The AANA Foundation extended an invitation to participate in the State of the Science Oral and Poster Session at the AANA Annual Meeting in Washington, DC. This type of forum offers unique opportunities to talk directly to researchers about their research findings. The interaction among colleagues in a less formal setting set the stage for invigorating discussions and exploration of the research findings.

Each year, Poster Session candidates are selected by the AANA Foundation Board to present their research for the poster presentation. This year, many of the abstracts from the State of the Science Oral and Poster Sessions were submitted for potential publication in the *AANA Journal*, and 47 abstracts were selected. Twenty-two of the abstracts were published in the October 2005 issue, and the remaining 25 are published here. For further detail and reference citations concerning individual abstracts, please contact the authors.

Lorraine M. Jordan, CRNA, PhD
AANA Director of Research and AANA Foundation

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### A23

**An analysis of the issues affecting US Army CRNA retention**

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**US Army Graduate Program in Anesthesia Nursing**

**Introduction:** Current strength of Certified Registered Nurse Anesthetists (CRNAs) in the Army is at a low of seventy-one percent. The purpose of this research is to identify issues that impact CRNAs decisions to leave the Army. Specifically, we hypothesized that wages, job satisfaction, and deployment frequency will have the greatest effect on CRNA retention with probable differences between genders.

**Methods:** This study is a secondary analysis of data from a 2004 Army CRNA Retention Survey. The survey was disseminated to all active duty Army CRNAs. One-hundred-thirty-five US Army CRNAs were included in the study.

**Results:** Only eight percent of men and four percent of women stated their intent to remain on active duty following active duty service commitment. Sixty-two percent of men and seventy-one percent of women either did not respond or were undecided with regard to separation. Eighty-four percent of respondents state that they currently have an adequate independence and are satisfied with their current role. The two core issues with the greatest influence on separation from the Army were inadequate wages and deployment. Of the 135 respondents, seventy-nine percent ranked deployment or inadequate wages as the most influential reason for leaving active duty. Fifty-eight percent of men versus twenty-five percent of the women rated inadequate wages as being most influential. However, fifty percent of women as compared with twenty percent of the men rated deployment as the most influential reason.

**Conclusions:** This research provides a scientific approach in addressing the critical issues affecting Army CRNA retention. With a majority of CRNAs still uncertain as to whether they will separate, senior Army leadership may be able to use this information to retain many of these Army CRNAs.

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### A24

**The effects of valerian on the time course of emergence from general anesthesia in Sprague-Dawley rats (Rattus norvegicus)**

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**US Army Graduate Program in Anesthesia Nursing**

**Introduction:** Nearly 25% of all patients that present for surgery take some type of nutraceutical. This steep rise in herbal use may be associated with increased morbidity and mortality as a consequence of interactions with anesthetic agents or herbal-induced alterations of physiology. The effects of valerian, purported to have GABAa receptor activity, on emergence time from general anesthesia are unknown.

**Methods:** Thirty-two male Sprague-Dawley rats were assigned to one of four treatment groups: (1) vehicle, (2) 30 mg/kg valerian, (3) 2 mg/kg midazolam, and (4) a combination of 30 mg/kg of valerian and 2 mg/kg of midazolam. Thirty minutes after drug administration, animals underwent a standard laparotomy under 2.5%
isoflurane anesthesia. Surgery consisted of an incision followed by externalization of a portion of the small intestine for 4 minutes. The intestine was gently rubbed as a standard irritant. At the end of surgery, isoflurane was discontinued and the time, in seconds, from discontinuation of isoflurane to the time the animal righted itself and took one step was recorded as emergence time.

**Results:** A one-way analysis of variance revealed that animals in the midazolam group took significantly longer to emerge from anesthesia (mean 352) compared to rodents in either the vehicle (mean 123) or the valerian alone (mean 127) group (p<0.01). More importantly, rodents who were administered a combination of midazolam and valerian took significantly longer to emerge from anesthesia (mean 452) compared to all other groups (p<0.01).

**Conclusions:** Awareness of possible interactions nutraceuticals may have with conventional anesthetics is important so that potential problems may be recognized and treated. These findings suggest that the combination of valerian and midazolam significantly prolongs emergence time compared to midazolam alone. These data demonstrate the need for continued scientific research concerning the effects of nutraceuticals and their potential for interaction with traditional anesthetics.

**References**

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**A25**

**Lidoderm 5% patch as an adjunct for pain control for patients undergoing lithotripsy**

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**Introduction:** The goal of anesthesia management during extracorporeal shock wave lithotripsy (ESWL) is to maximize patient comfort allowing focus of the lithotriptor shockwave on the targeted calculi. Pain sensation caused by lithotripsy varies widely among individuals causing a significant impact on anesthesia management. The purpose of this study was to determine if the use of a Lidoderm 5% patch would be effective in decreasing pain and fentanyl requirements for patients undergoing ESWL.

**Methods:** A randomized, double blind, experimental study was performed on 27 patients scheduled for ESWL. Non-probability convenience sampling was utilized. Patients were randomized to receive either a Lidoderm 5% patch (experimental group) or a placebo patch (control group). The patients applied the patches 8-14 hours prior to the procedure over the expected treatment area. An unblinded researcher removed the patches just prior to the procedure. A blinded researcher recorded patient pain ratings (using a numeric pain scale as 0-none to 10-worst pain possible), lithotriptor shockwave level, and amount of fentanyl administered.

**Results:** The total amount of fentanyl required differed between groups. In the placebo group, 45.5% of patients required 0-200 mcg of fentanyl and 54.5% required >200 mcg of fentanyl to maintain comfort throughout the procedure. In the experimental group, 81.3% required 0-200 mcg of fentanyl and only 18.8% required >200 mcg to maintain comfort. Chi-square analysis of this difference provides a value of 3.76 and closely approaches statistical significance with a p-value of 0.053.

**Conclusion:** Although continuation of this study is necessary, the interim analysis appears to indicate the Lidoderm 5% patches are a useful adjunct for pain control during ESWL. There appears to be a reduction in fentanyl requirement in the experimental group.

**Source of Funding:** The 2004 Allen T. Jarvis, CRNA Memorial Research Grant, AANA Foundation.

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**A26**

**A historical review of the awake craniotomy**

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**Introduction:** The history of the awake craniotomy has evolved through overall advances in medicine and anesthesia. Fossil skulls with craniotomy sites have been found in ancient tombs dating back thousands of years. These crude craniotomies were likely performed on awake patients with minimal analgesia. Advances in medicine have revolutionized the awake craniotomy procedure making it safer and more comfortable for the patient.

**Methods:** A literature review has been conducted on awake craniotomy practices from ancient times until present. Multiple sources are utilized to present a succinct timeline of events and trends in neuroanesthesia. A retrospective chart review of awake craniotomies
spanning the decades of neurosurgery at Mayo Clinic, Rochester, has been completed. Five charts per decade of awake craniotomies performed at Mayo were randomly selected and reviewed with the use of a data collection tool. Parameters include indication for awake craniotomy, length of procedure, medications, use of local infiltration, perioperative complications, monitoring techniques, and changes in anesthetic techniques.

Results: The data collected following an historical literature and chart review is presented on a poster in a succinct timeline format. This timeline includes historical data from ancient times through present day practices of the awake craniotomy.

Conclusion: Advances in neurosurgical technique, anesthesia, and monitoring have impacted the awake craniotomy. From ancient trephination with crude tools and little education to modern day electrophysiology with advanced skills and knowledge, the awake craniotomy has transpired into an effective option for neurosurgical treatment. Advances in anesthesia have allowed this procedure to be completed in a safe and humane manner.

A27
Is the administration of pre-operative ondansetron orally disintegrating tablet, 8 mg, as effective as the intra-operative use of ondansetron, 4 mg, intra-venously in the prevention of nausea and vomiting in patients undergoing laparoscopic cholecystectomy?

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Introduction: Postoperative nausea and vomiting is a common problem in surgical patients. Laparoscopic procedures increase the risk of post-operative nausea and vomiting (PONV), and careful selection of prophylactic antiemetic drugs is a must. Although numerous studies evaluate PO and IV ondansetron, there is limited research involving the new ondansetron orally disintegrating tablet (ODT). The objective of this study is to determine the efficacy of ondansetron ODT, 8 mg, in the prevention of PONV, when given pre-operatively in patients undergoing laparoscopic cholecystectomy.

Methods: Following IRB approval, 19 patients undergoing elective laparoscopic cholecystectomy were randomly enrolled in the double-blinded study. In the pre-operative area, the patients received either ondansetron ODT, 8 mg, or a placebo pill. After induction of anesthesia, the patients received either ondansetron, 4 mg IV, or 2 ml of saline IV. On arrival to the post-anesthesia care unit (PACU), at regular intervals, the blinded observer recorded the episode of retching and vomiting and rated the nausea and pain according to the scale. Twenty-four hours after the surgery, the patients were asked if they had any episodes of nausea and vomiting and their overall satisfaction with their PONV management was rated.

Results: Total patient population at time of interim analysis consisted of 19 patients. Results from T-test and chi-square analysis showed no statistically significant difference between ondansetron, 4 mg IV, and ondansetron, 8 mg ODT. A p-value less then 0.05 was considered statistically significant.

Conclusion: This study has shown that the orally disintegrating form of ondansetron offers an alternative and equally effective form of the anti-emetic ondansetron. Ondansetron ODT may, in the future, be a cost-saving alternative for the prevention of PONV. Our results represent interim analysis and further research will be needed to determine the place of ondansetron ODT in the prevention of PONV.

A28
Pharmacological preconditioning with sevoflurane imparts cardioprotection to H9c2 cells undergoing chemical hypoxia

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Introduction: With the aging of the population, anesthesia providers increasingly have to treat patients with ischemic heart disease. Experimental evidence has indicated that volatile anesthetic agents may exert cardioprotective effects that cannot simply be explained by the alterations in coronary blood flow or in the myocardial oxygen balance. Instead, it seems that volatile anesthetics may have direct cardioprotective properties. Similar to brief ischemic episodes, preconditioning with volatile anesthetics promote and establish a protective cellular state in cardiac tissue. This study was designed to assess the cardioprotective effects of pharmacological preconditioning (PP) with sevoflurane (SF) at clinically significant doses on H9c2 cells undergoing chemical hypoxia (CH) with cyanide (CN-).

Methods: Studies were performed using H9c2 cells, which is an excellent in vitro model of cardiac muscle because they possess signaling pathways and receptor systems similar to primary cardiac cells. H9c2 cells were PP with SF at concentrations of 1.0, 1.5, and 2.0
MAC for 10 minutes prior to undergoing 60 minutes of CH induced with 30 mM CN- in the presence and absence of 1.0 mM pyruvate. Cell viability was assessed by measuring LDH in H9c2 cell media and tissue (expressed as a % of LDH released). Data were analyzed using ANOVA and Tukey's multiple comparisons analysis. P< 0.05 was statistically significant.

Results: PP with SF 1.0 MAC significantly reduced the LDH released from H9c2 cells in the absence of pyruvate compared to ischemia alone (18.03 ± 0.79; 26.73 ± 2.13, respectively). PP with SF at concentrations greater than 1.0 MAC did not afford any cardioprotection in the absence of pyruvate (21.97 ± 1.29, 25.23 ± 1.76, respectively). The presence of pyruvate abolished the cardioprotective effects of sevoflurane 1.0, 1.5, and 2.0 MAC compared to ischemia (21.68 ± 1.08; 21.80 ± 1.20; 21.30 ± 1.96, 21.85 ± 1.30, respectively).

Conclusion: PP with SF 1.0 MAC in the absence of pyruvate reduced the LDH released from H9c2 cells undergoing 60 minutes of CH induced by 30 mM CN-. These results indicate that PP with SF in clinically significant doses is cardioprotective in this model of simulated ischemia.

A29
Nurse anesthesia student’s satisfaction with the first semester clinical evaluation tool
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Introduction: At the University of Southern California nurse anesthesia program, the clinical evaluation tool is used to guide student learning, evaluate student progress, and compute semester grades. Because students have differing opinions regarding the validity and usefulness of this tool, we decided to survey students from other programs to determine their level of satisfaction, and whether or not this was related to the type of clinical evaluation tool used.

Methods: All nationally accredited nurse anesthesia programs were contacted, and second year student nurse anesthetists were solicited through emails forwarded by their program faculty. Students accessed the survey through surveymonkey.com.

Results: Responses were received from 36% (34/95) of programs and results were computed using Likert scale analysis (n=166). Overall, 56.5% of students felt that their evaluation tool was appropriate for evaluating their clinical abilities. However, only 14.4% of students reported being graded on their evaluations, and these students fell below the satisfaction level (neutral to dissatisfied). The rest of the students fell between neutral and satisfied. Of students receiving grades, 61.3% felt that their school’s evaluation tool was an unfair way of computing grades, and 76.1% felt that being graded for their evaluations did not motivate them to work hard. Only 19.6% of students felt that preceptor bias affected their clinical evaluation.

Conclusions: The majority of nurse anesthesia students are satisfied with their school’s clinical evaluation tool, and preceptor bias is not a concern for most students. However, students whose evaluations were used for letter grades were less satisfied than those whose evaluations were used for pass/fail or feedback only. The study suggests that students may be more satisfied with a clinical evaluation model that does not involve grades. Many schools have already adopted this model, which may explain the moderate level of student satisfaction.

A30
Evaluation of esophageal temperature for patients undergoing percutaneous circumferential pulmonary vein radiofrequency ablation
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Introduction: Circumferential pulmonary vein ablation (CPVA) is an effective and relatively safe procedure for treating atrial fibrillation. CPVA is not without risk; rapid increases in temperature were noted during the CPVA procedures by Pappone. Two studies by Pappone et al indicated the need for further evaluation of procedure temperature changes. The objective of this retrospective chart review was to determine whether an esophageal temperature increase occurred during general anesthesia for percutaneous circumferential pulmonary vein radiofrequency ablation.

Methods: We conducted a retrospective descriptive chart review of one hundred thirteen patients undergoing CPVA procedures under general anesthesia at Mayo Clinic Rochester, from September 2003 to September 2004. Esophageal temperature probes used during general anesthesia were placed in proximity to the radio frequency ablation catheter. Serial esoph-
ageal temperature recordings were analyzed to determine if significant increases occurred.

Results: Seventy-three out of one hundred thirteen patients demonstrated a significant temperature increase of 0.8 degrees Celsius or higher within a one-minute interval.

Conclusion: The information gained from this study may help the anesthesia provider more accurately assess the cause of hyperthermia during the CPVA procedure. Possible anesthetic considerations for a temperature rise could indicate whether the increase is transient from the ablation itself, or resulting from a hypermetabolic state.

A31
Anesthesia assisted opioid detoxification with naloxone and 6ß-naltrexol in mice
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Introduction: Ultra rapid opioid detoxification (UROD) remains a controversial treatment for opioid addiction in humans. Naloxone and naltrexone are used to displace the agonist off the opioid receptors. There is evidence that these classical opioid agonists act as inverse agonists in the opioid dependent state. This activity profile may contribute to the severity of the withdrawal observed clinically. In contrast, the opioid antagonist 6ß-naltrexol may act as a true neutral antagonist, displacing agonist molecules from the opioid receptors while precipitating less withdrawal. The goal of this investigation was to determine the sympathetic response to antagonist-induced withdrawal under conditions that model UROD.

Methods: Adult male mice were implanted subcutaneously with a 25 mg morphine or placebo pellet. Seventy-two hours later, mice were anesthetized with isoflurane and monitored for blood pressure, heart rate, and respiration. Following a stable recording of vital signs, mice received intraperitoneal injections of saline or equieffective antagonist doses of naloxone or 6ß-naltrexol. Animals were monitored for up to 90 minutes following injection of the antagonists.

Results: Naloxone injection produced a rapid and significant elevation in all three measures that was maintained for the duration of the experiments. Equieffective antagonist doses of 6ß-naltrexol produced a significantly less intense rise in heart rate. There was also a trend for less elevation of respiration and blood pressure. Gross behavioral signs of opioid withdrawal were also seen in both naloxone and 6ß-naltrexol groups, though less in the 6ß-naltrexol treated animals.

Conclusion: Some aspects of UROD can be modeled using opioid dependent mice that are anesthetized during the precipitated withdrawal. Administration of naloxone, a putative inverse opioid agonist, produced a rapid withdrawal syndrome. Neutral antagonist 6ß-naltrexol produced a less severe withdrawal on some measures. Data continue to support the hypothesis that opioid neutral antagonists may have clinical utility in the management of opioid overdose and detoxification.

Source of Funding: Dean Hayden Student Research Grant.

A32
Preparation for rural nurse anesthesia practice
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Introduction: The purpose of this study was to survey the opinions of nurse anesthetists employed in rural areas regarding their preparedness to practice in an independent setting. For the purpose of this research an independent setting was defined as a nurse anesthetist not working under medical direction or supervision of a physician anesthesiologist. This study also attempted to determine educational and clinical experiences that would optimally prepare students seeking employment in these unique practice settings.

Methods: Following attainment of IRB approval, a questionnaire was mailed to 100 Certified Registered Nurse Anesthetists (CRNAs) working in rural settings. The items asked the respondents to supply demographic information and answer questions regarding their preparedness to practice independently following graduation. In addition, the survey asked for suggestions that would facilitate the transition from anesthesia student to rural anesthesia provider.

Results: The response rate was 48% (N=48). Seventy-nine percent (N=38) of the respondents were male, and 60% (N=29) were over the age of 50. Although only 18% (N=8) of the respondents had a rural rotation during their training, 48% (N=23) believed that their anesthesia program prepared them to practice independently. All the respondents that were offered specialty rural rotations during their training found it beneficial. Over 90% of all respondents indicated that increased experience in regional techniques, obstetric anesthesia, and the management of the difficult airway would enhance preparation for independent practice.

Conclusion: This study found that the majority of rural anesthesia providers surveyed are projected to reach the age of retirement within the next 10 years. Many of
these vacant positions will likely be filled by recent graduates. The comments gleaned from this research suggest that a specialty rotation and increased obstetric, regional, and difficult airway experiences would positively impact rural readiness. Future research may include the identification of facilities that could serve as elective rural rotations.

A33
Do junior nurse anesthesia residents benefit from a mentor?
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Introduction: Mentorship is considered by many authorities as being possibly the most important developmental tool for the progression of a professional in training. In recent years, progressively increasing support of mentoring programs has been documented, especially in business, academia and overall career development. In 2003, Waugaman and Aron identified the shortage of nurse anesthetists and evaluated the reasons for the high attrition rate in nurse anesthesia programs. Waugaman and Aron identified a major factor influencing this high rate as the failure to be properly socialized into the profession. The goal of this research was to examine the role played by mentorship in decreasing anxiety and promoting success among first year residents.

Methods: A convenience sample of junior residents enrolled in the Anesthesia Nursing Program at Florida International University, in Miami, Florida, served as the basis for this study. Junior and Senior residents were paired together based on geographical location of the clinical assignment. Junior residents completed the Zung Anxiety Self Rating Scale in a pre/post test format. A modified version of the Mentoring Scale by Dreher and Asher was administered at the conclusion of the first semester. Senior residents who volunteered to be mentors were provided with information on “What Is A Mentor” and a “Should I Become a Mentor?” checklist.

Results: Thirty-seven mentee/mentor couplets were analyzed using SPSS. The average anxiety score on the pre-test had a mean of 2.0959, and on the post-test the mean was 2.5789. The scale ranged from 1 (never) to 5 (all the time). The Zung Anxiety Self Rating Scale had a reliability factor of 0.802. The modified Mentoring Scale ranged from 1 (not at all) to 5 (to a very large extent). 48.6% of the junior residents rated the mentors at below 4 (a small extent) and 24.3% rated the mentors above 4 (large extent). 48.6% of the junior residents rated the benefit of the mentor as “large-very large extent.” A recommendation for future studies would be to cultivate a personal relationship with the mentor and mentee.

References:

A34
How soon after percutaneous coronary intervention (PCI) is it safe to undergo non-cardiac surgery?
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Introduction: Surgery is associated with the development of a procoagulant state and can increase myocardial oxygen consumption secondary to the stress of the surgical procedure. Study data suggest that correction of CAD by PCI reduces the incidence of myocardial infarctions in non-cardiac surgery patients, and delaying non-cardiac surgery can reduce the rate of cardiac complications. Current literature recommends waiting at least six weeks following a PCI to undergo non-cardiac surgery with the highest risk being within the first two weeks. The situation is further complicated by the introduction of drug eluting stents, newer anticoagulants, and new thrombin inhibitors. The drug eluting stents require use of anti-platelet therapy, and recent reports show evidence of late onset stent thrombosis of drug eluting stents with discontinuation of clopidogrel therapy, which is often canceled prior to non-cardiac surgery.

Methods: A retrospective study of 853 charts was performed on patients who have undergone PCI and non-
Cardiac surgery at the Mayo Clinic in the time period between January 1, 1990, and January 1, 2004. A comprehensive data collection was done gathering information on type of PCI, type of non-cardiac surgery, medications, and the presence of complications outlined by the collection tool. All types of non-cardiac surgery were included with the exception of minor procedures such as joint aspirations, endoscopies, and skin biopsies.

**Results:** Our study categorized optimal post-PCI time for a patient to have non-cardiac surgery. High stress and emergency surgeries were found to be more hazardous for the PCI patient when compared to other surgeries.

**Conclusion:** Data from this study demonstrate that neither rocuronium nor lidocaine reduces the incidence of post-operative myalgia induced by succinylcholine compared to placebo in the morbidly obese population.

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**A36**

**Comparison of ventilation and cardiac compressions when utilizing the Impact Model 730 automatic transport ventilator versus a conventional bag valve with a facemask in a model of adult cardiopulmonary arrest**

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**Introduction:** International Consensus on Science (Guidelines 2000) called for increased use of automatic transport ventilators (ATVs) during cardiopulmonary resuscitation (CPR). This investigation compared the effectiveness of the delivery of ventilation and compressions by registered nurses (RNs) during 2-person CPR on an instrumented manikin using a conventional bag valve mask (BMV) and a prototype ATV, Impact Model 730, with a mask.

**Methods:** Using a randomized crossover quasi-experimental design, subjects (n = 28) alternated performing CPR using the BVM or Impact 730 on a manikin. Flow, volume, pressure, and number of cardiac compressions were measured using a pneumotach system. A lower esophageal sphincter was constructed using a 5 cm water positive end expiratory pressure valve with stomach volume measured using a mechanical respirometer. Ease of use was measured using a 10-cm visual analog scale. A one-tailed paired Student t-test was used to compare difference in actual and recommended number of breaths, compressions per minute, tidal volume, mask leak, stomach volume per breath, and ease of use (p < or = 0.05).

**Results:** There was no difference between the mean...
Predictors of student success in the US Army Graduate Program in Anesthesia Nursing

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US Army Graduate Program in Anesthesia Nursing

Introduction: Currently, the Army is experiencing a shortage of Certified Registered Nurse Anesthetists (CRNAs). Because the US Army Graduate Program in Anesthesia Nursing (USAGPAN) is virtually the sole academy for US military personnel, it is essential that officers who begin the USAGPAN successfully complete the program. The objective of this research is to identify cognitive and non-cognitive student characteristics that may predict success in the USAGPAN.

Methods: This three-year longitudinal, prospective, descriptive, correlational study was initiated in 2003 and will be completed in 2006. Students are invited to participate in the study by email. Completion of the assessment tools indicates consent. Cognitive and non-cognitive assessment tools are used to identify predictors of success in the USAGPAN. The two non-cognitive tools administered are the Rotter Locus of Control Scale and the trait portion of the State-Trait Anxiety Inventory. The cognitive indicators include the students’ undergraduate grade point average (GPA); undergraduate science GPA; total graduate record examination (GRE) score; all subcategories of the GRE (quantitative, verbal, analytical, written); and the Watson-Glaser Critical Thinking Appraisal. The measure of success is defined as graduation or withdrawal from the program.

Results: The relationship between graduation or failure and scores from all cognitive and non-cognitive indicators was tested with logistic regression to identify predictors or combinations of predictors for success in the USAGPAN. Although analysis revealed no variables statistically predictive of graduation, the Rotter Locus of Control scores approached significance (p=0.08) suggesting that students with a more external locus of control are more likely to succeed.

Conclusion: These results suggest that the Rotter Locus of Control may be the most predictive indicator of success in the USAGPAN. These findings may aid in identifying students at risk for failure so that interventional measures can be developed and implemented whereby the faculty can promote success and conversely decrease attrition.

A38

A comparison of prescribed evening insulin glargine and preoperative blood glucose values

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Introduction: Currently no consensus exists on preoperative recommendations for evening insulin glargine (LANTUS) dosing. To avoid perioperative hypoglycemia, a reduced evening dose is common.

Methods: This retrospective chart review (n=433) compared prescribed evening insulin glargine dose and fasting blood sugar (FBS). Type 1 diabetics (defined as under age 31 at onset, never on oral antihyperglycemic agents) and Type 2 diabetics (all others) were grouped according to the protocol instructions of the anesthesia department at that time: (A) take no insulin glargine (B) take 50% of your usual insulin glargine (C) take 100% (including those asked not to alter the dose) or (D) consult your own diabetes care provider for the dose. These groups were further divided by FBS on the day of surgery: (1) hypoglycemic as 79 mg/dl or less, (2) normoglycemic as 80-179 mg/dl, or (3) hyperglycemic as 180 mg/dl or more.

Results: No significant difference was found among the percentage of prescribed evening insulin glargine and FBS groups in Type 1 diabetics (n=88). In Type 2 diabetics (n=345), as insulin glargine percentage increased, FBS group value decreased ($r=-.12, p<.03$).
Patients who consulted diabetes care providers (n=39) were most likely to fall in the 80-179 mg/dl group. Independently, diabetes type and degree of baseline glucose control also significantly related to FBS.

Conclusion: Between 50% and 100% of evening insulin glargine dose should best result in normoglycemia, while avoiding hypoglycemia. Although few in number, patients that had individualized advice from their own diabetes care provider had the greatest success in achieving the targeted FBS range. Insulin glargine is now widely accepted for meeting basal insulin requirements because of its peakless property and 24 hour duration. An evening dosing strategy by anesthesia care providers should be adopted that will most likely avoid perioperative hypoglycemia and extreme hyperglycemia.

A39
Endotracheal tube cuff pressure following intubation
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Introduction: An endotracheal tube (ETT) is frequently necessary for airway management to enhance patient safety; however, improper inflation of the ETT cuff may lead to airway complications. The current method to determine ETT cuff pressure is estimation by finger palpation of the ETT pilot balloon. The purpose of this study was to explore the anesthesia provider’s ability to estimate ETT cuff pressure using this subjective method in comparison to a quantitative measurement obtained using a manometer.

Methods: Participants included anesthesiologists and Certified Registered Nurse Anesthetists with experience ranging from zero to greater than 15 years of practice. Providers followed a standard induction protocol and then subjectively assessed the ETT cuff pressure. Afterward, a researcher obtained a quantitative measurement using a Posey Cufflator manometer. The hypothesis was that there would be a difference between subjective estimation and quantitative assessment of ETT cuff pressure. A sample size of fifty measurements was obtained, and the data were analyzed using descriptive and inferential statistics.

Results: Seventy-two percent of the actual cuff pressures were incorrectly estimated by finger palpation. While 28% were within the acceptable limits, 26% were lower than estimated, and 46% were higher than estimated. No difference was noted between years of experience and incorrect cuff inflation.

Conclusion: Nothing is more important to an anesthesia provider than a secure airway. These findings demonstrate that the currently practiced method of subjective assessment of ETT cuff pressures is inadequate and that a more definitive method to determine initial ETT cuff inflation may be warranted.

Source of Funding: Uniformed Services University of the Health Sciences.

A40
Impact of work patterns on the health of Certified Registered Nurse Anesthetists
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Introduction: The number of hours worked by health care providers has recently been under intense scrutiny. Substandard performance, medical errors, and detrimental effects on the provider’s mental and physical health have been associated with extended work hours. The purpose of this survey research was to determine the prevalence of extended work schedules in anesthesia providers employed in a large suburban medical center and to evaluate the impact on the practitioner and his or her practice.

Methods: After IRB approval was obtained, a survey (piloted for content and context reliability) was developed and administered to 300 CRNAs working for the Detroit Medical Center and affiliated sites. A cover letter accompanied the survey explaining the purpose of the research. The 42-item instrument required the respondents to provide demographic data and information regarding their typical work schedule. The questions that addressed the provider’s mental, physical, and psychosocial health were rated using a Likert Scale.

Results: The response rate was 46% (N=139). Thirty-nine percent (N=54) of the respondents reported working 41-48 hours per week. Thirty-five percent of respondents (N=49) reported working 6-10 hours of overtime per week. Increased work hours were positively correlated with caffeine consumption and BMI. The average BMI of respondents working less than 40 hours was 23, and for those working greater than 40 hours per week the average BMI was 27.

Conclusions: Although this data revealed that the providers working more than 40 hours per week were heavier and consumed more caffeine, there were no differences in the respondents’ perceptions of their physical and mental health. The health care providers working in excess of 40 hours per week did not experience more job related injuries. Future research may evaluate the impact of extended work hours on job performance and critical thinking skills.
Second-year nurse anesthesia student involvement in mentoring

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Introduction: In effort to aid the transition of the incoming class into The Nazareth School of Nurse Anesthesiology, a Second-Year Student Involvement in Mentoring Program (SSIM) was created and implemented. The SSIM program is an adjunct to the training provided by CRNAs and Anesthesiologists.

Methods: The Student Mentoring Program was a student-to-student orientation program. This program was piloted on September 17, 2004, and completed on November 4, 2004. This pilot involved the incoming class of 2006. The mentoring program encompassed 72 hours of instruction over the course of 12 days. The purpose of the study was to have the first-year students transition smoothly into the clinical/operating room setting with an understanding of the role and responsibilities of a nurse anesthesia student and to decrease anxiety levels. The orientation program included: assessment, medication review, room preparation, patient positioning, simulation from induction to emergence, documentation requirements and operating room etiquette. Clinical coordinators at each site completed a series of 4 open-ended evaluations. In addition, the first-year students completed anonymous questionnaires about the SSIM program.

Results: Feedback received from the students was positive. 100% of the students recommended continuing the program for future classes. 85.7% of clinical coordinators commended and recognized the SSIM program as having had positive results. The clinical coordinators also acknowledge a positive difference between students of the SSIM Program compared to students that were not exposed to a mentoring program.

Conclusions: The program was well received by the participants. The majority of the students of the incoming class felt more prepared and less anxious about their role as a nurse anesthesia student after the program. First-year students suggested that the program be continued by the second-year students for all incoming classes. It is our recommendation that more simulation and exposure to the operating room initially would be beneficial.

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Postoperative outcome in pacemaker patients undergoing non-cardiac surgery

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Introduction: Over 300,000 patients with pacemakers (PM) undergo non-cardiac, non-implant surgery yearly in the US. A previous report states that PM patients have an increased risk of perioperative mortality, supported by a subsequent abstract (2001) reporting greater than 4% postoperative cardiac death rate. Guidelines from both NASPE-Heart Rhythm Society and American College of Cardiology recommend immediate preoperative and postoperative PM evaluation, as that might reduce or prevent PM problems.

Methods: Surgery charts from all PM patients for a two-year period were retrospectively reviewed for postoperative 30-day cardiac mortality (P30DCM), which was determined by each patient’s last postoperative clinic visit date, or by contacting the patient, family, or referring physician if 30-day history was not available. Survival/mortality data was obtained on every patient.

Results: A total of 139 operations were identified, ranging from skin cancer excision (low risk) to significantly invasive procedures such as pancreatectomy or thoracotomy (high risk). Preoperative evaluations found: 6 PM with depleted battery, 6 PM with inadequate safety margins for pacing, and 11 PM with dangerous or injurious settings, all of which were corrected prior to surgery. Postoperatively, 6 PM had pacing threshold increase and 1 showed power-on reset. P30DCM was 0 (95% confidence interval, 0 to 2.9 [2.1%]). Three patients died from noncardiac causes: one from necrotizing fasciitis, two from metastatic disease.

Conclusion: Comprehensive evaluation of PM with appropriate interventions prior to and after surgery appears to have produced a 30-day postoperative cardiac mortality of zero for 139 consecutive cases during a two-year period. These data suggest that immediate preoperative and postoperative PM checks can reduce or prevent postoperative cardiac mortality in PM patients.

Use of root cause analysis (RCA) to enhance nurse anesthesia education

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**Introduction:** Delivering modern anesthesia care is complex and interconnected with other disciplines. When an adverse event, clinical error, or near miss occurs, uncovering the factors that have contributed to it, can facilitate changes that may prevent future events. Mandatory reports to accrediting and regulatory authorities require a structured and systematic approach, such as RCA, to adverse incidents. As leaders in health care and proponents of patient safety it is important that anesthesia practitioners learn the concepts and processes that will enable them to direct measures that can correct system issues.

**Methods:** Second year nurse anesthesia students enrolled in Advanced Clinical Experiences, learned the technique and performed RCA. As a seminar assignment, students were required to report an adverse event, error, or near miss and perform an interdisciplinary review that included describing latent and active errors, collection and evaluation of evidence, and formulation of plans for changes that could help improve patient safety. The instructor served as facilitator for discussions. Written reports were also submitted. After the semester ended, students assessed the value of the experience using an anonymous, open question survey.

**Results:** Thirteen nurse anesthesia students presented and analyzed eleven adverse events or near misses. Discussions and written reports demonstrated a willingness to remain accountable while recognizing the system factors that increase the likelihood of error. Seminar discussions of the cases provided a forum for group learning. Students collaborated with the community of interest in order to present an interdisciplinary analysis that included suggestions for policies or techniques to improve patient care. Ten of thirteen students responded to the survey, where their evaluation of the technique and its value to their education was positive.

**Conclusions:** Root cause analysis of adverse events is a useful tool to improve nurse anesthesia students’ professional accountability. Using the technique as a classroom exercise helped the students to develop the vision needed to become leaders in evaluation of clinical events.

**References:**

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**A44**

**Effects of dexmedetomidine in the coronary artery bypass graft (CABG) patient: A pilot study**

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**Introduction:** Postoperatively CABG patients remain intubated requiring sedation and pain management. Propofol is a commonly used sedative but requires concomitant analgesic use. Dexmedetomidine (DEX) is an alpha-2 agonist providing both sedative and analgesic properties. Limited research has been conducted regarding its efficacy for postoperative CABG patients. The purpose of this study was to compare propofol to DEX infusions to determine differences in amount of post-op pain medication used, intubation time, and cardiothoracic unit (CTU) time.

**Methods:** Data was collected via an IRB approved retrospective chart analysis on 100 consecutive CABG patients presenting to the study institution. Data collected included demographics, DEX and propofol use, total MSO4 equivalent pain medication in CTU, total post-op intubation time, and total CTU time.

**Results:** Of the 100 charts reviewed, 2 were eliminated for receiving both medications, and 5 did not receive either. Of the 93 remaining, n=34 received DEX and n=59 propofol. Because the DEX group was significantly older (62.1 [SD±5.4] vs 59.6, [SD±5.3], p=.034), data was analyzed by multivariate analysis of covariance using age as the model covariate. The DEX group showed significantly shorter total intubation minutes (365 [SD±232] vs 503 [SD±378], p=.037). Though the DEX group used less morphine equivalents of pain medication post-op, (13.9 mg [SD±11.5] vs 17.3mg [SD±11.9]) and had shorter mean total CTU minutes (1434 [SD±458]) vs 1620 [SD±550], p=.102), differences were not statistically significant due to low power (mg MSO4 p=.436, power =.121; CTV time p=102, power =.373).

**Conclusion:** DEX has potential to benefit the CABG population. In this sample, use of DEX appeared to be related to shorter total intubation time. It is possible that DEX use may also be related to decreased total CTU time and pain medication usage, and could have hemodynamic and economic impacts, but additional prospective randomized studies are needed.

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**A45**

**The effects of chloroprocaine versus lidocaine for skin infiltration prior to intravenous catheter insertion**

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Introduction: The purposes of this study were to determine which of two local anesthetics, chloroprocaine or lidocaine, created less pain upon intradermal injection and to determine which one was more effective in reducing pain when an 18-gauge intravenous catheter was inserted.

Methods: The study was a prospective, double blind, mixed, crossover design. A convenience sample of 64 healthy US Army and Air Force active duty and retired officers, age 22-64, was used. Each subject received both treatments. A 100-mm visual analogue scale (VAS) was used to measure the level of pain during injection of the local anesthetic and insertion of the intravenous 18-gauge catheter.

Results: There was no statistically significant difference in the amount of pain on injection between the two local anesthetic agents (lidocaine m=23.42, sd=16.052; chloroprocaine m=22.25, sd=17.257) (p=0.995). Both agents were very effective in decreasing the pain of intravenous catheter insertion (p=0.00) (lidocaine m=3.16, sd=5.934; chloroprocaine m=4.08, sd=8.346). No statistically significant difference was found in the effectiveness of the two drugs in reducing the pain of intravenous catheter insertion (p=0.99).

Conclusions: Both lidocaine and chloroprocaine create approximately the same amount of pain on injection and are equally effective in reducing the pain associated with an insertion of an 18-gauge needle. Lidocaine is less expensive than chloroprocaine and should be considered as well as provider preference and availability when starting IVs.

A46

Will the addition of a sciatic nerve block to a femoral nerve block provide better pain control following anterior cruciate ligament repair (ACLR) surgery?

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Introduction: Anterior cruciate ligament repair (ACLR) surgery is associated with extreme postoperative pain and high opioid consumption. One of the current standards of care used to ameliorate this pain is a femoral nerve block (FNB). However, its efficacy is dependent on the source of graft material, the degree of surgical trauma to the operative site, and postoperative joint swelling that may affect distributions of the sciatic nerve. The use of combined femoral and sciatic nerve blocks (FSBs) in other knee surgeries has demonstrated improved postoperative analgesia and decreased opioid utilization.

Methods: This prospective, randomized, quasi-experimental study, compared the analgesic efficacy of a group of patients receiving a femoral nerve block to a group of patients receiving combined femoral and sciatic nerve blocks in the postoperative ACLR population. A convenience sample of 60 subjects received either femoral or combined femoral and sciatic nerve blocks utilizing 0.25% levobupivacaine. Measured variables included demographics, verbal analogue pain scores, modified Bromage scores, patients’ satisfaction scores, and total postoperative analgesic requirements. Data were analyzed utilizing descriptive and quantitative inferential statistics. We anticipate significant differences (p<0.05) in postoperative opioid consumption and pain scores. Further, we expected patients in the combined femoral and sciatic nerve block group to be significantly more satisfied with their surgical experience.

Results: A total of 56 subjects (27 FNB; 29 FSB) were used in analysis. No differences in surgical times, anesthesia times or intraoperative analgesic requirements, and onset of motor (Bromage scores) or sensory levels were noted between groups (p>0.05). No differences in demographic variables or type of graft used for the procedure (p>0.05), but did note differences in overall median satisfaction scores between the FNB (2.5) and FSB (1.0) groups (p=0.001). Differences were noted in postoperative analgesic requirements between groups in the PACU, home, and total postoperative analgesic requirements (p<0.05) but not in the same day surgery unit. Time to first analgesic request was also significantly longer between the FSB group and the FNB group (496.5 ± 241.6 minutes versus 366.1 ± 138.34 minutes, respectively) (p=0.016). Thirty-nine of the 56 subjects (69%) strongly agreed to overall pain control satisfaction, 66% (n=26) in the FSB group, and 33% (n=13) in the FNB group (p=0.001). Similar findings were encountered when subjects were asked if they were satisfied with the leg block and if they would have the leg block again, if needed. All subjects enrolled had a successful block placed (FNB or FSB) with an average onset of 5-30 minutes.

Conclusions: In our study we found that the FSB was superior to the FNB in terms of patient overall satis-
faction and reduction of postoperative analgesic requirements without increasing adverse events, and therefore this combination (FSB should be used in all ACLR patients whose primary goal in placement is to facilitate an increase in postoperative analgesia and overall satisfaction.

Reference:

A47

Preoperative angiography and postoperative renal dysfunction in cardiac surgical patients

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Introduction: Postoperative renal insufficiency is a major problem in the cardiac surgical population. This population is at high risk because of their old age and the frequency of chronic diabetes and hypertension. The etiology of postoperative renal insufficiency in the population is complex and presumably involves the interaction of a patient at risk and a variety of perioperative challenges, such as low cardiac output states, renal embolization, and nephrotoxins. The development of contrast-induced nephropathy after coronary angiography carries a poor prognosis. While renal insufficiency in cardiac surgical patients is well recognized, the potential link to preoperative angiography has not been assessed. This is of particular importance as the perioperative period has become progressively truncated, with many patients undergoing cardiac surgical procedures within 48 hours of their exposure to dye in catheterization laboratory. Based on the kinetics of contrast nephropathy, it is reasonable to predict that the interval between angiography and cardiac surgery may contribute meaningfully to post-cardiac surgery renal dysfunction.

Methods: The focus of our study is a retrospective, single center review of approximately 155 charts from 2000-2002. The study will include first-time cardiac surgical patients with an age > 65 years old with renal insufficiency. Patients will have the timing of angiography and surgery noted, and we will examine preoperative and postoperative creatinine concentrations. We will determine what percentage of the population that has cardiac surgery within 48 hours of angiography and develops worsening renal function.

Results: The summary of our data and results will be displayed in succinct poster format and will examine the relationship between timing of coronary angiography and cardiac surgery in patients with baseline renal insufficiency.

Conclusion: According to our statistical analysis, the development of worsening renal function following cardiac surgery does not appear to be related to timing of angiography.

Reference: