing to the theme uninformed. Quantitative analyses support findings of declining an AD and lack of understanding of an AD ($\chi^2 = 31.5$, $P > .0001$). **Conclusions:** Our findings show that many patients without an AD lack an understanding of the importance of the AD document for ensuring that their wishes are carried out. It is equally important that nurses go beyond just informing patients of their rights; in addition they must make certain that patients understand ADs and the need to communicate wishes to the HC-POA in order to meet the full intent of the PSDA. The simple question "Do you have an AD?" is not enough. johns151@mc.duke.edu

RES16 Early Progressive Mobility Program for Adult Critical Care Patients Receiving Mechanical Ventilation

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Purpose: This multidisciplinary study evaluates the implementation of an early mobility program in an effort to improve outcomes in adult critical care patients receiving mechanical ventilation. How does early mobilization compared with bed rest affect duration of ventilation, length of stay (LOS), and cost in this patient population? **Background/significance:** Preimplementation data revealed that our ventilator patients were on bed rest with the head of bed (HOB) at 30° as their activity event. Recent literature states that deconditioning, muscular atrophy, and ventilator-associated pneumonia (VAP) can result from immobility. We hypothesized that immobility can prolong time on the ventilator and increase critical care LOS and overall hospital LOS, which increases cost. **Method:** A convenience sample of 22 patients meeting specific inclusion criteria were enrolled in the study. A retrospective chart analysis yielded a preimplementation control group of 44 patients. The program consisted of 5 activity events: range of motion (ROM) exercises, HOB elevation, edge of bed (EOB)/dangle, stand and pivot to chair, and ambulation. These patients participated in 215 activity events during the study. These patients were compared with a retrospective usual care group. A daily progressive mobility data collection tool was developed and used by the study team and staff. Descriptive and inferential statistics were used for analysis. **Results:** Analysis revealed that ventilator days decreased from 11.75

days to 10.59 days, critical care LOS decreased from 15.84 days to 14.68 days, and hospital LOS decreased from 22.93 days to 19.32 days. Although these decreases are encouraging, they are not statistically significant. No cases of VAP occurred. The highest activity level achieved for 5% of the patients was ROM exercises; for 58% it was HOB up 60° with legs in dependent position; for 18% it was EOB/dangle; for 14% it was stand and pivot to chair; for 5% it was ambulation. **Conclusions:** An early progressive mobility program decreases time on the ventilator by 1.16 days, critical care LOS by 1.16 days, and overall LOS by 3.61 days. From these results, we can infer a cost reduction that will be calculated after additional data are collected to increase the postimplementation sample size to at least 44 patients. Another positive outcome of this study is that we are beginning to see a culture change in our unit regarding the value of early mobility in adult critical care patients. pamccrn@comcast.net

RES17 Effects of Family-Witnessed Resuscitation After Trauma Before Hospitalization

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Purpose: To examine the effects of family-witnessed resuscitation (FWR) in patients experiencing trauma from motor vehicle crashes and gunshot wounds. The primary aim was to compare the effects of FWR on family strengths (resources, coping, and problem-solving communication) and outcomes (well-being) and to compare those strengths and outcomes in families who witness resuscitation (n = 16) with those in families who do not witness resuscitation (n = 17) before hospitalization. **Background/significance:** Numerous studies have been conducted that examined the effect of FWR after hospitalization. Results suggested that there are benefits for families who witness resuscitation. However, none of these studies included trauma patients or effects of FWR occurring before hospitalization. This study has the potential to bring an understanding to an often neglected and vulnerable population who witness resuscitation by describing if the experience fosters any positive or detrimental family outcomes. **Method:** The Resiliency Model guided the design and selection of variables for this study. Data from a multivariate comparison prior study were used. Family members were asked to participate within 1 to 2 days after admission to critical care. The Family Inventory of Resources for Management measured family resources. The Family Crisis-Oriented Personal Evaluation Scale measured coping. The Family Problem-Solving Communication Index measured problem-solving communication. The Family Member Well-being Index measured family well-being. Descriptive statistics and analysis of covariance were used to answer the research question. **Results:** Family members of 33 trauma patients (motor vehicle crash, n = 19, 57%; gunshot wound, n = 14, 43%) participated in this study. Family members ranged in age from 18 to 61 years old (mean, 35.44; SD, 11.79). Most were female (73%) and African American (58%). Results indicated that scores for family resources ($f = .04$, $P = .84$), coping ($f = .01$, $P = .89$), problem-solving communication ($f = .01$, $P = .30$), and well-being ($f = .13$, $P = .71$) were no different in families who witnessed resuscitation than in families who did not witness resuscitation before hospitalization in this study. **Conclusions:** The effects of FWR during the prehospital time period are not detrimental to family. However, family members in this study did not have the benefit of a formal policy or procedure. Data were cross-sectional and sample size was small, so the impact of FWR on family strengths and outcomes needs to be examined in further research. The results of this study contribute to the growing body of literature that FWR does not adversely affect family members. The long-term effects of FWR are still unknown. jsl@uwm.edu

RES18 Impact of High-Frequency Chest Wall Oscillation and Chest Physiotherapy on Lung Function After Lung Transplantation

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Purpose: To examine differences between the effects of high-frequency chest wall oscillation (HFCWO) and chest physiotherapy (CPT) on lung function (dyspnea, peak expiratory flow [PEF], and Spo_2/Fio_2 ratio) in lung transplant recipients. **Background/significance:** Prior studies demonstrated HFCWO to be as effective in clearing secretions as CPT in patients with chronic pulmonary disease. Existing evidence is based largely on experimental studies with cystic fibrosis patients. It is unclear whether one of these treatments is more effective than the other on physiological indices of lung function. Subjective assessment of dyspnea may be as important as objective indices of lung function (eg, PEF) to determine airflow limitations after lung transplantation. **Method:** In a 2-group experimental, repeated-measures design, 37 lung transplant recipients (21 single lung transplants [SLTs], 16 bilateral lung transplants [BLTs], 70% male, mean age 57 [SD, 12.97] years) were randomized to CPT (10 AM, 2 PM) followed by HFCWO (6 PM, 10 PM; n = 18) or vice versa (n = 19) on postoperative day 3. Pretreatment and posttreatment measures were dyspnea (modified Borg score), Spo_2/Fio_2 ratio, and PEF. Data were analyzed by χ^2 analysis, *t* test, and mixed analysis of variance. **Results:** Patients receiving BLTs were significantly younger than patients receiving SLTs (mean, 48; SD, 13.5 vs mean, 65; SD, 5.4 years, $P < .001$). Pretreatment vs posttreatment dyspnea scores were significantly lower in patients who received HFCWO vs CPT at the 10 AM time point ($P = .05$). Mean posttreatment dyspnea scores decreased from 10 AM to 6 PM time points with both treatment methods ($P = .03$). PEF scores and Spo_2/Fio_2 ratio at 10 AM did not differ significantly from before to after treatment. A steady increase in posttreatment PEF scores occurred across time points ($P < .001$). A significant interaction was found between type of lung transplant and time point; SLT and BLT recipients had the highest posttreatment PEF scores at 6 PM and 10 PM, respectively ($P = .03$). **Conclusions:** Findings of this study suggest improved lung function (dyspnea and PEF) with both CPT and HFCWO after lung transplantation. At the first time point, dyspnea was improved among patients who received HFCWO compared with CPT. We speculate that HFCWO is an effective, feasible alternative to CPT. Further study of both methods is warranted to evaluate improvement in lung function outcomes for this population. leeaijin@gmail.com

RES19 Isolation Status Does Not Affect the Functional Outcome of Patients in Surgical Intermediate Care Units

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Purpose: To determine whether isolation for infection control has an impact on the functional outcome (FO) of patients in a surgical intermediate care unit (SIMC) compared with patients who are not isolated as measured by the Short Form health survey (SF-20). **Background/significance:** Isolation is routinely used to prevent the spread of drug-resistant infection. Evidence suggests that isolated patients receive inferior care and have fewer interactions with health care workers than nonisolated patients; thus it is unknown whether this has an effect on the patients' long-term FO. The SF-20 measures 6 health domains: physical, pain, role function, social function, mental health, and health perception. It is quick and easy to use, and it reports the patients' perception of their current health status. **Method:** As part of a prospective study examining the impact of isolation status on the process of care in SIMC patients with a length of stay (LOS) >2 days, we administered the SF-20 at serial time points to determine FO: at baseline (for prehospital status), at SIMC admission, at hospital discharge, and at 1 and 3 months after discharge). Patients were grouped by isolation status. Both *t* tests and longitudinal data analysis were performed and sample size power was calculated; significance was $P < .05$. **Results:** Over 5 months, 104 patients (28 isolated, 76 nonisolated) had a LOS > 2 days, and 36 patients consented to participate (14

isolated, 22 nonisolated). No significant differences were found between groups in demographics, underlying medical diseases, APACHE II score, or SIMC or hospital LOS. The mean SF-20 score was not different between isolated vs nonisolated groups at baseline (54 vs 61; $P = .43$), discharge (37 vs 37; $P = .97$), 1 month (40 vs 42; $P = .77$), and 3 months (42 vs 52; $P = .23$). Physical component scores decreased in both groups from baseline to hospital discharge ($P > .20$). The overall health perception of patients in both groups declined from baseline but had returned to baseline levels by 3 months ($P = .24$). **Conclusions:** Total SF-20 scores decline during hospitalization and slowly return to prehospital range by 3 months after discharge (physical and role categories are affected the most). Because the study was underpowered (0.11), we could not prove that isolation status had an influence on any aspect of FO. However, these data can be used in discharge planning and interventions for recovery from surgical illness. sswoboda@jhmi.edu

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RES20 Multifaceted Approach Successful in Reducing Bloodstream Infections Associated With Central Catheters

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Purpose: To evaluate the effectiveness of evidence-based interventions and infection prevention education to reduce bloodstream infections associated with central catheters (CLABSIs) in intensive care units. This study also validated the need for continuous education on care of central catheters and customized intravenous supplies and kits for sustained improvements. **Background/significance:** CLABSIs have been of national interest as health care–associated infection and mortality rates continue to increase. In response to growing concern over infection rates, a task force was chartered to identify vulnerabilities and make recommendations based on literature-supported best practices. Intensive care units (ICUs) were selected as the pilot units for improvement based on the high risk of infection and the critical nature of the patients. **Method:** Data on CLABSIs were collected by infection preventionists who used definitions from the Centers for Disease Control and Prevention (CDC) to identify infections and central catheter days. Interventions and infection prevention education were developed from recommendations of the CDC, Institute for Healthcare Improvement, the Society for Healthcare Epidemiology of America, and the Joint Commission. The implementation of an intravenous team was supported by the literature to sustain high-quality intravenous care. The intravenous team and the infection control staff worked to provide hands-on training and education to all levels of providers. Additional training on insertion of central catheters was provided to medical residents via a simulation laboratory. **Results:** Previous fiscal year (FY) infection rates per 1000 catheter days were 12.9 (FY06) and 6.0 (FY07) for the intensive care units. Postintervention rate for FY08 was 5.1, and as of April FY09 the rate for the ICUs was 1.5 per 1000 catheter days ($P = .02$). In FY08 there were 5 insertion-related infections, and as of April FY09 there have been zero. Upon receiving education, staff in 1 ICU became more involved in infection prevention practices. The unit developed a bundled, central catheter maintenance checklist and educational briefs on identified pathogens. Since the bundle was developed, it has been shared with the other ICU and has become the foundation for a national central catheter maintenance bundle work group. **Conclusions:** The interventions to reduce infections associated with central catheters resulted in successful improvement in the CLABSI rates for the ICUs. The intravenous team developed core teaching principles that led to facility-supported classes for all providers that access intravenous catheters. The acute care areas of the facility also experienced a reduction in CLABSIs as a result of the intensive education. An unexpected outcome was the improved infection prevention practices developed by the ICU staff to further reduce CLABSIs. karlynklg@msn.com

RES21 Nurses' Perceptions of the Feasibility of Use of the Critical Care Pain Observation Tool

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Purpose: To describe the perceptions of nurses in the intensive care unit (ICU) of the feasibility of the use of the Critical-Care Pain Observation Tool (CPOT) in a research context. Feasibility refers to the ease with which the clinicians can apply the tool (eg, simple to understand, easy to complete, quick to use) within the clinical setting. **Background/significance:** The CPOT is a behavioral pain scale that was developed for critically ill adults and is suggested in the clinical recommendations of the American Society for Pain Management Nursing (2006) for pain assessment in unconscious or critically ill nonverbal patients. Although the psychometric properties of the CPOT are well described, no study has yet explored nurses' experience with the use of this tool in terms of its feasibility. **Method:** A descriptive design was used for this study. A total of 51 ICU nurses from a university health care center in Montreal (Canada) were trained and used the CPOT for the research purpose of validation of the tool with enrolled ICU patients. At the conclusion of that validation study, the nurses were asked to complete a self-administered questionnaire about the feasibility (ie, length of time of training, time for assessment, clarity of directives, tool structure, scoring method, recommendation to use the CPOT routinely, how helpful it is for practice, how it influenced nursing practice) of the CPOT. **Results:** Thirty-three ICU nurses returned their completed questionnaire. All nurses agreed that the directives for its use were clear and that it was easy to complete. Some nurses specified that some items were difficult to score (eg, facial expressions, body movements). A total of 24 nurses agreed that the CPOT was helpful for practice and recommended its use routinely as it provides a standardized way to assess patients' pain. Other nurses pointed out the lack of specificity of some indicators (eg, agitation), and that the tool was not applicable for every nonverbal ICU patient (eg, heavily sedated, chemically paralyzed). **Conclusions:** The CPOT was easy to use and relevant for practice by ICU nurses who used it in a research context. Although further research is warranted to evaluate its feasibility in routine care, the CPOT appears to support ICU nurses in the assessment of their patients' pain and could contribute to better pain control in critically ill adults. Based on this finding, it is urgent that clinical guidelines of pain assessment in nonverbal patients be implemented into practice. celine.gelinas@mcgill.ca

RES22 Observations of Care Interventions to Improve Care for Therapeutic Hypothermia Patients

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Purpose: In June 2008, a therapeutic hypothermia protocol for patients after cardiac arrest based on published best practices was started. Nursing interventions including sedation are integral to caring for these complex patients. The purpose of this study was to identify what methods were provided to manage various physiological behaviors, such as shivering, seizures, and variations in blood pressure and temperature. **Background/significance:** It was hypothesized that multiple interventions were used for perceived shivering in hypothermia patients, including neuromuscular blockade (NMB) as a first-line choice of treatment. Exploring nursing observations and interventions used to manage shivering in patients who are hypothermic after cardiac arrest may help identify what nurses can implement independently and support more consistent orders from physicians on pharmacological management if required. **Method:** A research study titled "Effects of Sedation in the Therapeutic Hypothermic Patient After Cardiac Arrest" was approved by the institution's review board. A descriptive study through retrospective chart review of 25 hypothermia protocol patients (15 male, 10 female) was conducted by using a specially designed data tool from June to August 2008 (n = 10) and January to April 2009 (n = 15).

Physician orders, nursing notes, medication records, and a new nursing record for cooling therapy were used to collect data. Of the 25 patients reviewed, 20 experienced shivering. Eighteen patients were treated with a NMB and 2 with propofol. Two of the 18 NMB patients were later identified as having seizure activity. **Results:** Signs of shivering and correlation of interventions (including medications) were inconsistently documented despite a specific hypothermia documentation flow sheet that was in use. Findings indicate a possible lack of knowledge of shivering signs versus seizure activity and potential interventions to abate the adverse effects of shivering. Diverse physician orders when shivering or a decrease in temperature water of the cooling device was identified. The only interventions documented for shivering was pharmacological treatment with NMB, sedatives, and analgesics. No pattern for treatment could be established. **Conclusions:** The physician-nurse best practice hypothermia team reviewed results and recommended using the published Bedside Shivering Assessment Scale that quantifies shivering and denotes specific interventions. Providing consistency may lessen various physiological behaviors and now provides consistent physician orders. Education of nursing staff on surface warming options, the Bedside Shivering Assessment Scale, identification of shivering and seizures, and the need for more in-depth documentation is in process. rochelle.armola @promedica.org

RES24 Pain Assessment in Nonverbal Critically Ill Adults by Using the Behavioral Pain Scale: Part 2

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Purpose: Pain is a stressor for critically ill patients. In general, pain is recognized as a subjective and multidimensional experience. As a subjective concept, pain is whatever the experiencing person says it is and exists whenever the person says it does. How do we capture subjective self-report of pain when critically ill patients are unable to communicate? Verbal communication may be impaired by administration of sedatives, endotracheal intubation and mechanical ventilation, and altered level of consciousness. The purpose of this study is to determine continued reliability of the Behavioral Pain Scale (BPS) in nonverbal critically ill patients. Research is needed to document reliable observable pain indicators in order to detect and treat pain properly. The research question guiding this investigation asks "Is the behavioral pain scale (BPS) a valid and reliable tool to measure pain in nonverbal critically ill cardiac and intensive care patients?" **Background/significance:** Pain that is not properly assessed and treated may lead to the development of complications for critically ill patients. Adequate and appropriate pain assessment is the first step in the detection of pain, resulting in the development, implementation, and evaluation of a plan of care to avoid complications related to unrelieved pain. Although no lone behavioral tool has been shown to be superior for use in this population, the psychometric properties, support for use in a specific patient population, and setting and ease of use should be considered when choosing a tool. **Method:** A prospective, observational design was used to collect data to answer the research question. A convenience sample of 28 subjects was observed 5 times each for a total of 280 observations (140 paired). Multiple tests for reliability were done on the data. **Results:** A Cronbach α of .86 (moderately strong internal consistency) was obtained for the BPS scale. Interrater correlations (0.76-1.0) for the faces subscale were statistically significant ($P < .001$). Interrater percent agreement (72%-74%) for the faces subscale improved tremendously over part 1's results (27%-64%). **Conclusions:** The BPS scale is a reliable pain assessment tool for nonverbal critically ill patients. This second part of the study strengthened the positive reliability findings of part 1 by improving the interrater agreement on the faces subscales. Therefore, the BPS scale is appropriate for use in nonverbal critically ill adults for pain assessment. Brandee.Fetherman@ahsys.org

RES25 Pain Assessment in Nonverbal Patients in Critical Care

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Purpose: To validate a pain scale by using psychometric methods and specifically to compare the reliability and validity of the Pain Assessment in Advanced Dementia (PAINAD) and the Critical-Care Pain Observation Tool (CPOT) scales in critical care patients. **Background/significance:** A patient's self-report of pain should be obtained as often as possible as the "gold standard." Yet in critical care many factors alter patients' verbal communication, making pain assessment difficult. Scientific advances in understanding pain mechanisms, multidimensional methods of pain assessment, and analgesic pharmacology have improved pain management strategies. Still, pain assessment in nonverbal patients in critical care continues to present a challenge for clinicians and researchers. **Method:** A descriptive, comparative, prospective design was used in this study. A convenience sample of 100 adult, nonverbal critical care adult patients with various diagnoses who required pain evaluation were assessed with the PAINAD and CPOT scales. Data were collected during a 6-month period in all intensive care units (ICUs) (26 from the surgical ICU, 27 from the medical ICU, 34 from the neonatal ICU, and 13 from the cardiac ICU). Observations of pain assessments for nonverbal patients who required pain evaluation were recorded on the PAINAD and the CPOT at the same time. **Results:** Critical care patients ranged in age from 19 to 90 years (mean, 55; SD, 17). Most patients were male (n = 60, 60%). The range of PAINAD scores was from 0 to 8 (mean, 2.04; SD, 2.37). The range of CPOT scores was from 0 to 8 (mean, 1.96; SD, 2.07). Internal consistency reliability for the PAINAD was 0.80. Internal consistency reliability for the CPOT was 0.76. The correlation between the PAINAD and CPOT was 0.86 ($P < .001$). A Bland-Altman plot was used to examine the agreement between the 2. Mean bias between the 2 tools was 0.10 (SD, 1.22). The limits of agreement ranged from –2.33 to 2.53, indicating adequate agreement. **Conclusions:** The results of this study indicate that PAINAD and CPOT scores did not differ for assessing pain in nonverbal patients in critical care. However, the lower reliability of the CPOT tool requires further investigation. Further research in the area of pain assessment for nonverbal patients in critical care is needed. cmaidl@wi.rr.com

RES28 Patients' Response to Therapeutic Mobility Activities: Molecules to Outcomes

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Purpose: This study examined effects of therapeutic mobility activities among patients who experienced prolonged mechanical ventilation (MV). Serum inflammatory markers, interleukin (IL)-6 and IL-10, were analyzed for changes after activity. IL-6 and IL-10 were also examined for their association with patients' outcomes of delirium, discharge muscle strength, duration of mechanical ventilation, length of stay in the intensive care unit (ICU), and disposition after ICU (ie, death, long-term care, or home). **Background/significance:** Progressive mobility includes continuous lateral rotation, range of motion, chair-sitting, and walking. Reports indicate progressive mobility is safe and decreases both duration of MV and length of stay in some ICU patients. However, the mechanism of benefit for this therapy is not well characterized. One explanation is that mobility activity affects the inflammatory profile to prevent molecular and systemic complications; reducing complications is congruent with the research priorities of the American Association of Critical-Care Nurses. **Method:** This was a prospective study with a period of routine care followed by implementation of a therapeutic mobility protocol in an urban academic hospital. Biomarkers of inflammation were collected before and after 20 minutes of activity for 3 consecutive days and then weekly until the patient was discharged

from the ICU. Patient outcomes of muscle strength, delirium, complications from bed rest, MV duration, ICU length of stay, and disposition after the ICU were collected for 80 patients admitted to surgical and medical ICUs. We hypothesized that activity would reduce the proinflammatory profile and a profile of anti-inflammation would be associated with better outcomes among participants. **Results:** The average participant was 66 years old (mean); 51% were male. Sixty percent were white, had pulmonary (25%) or cardiac (19%) admitting diagnoses with moderate-to-high acuity (mean APACHE III scores of 71) and 2 to 3 comorbid conditions, and received MV 7 days (mean) before enrollment. IL-6 averaged 82.3 pg/mL at rest (range, 0.78-795) and 80.8 pg/mL (1.08-780) after activity. IL-10 was 32.4 pg/mL (1.9-1858) at rest and 36.6 pg/mL (1.7-2115) after activity. Differences in IL-10 were associated with a longer duration of activity, when patients' characteristics (eg, age, sex) were held constant. There was a marginal association with biomarkers and discharge to dependent care. **Conclusions:** Findings indicate duration of activity influences anti-inflammation in chronically critically ill adults with prolonged mechanical ventilation, suggesting a biological mechanism for the benefit of progressive mobility among these patients. Unlike studies of patients with sepsis and trauma patients, biological markers of inflammation were not associated with outcomes. It may be that adults with prolonged MV may have unique biologic responses to critical illness.
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RES29 Pediatric Ventilator-Associated Pneumonia Registry (VAPoR): A Precise VAP Detection Tool
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Purpose: A prospective quality improvement study was conducted by the National Association of Children's Hospitals and Related Institutions (NACHRI) Pediatric Intensive Care Unit (PICU) FOCUS Group to better define ventilator-associated pneumonia (VAP) in children. Through a national pediatric VAP registry, a stringent method for VAP surveillance and VAP detection was implemented by 16 PICUs. With consistency in VAP detection, this study has led to a better understanding of pediatric VAP. **Background/significance:** VAP is one of the most common hospital-acquired infections in PICUs. The National Nosocomial Infection Surveillance report defined PICU VAP rates as 2.5/1000 ventilator days, affecting 3% to 10% of children receiving mechanical ventilation. VAP is associated with increased mortality, morbidity, and cost. A survey of 16 PICUs showed significant variability in VAP surveillance methods with many not performing any surveillance. This results in unreliable pediatric VAP data for use in comparative studies. **Method:** Sixteen PICUs collaborated to implement a stringent, prospective method of VAP detection. A Web-based pediatric VAP registry was constructed, and before data submission all study participants were trained in VAP surveillance and detection processes that strictly adhered to the Center for Disease Control and Prevention's 2008 PNU1 criterion. Sites conducted daily surveillance data for 6 consecutive months, uploading surveillance and detection data as well as other demographic and clinical data. Data from the Virtual PICU System (VPSLLC), a national PICU database, including case-specific severity of illness scoring and other clinical information, were analyzed to gain a better understanding of pediatric VAP. **Results:** After 6 months, approximately 2000 ventilator patients have been enrolled in the registry. Interim analysis shows an overall VAP rate for participating institutions of 7.17 VAPs/1000 ventilator days. This rate differs greatly from the previously reported rates by the National Nosocomial Infection Surveillance (2.5/1000 ventilator days). There were no differences in mortality between children with and without VAP, and those children with VAP had significantly longer durations of mechanical ventilation ($P = .004$). Procedures such as endotracheal tube change ($P = .009$), flexible bronchoscopy ($P < .001$), and transfer from another institution ($P = .02$) were significantly associated with VAP. **Conclusions:** As a limited number of VAP cases are confirmed in any PICU, the multi-institutional approach to this study was critical to collecting sufficient data for a more accurate description of pediatric VAP. In an effort to help create more precise criteria for pediatric VAP detection, interim findings specific to surveillance and diagnostic criteria were presented to the Centers for Disease Control and Prevention. This study can serve as foundation for further studies aimed at testing the impact of specific VAP prevention.
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RES30 Predicting Fluid Responsiveness in Postoperative Liver Transplant Patients
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Purpose: To determine the sensitivity and specificity of threshold values of central venous pressure (CVP), pulmonary artery end-diastolic pressure (PAEDP), and 2 functional hemodynamic indices: systolic pressure variation (SPV) and SPV% to predict fluid responsiveness (bolus-induced increase in stroke volume [SV] > 10%) during the first 2 hours after surgery in liver transplant patients receiving mechanical ventilation. **Background/significance:** Fluid boluses to optimize SV are traditionally based on static indices (CVP/PAEDP). Functional indices are better predictors of fluid responsiveness than are static indices in critically ill patients. Only 1 study of functional indices in the acute postoperative period for liver transplant patients was found, and no study evaluated the SPV/SPV%, which can be obtained at the bedside. It was not known whether the SPV/SPV% would distinguish between fluid responders (Rs) and nonresponders (NRs). **Method:** Prospective observational study of a convenience sample of 20 ventilated (assist control-tidal volume [V_t], mean [SD], 7.6 [1.4] mL/kg) liver transplant recipients, 10 of whom received a bolus (6 patients: 1 bolus/4 patients: 2 boluses). Monitors were (1) optimized arterial catheter and (2) PA catheter with stat continuous cardiac output (CCO). Transducers were leveled at the phlebostatic axis. CCO was obtained in triplicate immediately before and 5 minutes after bolus completion. Radial artery pressure and PAEDP were measured at end-expiration; SPV/SPV% was measured over 3 ventilator cycles and averaged. Data were printed in hard copy, digitized, and analyzed offline by using UnScanIt, with reviewers blinded to response status. Vasopressors and ventilators were unchanged during the study period. **Results:** 13 boluses were given to 10 patients (R = 4/NR = 9). Bolus fluids were fresh frozen plasma, blood, albumin, or saline (bolus volume 250-500 mL) over 15 to 30 minutes. Median SV was lower in the R than the NR group: 66 mL/beat in R vs 102 mL/beat ($P < .05$) in NR. Median CVP and PAEDP were lower in the R vs the NR group: CVP in R, 6.8 mm Hg vs 9.2 mm Hg in NR; PAEDP in R, 11.4 mm Hg vs 16.3 mm Hg in NR. SPV/SPV% was higher in R vs NR: SPV in R, 8.3 mm Hg vs 7.9 mm Hg in NR; SPV%, 8.1% in R vs 5.8% in NR; differences were not significant. SPV% threshold > 7.5% discriminated Rs with sensitivity (sens) = 1.0, specificity (spec) = 0.7, and area under curve (AUC) = 0.78; SPV > 7 mm Hg (sens = 0.7/spec = 0.5; AUC = 0.7). CVP > 3.5, sens = 0.75, spec = 0.1; AUC = 0.45); PAEDP > 13 mm Hg (sens = 0.5, spec = 0.4, AUC = 0.21). **Conclusions:** SPV/SPV% was a better predictor of fluid responsiveness than was CVP/PAEDP in liver transplant patients. The small number of patients in the R group with normal CVP/PAEDP indicated adequate resuscitation. The results also reflect use of fresh frozen plasma/blood to correct coagulopathy vs optimizing SV. $V_t < 8$ mL/kg and vasopressors most likely caused smaller SPV/SPV%; however, they remained adequate response predictors. Research in a larger sample is needed to confirm V_t indexed thresholds and to determine if combining SV and SPV/SPV% improves predictive abilities.

RES31 Quantitative and Qualitative Examination of Nurses' Attitudes and Decision Making in Response to Rapid Response Teams
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Purpose: Rapid response teams (RRTs) were implemented at our community hospital as a tool to decrease "failure to rescue" and to support the bedside nurse by bringing a critical care team to the bedside to quickly assess and treat clinically unstable patients. Using qualitative and quantitative methods, we explored nurses' attitudes and decision making around RRTs. **Background/significance:** RRTs were developed to bring clinical expertise and early intervention to the bedside for patients as soon as they show signs of clinical deterioration. Such teams have been shown to decrease the rate of "failure to rescue," a significant indicator of nursing quality. Little nursing research has explored nursing attitudes and use of the RRT. **Method:** The initial study was a quantitative descriptive survey involving a convenience sample of 140 registered nurses (RNs), using the 17-item Nurses Attitude to Rapid Response Team Survey. Descriptive statistics were used to analyze the data. We are doing a follow-up qualitative study to explore nurses' decision making about when to call an RRT versus the house officer or physician. We will use focus groups and semistructured discussions to elicit information and explore nurses' critical thinking about how they make those decisions. Three researchers will separately analyze the transcripts for concepts and code them, comparing results to assess interrater reliability. **Results:** 95% of the nurses felt that the RRT prevents unstable patients from having an arrest. 96% of the nurses indicated that the RRT offered them the opportunity to seek help in managing patients they were worried about. 72% of the nurses thought that the RRT was not overused in the management of hospital patients. Only 13% of nurses indicated that they would not call the RRT for fear of being criticized for not taking good care of their patients. 52% of the nurses indicated that they would call the house physician before the RRT. **Conclusions:** Despite the positive attitudes and the established hospital protocol for calling the RRT, 52% of the nurses indicated that they would call the house physician before the RRT. Nursing needs a better understanding of nurses' critical thinking about how they make decisions in response to a patient's deteriorating clinical condition. Jacqueline.Wavelet@inova.org

RES32 Rapid Response Teams: Nurses' Perceptions and Patients' Outcomes in Monitored Vs Nonmonitored Hospital Units

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Purpose: This pilot study explored rapid response team (RRT) outcomes specific to nurses' value perceptions. Effectiveness of RRTs is usually measured by patients' outcomes. This research expands RRT evaluation to include nurse-sensitive outcomes. The research questions were as follows: Does an existing RRT program affect nursing satisfaction from organizational or human resource perspectives? Is there a difference in RRT value perceptions between monitored and nonmonitored nursing units? **Background/significance:** Originating with the Institute of Healthcare Improvement's 100 000 Lives Campaign, RRTs have been recommended by regulatory, accrediting, and government agencies. Initially, little evidence supported these teams; endorsement originated from an anecdotal, common-sense posture. The ensuing evaluative research of RRTs that specifically focused on mortality and morbidity has produced mixed findings at best. RRT effectiveness should be evaluated by using a broader range of outcomes. **Method:** This nonexperimental study approved by the institutional review board was undertaken at a 300-bed acute care hospital in South Texas. A convenience sample (n = 72) of non–critical care nurses was used. A survey consisting of 12 statements with responses on a Likert scale from 1 to 5 was administered to RNs and licensed practical nurses who had used the RRT in the past 6 months. Day and night shift had equivalent samples. Patients' outcomes (mortality/morbidity) and nurses' perceptions of the value of the RRT from an organizational perspective (value, educational opportunity, and teamwork) and a human resource perspective (retention, recruitment, nurse advocacy, and mentorship) were evaluated. **Results:** Preliminary analysis of patients' outcome data resulted in mixed outcomes similar to national research findings. Analysis of the RRT nursing outcomes, however, using descriptive and correlational statistics, suggests that RRTs do affect recruitment and influence nurses' decisions to remain employed. High mean scores and standard deviations were relatively uniform across all license types, shifts, and lengths of employment. Patterns were identified by location; nurses in nonmonitored areas scored higher in relation to human resource variables, suggesting even more importance linked to RRTs and the healthy work environment of these units. **Conclusions:** As current research is resulting in mixed results with respect to patients' outcomes, this study supports the position that RRTs may be of more value to organizations and nursing services than previously identified. These results may have direct implications for RRT selection and training, the RRT to staff interaction focus, as well as hospital RRT marketing. Results will provide the framework for further study—specifically, comparative analysis between patient and nursing outcomes. jbrowne1957@sbcglobal.net

RES33 Recombinant Human Hyaluronidase-Facilitated Subcutaneous vs Intravenous Rehydration Therapy in Infants and Children

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Purpose: The objective of the INcreased Flow Utilizing Subcutaneously-Enabled Pediatric Rehydration II (INFUSE-Peds II) study is to evaluate whether recombinant human hyaluronidase (rHuPH20)-facilitated subcutaneous fluid administration can be done safely and effectively in appropriate volumes, compared with the intravenous route, in children with mild to moderate dehydration. **Background/significance:** Establishing intravenous access can be difficult, especially in children with dehydration, who often have small, volume-depleted veins. Subcutaneous rehydration therapy is an alternative to intravenous rehydration therapy when parenteral treatment is indicated in patients with mild to moderate dehydration. A previously published clinical trial demonstrated the safety, efficacy, and tolerability of rHuPH20-facilitated subcutaneous fluid administration in children. **Method:** Children aged 1 month to 10 years with mild to moderate dehydration were enrolled in an ongoing, phase IV, open-label, noninferiority, company-sponsored clinical trial. Patients were randomized to treatment groups (subcutaneous or intravenous), stratified on the basis of baseline body weight and severity of dehydration. Patients received 20 mL/kg isotonic fluid over 1 hour and additional fluid, as needed, until clinically rehydrated after up to 72 hours, via subcutaneous or intravenous administration of fluids. The primary end point was total fluid volume administered at a single infusion site. Secondary end points included dehydration symptoms, dehydration score, ease-of-use outcomes, and safety evaluations, including adverse events. **Results:** Interim analysis is reported on 74 patients (37 subcutaneous, 37 intravenous), with a mean age of 1.98 (SD, 1.56) years. Mean volume infused was 374 (SD, 292.1) mL subcutaneously vs 491 (SD, 645.3) mL intravenously, and 445 mL subcutaneously vs 419 mL intravenously when adjusted for duration. Mean improvement in dehydration score was -2.8 (-3.2, -2.4) subcutaneously and -2.4 (-3.0, -1.8) intravenously; mean weight change was +0.3 kg (+0.2, +0.4) in both groups. Initial catheter placement was successful in 97% of the subcutaneous group vs 49% of the intravenous group (odds ratio, 38.0; range, 4.7-306.9). Catheter placement failed in 0 of 37 patients in the subcutaneous group vs 8/37 patients in the intravenous group; median placement time, 0.6 min (0.25, 0.92) in the subcutaneous group vs 5.0 min (1.0, 9.92) in the intravenous group. Adverse events (subcutaneous, intravenous) were mild to moderate: pain (73%, 86%), erythema (73%, 6.9%), swelling (80%, 0%), extravasation (0%, 3%). **Conclusions:** Preliminary results reveal that rHuPH20-facilitated subcutaneous infusions were generally

safe and well tolerated. Duration-adjusted mean volume of fluids and resolution of dehydration were comparable for both routes of administration. Catheter placement was quicker and more often successful with subcutaneous than intravenous administration. pip.spandorfer@yahoo.com

RES34 Simulation Training in Emergency Situation for New Graduate Critical Care Nurses: A Randomized Controlled Study

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Purpose: To examine how simulation training for new graduate critical care nurses on endotracheal intubation, temporary pacemaker, transcutaneous pacemaker, pulseless ventricular tachycardia, and ventricular fibrillation, which occur frequently in intensive care units (ICUs), affects their knowledge, self-efficacy, and performance ability to deal with the emergency situation. **Background/significance:** Emergency situations such as the need for cardiopulmonary resuscitation in ICUs are one of the most unexpected events that need fast and effective coping by critical care nurses. But new-graduate critical care nurses feel uncomfortable when they face such situations. Training of new-graduate nurses during orientation is needed to increase their knowledge of the emergency situation and their skills in dealing with them. Simulation training is considered more effective than traditional training in terms of increasing knowledge in a clinical setting. **Method:** Simulation training consists of scenarios of the role of 3 critical care nurses (1 assigned nurse and 2 assisted nurses) in 5 different emergency situations. Forty new-graduate critical care nurses were randomly assigned to either interventions or a control group. Slide presentation and simulation training were given to the intervention group, whereas only slide presentation was given to the control group. The knowledge, self-efficacy, and performance ability before and after the training were obtained. A repeated-measure analysis of variance is used to test the difference between variables. **Results:** Of the 40 randomized new-graduate critical care nurses, 20 were randomized to intervention and 20 to a control group. All nurses were female, and 77.5% of them had a bachelor's degree. No significant differences were found between groups at study admission for any personal characteristics and scores of variables. Significant increases were found in knowledge scores (mean [SD], 23.55 [2.41] for interventions vs 22.30 [2.51] for control, $P = .012$), and performance ability scores (10.30 [1.74] for interventions vs 4.50 [4.03] for control, $P < .001$). However, no significant difference between groups was found in self-efficacy ($P = .08$). **Conclusions:** Simulation training for new-graduate critical care nurses is useful to increase their knowledge and performance ability in emergency situations in the ICU. Therefore, providing such training to critical care nurses during orientation would improve the quality of critical care nursing and help new-graduate nurses to adapt. baimau98@ snu.ac.kr

RES35 Spontaneous Breathing Trials vs Weaning Parameters for Extubation in Postoperative Cardiac Surgery Patients

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Purpose: To improve clinical precision and decrease time to extubation in a nurse-led extubation protocol in postoperative cardiac surgery patients. Nurses in the cardiothoracic intensive care unit (CTICU) requested a change from the current weaning parameter (WP) method to a spontaneous breath trial (SBT) method. Presentation was made to the cardiothoracic surgeons and approved to begin in June 2008. **Background/significance:** With the renovation and opening of the new CTICU, nurses educated and challenged the cardiothoracic surgeons to improve clinical precision in extubation time by using the SBT method. Weaning parameters require cooperation. Patients are often anxious and may not understand all instructions. The SBT method is not inhibited by cognitive ability or language barrier. Patients receiving mechanical ventilation rarely notice when the change is made and remain relaxed. **Method:** In a retrospective comparison study, data from 342 cardiac surgery cases in 2008 were collected. The SBT worksheet includes a clear, easy-flowing algorithm on one side and a recording sheet on the other side. The patient is continually observed during the 2-minute screen for signs of respiratory distress. If the patient is doing well, a 30-minute trial continues with the nurse observing for fatigue and monitoring the rapid shallow breathing index (RSBI). RSBI is respiratory rate/tidal volume in liters. If the RSBI is >105, the patient is returned to full support. If the RSBI is <105, the patient has had a successful SBT. **Results:** Of the 342 patients, 190 were extubated by WP and 152 by SBT. The 2 populations were nearly identical in age, weight, height, ejection fraction, and EuroSCORE (risk of mortality score). Twice as many men (n = 238) as women (n = 104) participated. SBT patients were weaned 1.3 hours quicker than the WP group (SBT: 10.8 hours, WP: 12.1 hours). Only 2 patients were reintubated within 24 hours, one from each group. Results of the 2-tailed t test were not statistically significant ($P = .13$). Encouraged by this forward trend and acknowledging the learning curve by nursing and respiratory care, nursing staff continue to work diligently toward reducing hours to extubation. **Conclusions:** CTICU nurses have no intention of going back to the WP method. A Spontaneous Awake Trial (SAT) was added to the SBT in 2009 to aid nurses in first determining readiness and improving coordination with respiratory staff. Nurses describe the SBT process as a realistic picture, clear, not stressful, a better indicator, autonomous, and collegial in their impression of an improved clinical precision process. Was the change beneficial for our patients? Yes! dawn_gosnell@via-christi.org

RES37 The Impact of Critical Care Incident Stressors on Critical Care Nurses and Their Work Environment

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Purpose: To identify and describe stressors and traumatic events in the work environment of critical care nurses. **Background/ significance:** Critical care nurses are continually faced with the challenges of caring for acutely ill patients and their families. By their very nature, critical care units exude an environment of stress and tension through repetitive exposure to events outside the normal realm of human experience. Critical care nurses are frequently exposed to situations that may be emotionally charged, including patient mortality, ethical dilemmas, cardiopulmonary resuscitation, and the withdrawal of life support. Support to assist critical care nurses in identifying and dealing with these stressors may not be provided or sufficient. Hospitals that fail to provide services to ameliorate these negative psychological and behavioral effects or repeated exposure to such incidents leave critical care nurses at risk and feeling dissatisfied with their jobs. In turn, nurses' performance and turnover may be affected, thus adversely affecting patient care and outcomes. The patient care situations just mentioned, in addition to many other issues related to work environment that were not mentioned, cause stress in critical care nurses. Some events generate so much stress on the nurse that normal coping mechanisms are overwhelmed. Previous research indicates that 24% of critical care nurses have symptoms of posttraumatic stress disorder, compared with 14% of other nurses. **Method:** This study used a mixed method design. Phase 1 used a nonexperimental descriptive survey, the Critical Care Nursing Stress Scale. This electronic self-administered questionnaire was used with permission and included 40 multiple-choice questions in 5 areas: (1) management of the unit, (2) interpersonal relationships, (3) patient care, (4) knowledge and skills, and (5) physical work environment. A convenience sample of 73 critical care nurses in an acute hospital setting were instructed to select an answer to each of the questions by using a 5-point Likert scale to indicate the frequency, intensity, threat, and challenge level of a given stressor. Phase 2 used a phenomenological approach to study the lived experiences of 9 critical care nurses who had first-hand knowledge of a traumatic event while working in an ICU. Following the consent process, 1-on-1 semistructured interviews were conducted and audiotaped by a behavioral health practitioner in a location and time chosen by the participants. An

interview guideline, comprising 9 questions developed by the researchers, was used to guide the interview process. Van Manen's method of thematic analysis was used to analyze the data collected in the interviews. **Results:** Findings were not statistically significant; however, they were clinically significant. Although the respondents rated stressors in 5 areas, the highest responses reported were from only 2 of these areas: patient care and management of the unit. The stressor with the highest frequency was routine procedures: 51% (patient care); the stressor with the highest intensity was emergencies and arrests: 39% (patient care); the stressor that was the greatest challenge was patients in critical, unstable condition: 36% (patient care); the stressor that was the greatest threat was apathetic, incompetent medical staff: 34% (management of the unit). The response rate was 70% with a mean age range of 20-30 years (67%) and the majority (90%) of respondents were female. Sixty-four percent (64%) of respondents reported having been a nurse for <5 years and 76% reported having worked in critical care <5 years. The 9 interviews yielded rich responses, providing insight to how traumatic events in the work environment affect many aspects of nurses' lives. When categorizing events that critical care nurses consider traumatic, the following key themes emerged: the nurse's level of experience, peer support, self-doubt, and need for validation of actions. Responses revealed that a wide range of stressors adversely affect the work performance of critical care nursing staff, and 80% of respondents reported that a critical incident debriefing program would be beneficial to them. **Conclusions:** Nurses working in critical care will experience stressors and critical incidents. A healthy critical care work environment is made up of healthy nurses and an alert, responsive management team that supports them. Nurses who experience high stressors without resolution can adversely affect the health care team, patient care delivery, the work environment, retention and recruitment, and ultimately patients' outcomes. Implications for practice could include the development and implementation of a debriefing program in which nurses could openly share their thoughts and feelings after a traumatic event, which could help to ameliorate the negative effects of the stressors. Providing education to the management team on how best to support their staff, providing education for critical care nurses that includes a variety of simple relaxation and coping strategies and development of critical communication skills, would also be beneficial. More research could be done on larger nursing populations to explore the physical and psychological impact on nurses who work in an environment with high stressors, as well as on the effectiveness of debriefing programs in the critical care unit. Potentially, a debriefing program could increase job satisfaction, decrease burnout, increase retention, and promote a healthier work environment with healthier nurses.
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