Portfolio Project

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Capstone Project

DOCTOR OF NURSING PRACTICE

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Harris College of Nursing and Health Sciences

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2013
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FALL 2011
Concept Map

Nursing Process and the Complexity Theory

Nurses intertwine countless threads, adjusting for each unique situation. At times it is the physical pattern that dominates our attentions and another time it is the emotional pattern. Complexity theory provides the multi-dimensional and inter-relational nature of health and healing embraced by the holistic framework of nursing.

KEY:
- Linear Nursing Process
- Complexity, various teams of people involved in carrying out the nursing process
- Continuation of process


Concept Map

Linear and Complex

A linear theory involves causal relationships.¹ It suggests that the presence of one phenomena leads to a change in another.¹ A linear theory is a direct relationship which means that if a certain phenomena happens, then a certain consequence is expected to follow.¹ Linear theory is more simplified as compared to Complexity Theory in which there is spontaneous adaptation as multiple interacting systems evolve through mutual adaptation.²

Decision/SWOT/Cost Analysis

Decision Analysis – Use of Perioperative Warmers

Magen Kacir RN, BSN

Texas Christian University

Doctorate of Nurse Practice in Nurse Anesthesia

April 27, 2011
**Introduction**

The human system usually maintains a core body temperature of 37 degrees Celsius, which is important in order to prevent deterioration of metabolic functions. In the perioperative area patients are anesthetized in cool environments, thus putting them at high risk for hypothermia. Nevertheless, there are risks and benefits to consider with any intervention. The purpose of this analysis is to assess whether to use convective body warmers and fluid warmers perioperatively aid in the prevention of hypothermia.

**Review of Literature**

A review of the literature revealed consistent adverse events related to perioperative hypothermia, resulting from lack of use of a perioperative warmer. These events included increased rates of wound infections, increased loss of blood, and prolonged postoperative period. The review resulted in an adequate description as to how and why hypothermia occurs in the perioperative area. Sessler illustrates the role that general anesthesia plays in perioperative hypothermia. General anesthesia takes away a patient’s ability to normalize his body temperature through behavior, so that the autonomic defenses alone are available to respond to changes in temperature. However, anesthetics widen the interthreshold range that trigger thermoregulation to approximately 20 times the normal range. The literature review revealed the need for perioperative warmers. The review also discovered two types of warmers (conservation and convection) used in the perioperative area. Convective warming is found to be more effective both for patient outcomes and cost effectiveness to the institutions. Possible risks faced by patients warmed during the perioperatively phase include increased bacterial contamination of the operating theater and surgical
wound during prolonged surgery. 3 (p R13) Yet, warming equipment itself does not cause bacterial dispersal and is unlikely to cause contamination of the surgical field. 3 (p R15)

Databases used to obtain these articles were Cochrane Library and EBSCO Medline. The reviewer collected the articles over a month’s time that spanned from March 2011 to April 2011. The search criteria used to obtain the articles included “perioperative hypothermia” and “perioperative warmers.”

SWOT

The role of SWOT analysis is to take the information from the environmental analysis and separate it into internal issues (strengths and weaknesses) and external issues (opportunities and threats). 4 It involves specifying the objective of the healthcare institution and identifying the internal and external factors that are favorable and unfavorable to achieve that objective. 5 When addressing the issue whether to use perioperative warmers, a SWOT analysis demonstrates how to decrease adverse events in the perioperative area that relate to thermoregulation. It also gives the healthcare institutions a look at all sides of the issue.
SWOT analysis of the use of perioperative warmers

<table>
<thead>
<tr>
<th><strong>Strengths</strong></th>
<th><strong>Weaknesses</strong></th>
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</table>
| - Decreased risk for resistance to surgical wound infection ¹ (p 1733)  
- Decreased loss of blood ¹ (p 1733)  
- Decreased postoperative recovery time ¹ (p 1733) | - There is no standard pricing for perioperative warmers.  
- The cost of warming patient, like any other supplies, variable and may be hard to budget for. |

<table>
<thead>
<tr>
<th><strong>Opportunities</strong></th>
<th><strong>Threats</strong></th>
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<tbody>
<tr>
<td>- Further research on whether hospitals and healthcare professionals can achieve better patient outcomes with a combination of conservation and convective warmer ² (p 672)</td>
<td>- Possible overheating of patients. No evidence of any benefits is associated with supranormal core temperatures</td>
</tr>
</tbody>
</table>

Cost-Effective Analysis

A variety of methods exist to maintain normothermia and reduce the risk of the associated adverse events of hypothermia. For that reason, a Cost Effective Analysis would be an appropriate methodology for this topic. Two comparable methods of preserving normothermia are conservation methods and convective methods. The first important thing to note is that patient outcomes show no differences between the two groups, in terms of central temperatures, after one hour in the recovery room. ² (p 672) However, despite the use of a combination of heat conservation methods, five patients had temperatures <36 degrees Celsius upon leaving the operating room. ² (p 672) The conservation group had 31% of patients in the group leave the perioperative area with a temperature of less than 36 degrees Celsius compared to only 5% in the convective group. ² (p 672) The convective warmers produced better outcomes initially and are available at more reasonable cost when compared to the conservation blankets and fluid warmers.
Synthesized Evidence

The reviewer used three articles in her analysis—one systematic article and two quantitative research articles. The “Mild Perioperative Hypothermia,” a systematic review article, was the basis for the analysis paper. This article included 60 articles in its review. The information presented was thorough in its explanation as to how the body maintains its core temperature and the adverse events that occur when the temperature deviates below the normal core temperature. The quality of the “Mild Perioperative Hypothermia” article may be poor considering the articles included ranged from 1965-1997. Also, the article does not include a section of how the articles were selected to be included in the review. The second and third articles fall under quantitative research. Quantitative research measures outcomes using numerical data. 6 (p 18) The “Bair Hugger Patient Warming System in Prolonged Vascular Surgery: An infection risk” examined sixteen patients undergoing aortic surgery, twelve male and four female, the mean age of 72.5 years. This article is not of upmost quality because of the limits within the study. While the warming equipment did not cause bacterial dispersal, the authors did not explore the role of the patient flora or conduct the study in a true surgical setting. 3 (p R15) “Heat Conservation vs. Convective Warming in Adults Undergoing Elective Surgery” is also a quantitative research article. This article looked at the difference between convective and conservation warmers. This article was of good quality due to the rigorous inclusion criteria. The participants included 37 adult patients who were class ASA I-III undergoing elective major gynecological, orthopedic, and general surgery scheduled to last two hours whom the researcher had randomly assigned to one of the two groups. 2 (p 670) The article sought to give the most accurate results by going to the extent to of excluding two patients from the data analysis because the surgery lasted less than
The article was published in 1997 limiting the quality of the research.

**Conclusion**

The combination of anesthetic-induced thermoregulatory impairment and exposure to cold operating rooms makes nearly all patients hypothermic. Even mild perioperative hypothermia is associated with adverse outcomes, and thus the intraoperative core temperature should remain above 37 degree Celsius. Perioperative hypothermia is preventable with use of a perioperative warmer. More specifically convective warmers because they produce slightly better patient outcomes than conservation warmers and are more cost effective. Perioperative hypothermia is a serious condition and is easily avoidable. Maintaining normothermia in the operating room gives the patient the best possible advantage for a rapid postoperative recovery.

**References**

Reflective Evaluation

Self-Reflection: Fall 2011

Magen Kacir RN, BSN

Texas Christian University – Doctorate of Nurse Practice in Nurse Anesthesia

December 20, 2011
Introduction

Having completed my first semester as a graduate student as been a lot of work. This semester I’ve realized how much I really do not know in terms of mechanism of action of drugs or specific physiology. I have at multiple times throughout the semester felt way in over my head. However, at the same time this is also the reason I chose to continue on and seek further education.

Reflection

Although I have felt overwhelmed with the amount and detail of the information presented to me this semester it also reassures me that I am where I am suppose to be. For me, I excel better in the task I am asked to do if I know why or how that task works. This semester I have learned more about why I did something I did as a nurse than I did in the four years I spent getting bachelors in nursing. I am not bashing nursing school but rather reflecting on that I had I not continued on and sought further education I’m not sure I could’ve been the best possible healthcare professional I could be.

I have also been humbled this semester as I am usually an A student but managed to have more Bs than As this semester. In undergraduate I felt like grades were a reflection of the amount of work put into the course. However, I quickly learned this semester that that would not be the case for graduate school. I do not feel that the B I received in courses reflect the amount of work I put into the course but rather I am learning how to think and applied the knowledge I have been taught differently than I previously been able to do for undergraduate exams.
Conclusion

Although technically I have a year under my belt in the program I know that this is just the very beginning of a long road ahead of me. I hope to take away from this semester the humbling experiences and apply them towards better grades and myself next semester.
SPRING 2012
Research Proposal/Narrative Review

Oxygen Administration to Acute Myocardial Infarction Patients:

Narrative of Proposal

Magen Kacir, RN, BSN

Instructor: Dr. Welliver, CRNA, DNP, ARNP

Harris College of Nursing and Health Sciences

Texas Christian University

November 18, 2011

NRAN 73195: Narrative of Proposal
Introduction

The role of oxygen administration to acute myocardial infarction (AMI) patients has been debated for years as well as its contribution to reperfusion injury. The term “reperfusion injury” is defined as damage to tissues due to restoration of blood flow. The notion of reperfusion injury was examined by Hearse in 1977 that suggested cells damaged prior to reperfusion were in fact viable before the reintroduction of blood flow. A generally recognized source of reperfusion injury is the production of oxygen-derived free radicals which are known to be cytotoxic to surrounding cells.

After a synthesis of the literature was preformed the proposed intervention is to not administer supplemental oxygen to uncomplicated acute myocardial infarction post PCI patients who do not demonstrate signs of respiratory distress. A SWOT analysis was preformed on the proposed and intervention as well as an external and internal situational analysis. The facility that the intervention is to be implemented in is Sacred Heart Hospital, Pensacola. Sacred Heart Hospital of Pensacola is a non-profit general medical and surgical facility. The hospital has 458 beds and offers inpatient and outpatient services that include cardiac catheterization for diagnosis and treatment for adults.

Internal Situational Analysis

The internal situational analysis factor assessed cost of implementation, human resources necessary, marketing, and operations analysis.
• **Costs to implement the project**--
  
  o The cost to implement the project will be related to the cost of education of the current workers (nurses, respiratory therapist, doctors, etc) in regards to modification of the current intervention of oxygen administration to AMI patients post PCI. The total mean in-hospital cost for an acute myocardial infarction patient was $14,772. Every year, about one million people suffer a heart attack. The average cost of a healthcare educator to a facility is about $44,000.

• **Human resources necessary**--
  
  o Implementation will not require any additional workers rather the current worker will need to be educated on the implementation of the project.

• **Marketing**--
  
  o Marketing the project to the current workers within the facility will require posters to remind the workers of the change to current intervention. Marketing will be required outside the Cardiac Catheterization Lab as well. Workers in the intensive care units as well as the telemetry units will need to be educated on the implementation of the new intervention. Posters and flyers are useful communication tools to spread information quickly and build awareness. They are often a highly versatile and inexpensive form of advertising when compared to other marketing materials.
• Operations analysis--
  o The current process of treating AMI patients post PCI will need to be modified in order to implement the project. After the patient has received a stent the doctor and the nurse will need to assess that the patient is ventilating properly and maintaining an oxygen saturation level above 90% before removing the supplemental oxygen.

External Situational Analysis Factor

External situational analysis assessed demographic, economic, legal and policy, and social and technological information.

• Demographic
  o Age: Median age is 39.4 years\textsuperscript{6}
  o Persons over age 65 years in Pensacola, Florida is 8,826 or 17.6\% of the population.\textsuperscript{7}

• Economic
  o The number of deaths in Florida due to cardiovascular disease in 2007 was 54,542, with an estimated hospital cost of $7.2 billion.\textsuperscript{8}

• Legal and Policy
  o American Heart Association (AHA) recommendations; 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science;
    ▪ Initial General Therapy for acute coronary syndrome (ACS):
      • Oxygen should be administered to patients with
breathlessness, signs of heart failure, shock, or an arterial oxyhemoglobin saturation <94%

- **Social and Technological information**
  
  o State plan to reduce incidence of disease; the Department of Health for the state of Florida has developed a state plan for 2009-2012 to prevent stroke and heart disease. In collaboration with the Center for Disease Control and Prevention, Florida has developed a set of priorities to implement along with measurable objectives to track progress of the plan.
    
    ▪ The Florida Association of Community Health Centers, Inc., in collaboration with the Heart Disease Stroke Prevention Program (HDSPP), will expand the number of Cardiovascular Disease collaborative used in federally funded community health centers in Florida.  

**SWOT Analysis**

- **Strength** – Patient’s may benefit from not receiving oxygen post PCI by minimizing reperfusion injury and therefore rescuing viable cells from further damage.  

- **Weakness** – The actual benefit of patient’s receiving oxygen post PCI has not been proven. Even though it has been suggested that oxygen administration may be damaging to myocardial cells during reperfusion it has not been established that the benefits may outweigh the cost of administering oxygen post PCI.

- **Opportunities** – The opportunity that may arise with the implementation of this invention is retaining more viable myocardial cells during reperfusion of the
myocardium post PCI and thus limiting the infarct size.\textsuperscript{6}

- \textit{Threats} – While it is suggested that oxygen administration during reperfusion may decrease the number of viable cells in the infarcted area the proven benefits of oxygen administration post PCI has not been studied. Therefore, not administering oxygen to patient’s post PCI may have more damaging effects than we know.\textsuperscript{11}

\textbf{Evidenced-Based Practice Model: Rosswurm and Larabee}

The Rosswurm and Larabee model will be used to implement the intervention into the facility. The Rosswurm and Larabee model is an evidenced-based model that is obtained from theoretical and research literature as it relates to evidence-based practice, research utilization, and change in theory.\textsuperscript{12} This model aids practitioners through the process of changing to evidence-based practice, beginning with the assessment of the need for change and ending with the integration of an evidenced-based protocol.\textsuperscript{12}

1. \textbf{Assess the need for change in practice:}

The recommendation from the American Heart Association for oxygen administration in acute myocardial infarction patients is the current practice the facility follows. As mention previously this recommendation states that oxygen should be administered to patients with breathlessness, signs of heart failure, shock, or an arterial oxyhemoglobin saturation <94\%.\textsuperscript{9} Oxygen-derived free radicals have been associated with increasing myocardial injury.\textsuperscript{13} This form of myocardial injury, which by itself can induce cardiomyocyte death and increase infarct size, may in part explain why, despite optimal myocardial reperfusion, the rate of death after an acute myocardial infarction approaches
2. **Link Problem with Interventions and Outcomes:**

The problem is linked with myocardial reperfusion injury. The intervention will include removal of supplemental oxygen to acute myocardial infarction patient unless the patient cannot maintain an oxygen saturation >94% or exhibits signs of respiratory distress. Identified outcomes are a decrease in myocardial reperfusion injury in uncomplicated acute myocardial infarction cases.

3. **Synthesize of Best Evidence:**

A synthesis of the evidence has previous been preformed. The best current evidence suggests potential harm with oxygen administration and no clear evidence to support its use.

4. **Design a change in practice:**

The design to implement the intervention will include two major components, education and reinforcement. The first component will consist of a continuing education class to inform the staff (nurses, doctors, and respiratory therapist) of the best current evidence regarding oxygen administration to acute myocardial infarction patients. This information presented will be in regards to myocardial reperfusion injury. The second component will include reinforcement of the education and best evidence presented in the class. This will include posters of the information to serve as reminders and will be posted in areas in which an acute myocardial infarction patient may be present (e.g. emergency department, cardiac catheterization lab, intensive care unit, and telemetry floor).
5. Implementing and Evaluating Change in Practice:

Pilot implementation of the design and intervention will be conducted through a coordinator. The coordinator will be available to the staff to answer questions as well as provide reinforcement of the intervention. Evaluation of the change in practice will be conducted through chart reviews and anonymous surveys of the staff to evaluate compliance issues.

6. Integrate and maintain change in practice:

Upon completion of the pilot study an evaluation will be performed to assess for a decrease in the size of the myocardial reperfusion injury. These results will be presented to the doctors, nurses, and respiratory therapist who attended the previous class and were involved in implementing the pilot study. The Rosswurm and Larabee evidenced-based model being used to implement the intervention encourages the involvement of stakeholders (doctors, nurses, and respiratory therapist) throughout the various steps of the model. By presenting them with the results of the pilot this will instill confidence in the usefulness of the change the practicability of making the change in their environment.
1. Assess
Oxygen-derived free radicals from hyperoxyemia have been associated with increased infarct size.¹²

2. Link
To reduce myocardial reperfusion injury supplemental oxygen to uncomplicated acute myocardial infarction patients will be removed unless patient demonstrates signs of respiratory distress.

3. Synthesize
The best current evidence suggests potential harm with oxygen administration and no clear evidence to support its use.

4. Design
The design will include two parts, an education and reinforcement component.

5. Implement & Evaluate
Pilot implementation of intervention will be conducted through a coordinator who will be available to the staff for education or reinforcement. Evaluation will be conducted through anonymous surveys.

6. Integrate & Maintain
Results of the pilot study will be presented to the staff.
Outcomes to be evaluated

Outcomes to be evaluated include compliance of staff to implement intervention and size of infarct post PCI in an uncomplicated acute myocardial infarction patient. Compliance of staff will be evaluated through chart reviews. These reviews will be conducted by the coordinator of the pilot study and committee if need be. To evaluate a decrease in myocardial reperfusion injury after removal of supplemental an MRI will be conducted. An MRI has illustrated to have a significant role in evaluation of myocardial infarction as well as in assessing microvascular perfusion.15

Conclusion

Because of the conceivable harmful effects that oxygen administration may have on infarct size it necessary to implement an intervention to decrease this risk to patients. While best current evidence suggests potential harm with oxygen administration it is imperative to be reminded that its intended benefits have not been studied as well. At this point interventions to protect patients must be put into place until best current evidence suggest otherwise.
References


15. Myocardial infarction testing with MRI.
   
Additional Work

**Genetic Principles Utilized in Clinical Practice**

The new age of healthcare is headed in the direction of genetic testing as a basis for diagnosis and treatment. This new direction raises hopes for disease detection and prevention as well as advancement in pharmacological treatment. However, these changes have challenges that arise within themselves as well as the ongoing ethical issues that the healthcare field continues to face.

**Proteomics** is the large-scale study of proteins, particularly their structures and functions and are vital parts of organisms to maintain physiological metabolic pathways. After genomics and transcriptomics, proteomics is regarded as the next step in the study of biological systems. Proteomics address how utilization of genetics can help with disease protection and prevention. Proteomic research has proved beneficial in chronic diseases such as cancer in that it has been able to provided information regarding the early diagnosis, prediction of therapeutic responses, and prognosis and potential new diagnostic tools for some infectious diseases. Early detection and more individualized treatment will be a clinical application of proteomics for the advanced healthcare provider. Also with the advancement in of the ability to detect the biomarkers for early diagnosis and treatment there will be the advancement to of the technology required to sense these biomarkers.

**Pharmacogenomics** is another area where genetic information of an individual has the ability to be utilized. Pharmacogenomics can be used as a predictor of a drug response based on a patient’s genotype. It has the potential to improve therapeutic
outcomes and individualize drug therapy, while avoiding toxic effects, treatment failure and adverse drug reactions.\textsuperscript{3} Adverse drug reactions are the fourth leading cause of death.\textsuperscript{3} This is ahead of pulmonary disease, diabetes, AIDS, pneumonia, accidents, and automobile-related deaths.\textsuperscript{3} Annually, Adverse drug reactions cost $136 billion, which is a greater cost than that of a diabetic or cardiovascular care.\textsuperscript{3} With the cost of healthcare rising and many acute care facilities looking at ways to cut cost and Pharmacogenomics could impact advance practice health providers by increasing the responsibility of the provider to be educated on how to provide accurate individualized care to avoid the cost of adverse drug reactions.

Ethical dilemmas arise in healthcare routinely and the utilization of genetics in patient care would be no exception. An example of an ethical dilemma related to genetic testing is when a patient chooses not to share genetic information with other family members when it may be important to their health.\textsuperscript{4} The patient’s decision now creates a dilemma for the healthcare provider, who on the one hand must respect the patient’s confidentiality, while on the other hand has the duty to warn other family members of their potential health risks.\textsuperscript{4} An example of such a situation would be a woman who has tested positive for hereditary breast/ovarian cancer informs her healthcare provider that she does not wish to share this information with her sisters and her mother as she does not get along with them.\textsuperscript{4} The concern for her sisters and mother is that each of them now has a 1 in 2 chance to carry the same breast/ovarian cancer gene mutation that puts each of them at a significantly increased risk to developing breast/ovarian cancer.\textsuperscript{4}

Genetic principles can be implemented or utilized in the clinical practice setting through disease detection and prevention as well as through pharmacological treatment.
As previously no area of healthcare is impervious to ethical dilemmas especially not the area of genetic testing. As advancements in healthcare and genetic testing continue to evolve patient treatment and outcomes will continue to evolve and improve as well.

References:


Reflective Evaluation

Self-Reflection: Spring 2012

Magen Kacir RN, BSN

Texas Christian University – Doctorate of Nurse Practice in Nurse Anesthesia

May 8, 2012
Introduction

The writing of this self-reflection comes at a perfect time. It is actually a typical night even though it is in the middle of finals week. It is a late night that is following a long day of studying. I have spent the time since I have woken up this morning up until this point reviewing a three-inch binder full of hundreds of pages from countless Point Points presented over of the semester. Reviewing and preparing for one big final test over the numerous facts and concepts I hope to have cemented in my brain for future clinical application.

Surprisingly in the short amount of time of these two semesters I feel that I have grown as a person and professionally just as much if not more than I had in the two years after graduating from my undergraduate studies and beginning a professional career. Seeing as to how I am only half way through the program I know this learning and evolving will continue and almost certainly beyond.

Reflection

Generally finals week is one of the most stressful weeks of the semester for a student. However, for the first time in my life as a student I actually have a sense of calmness. As I review the information and look back at the semester I realize that I have indeed learned and retained quite a bit. The first fall semester I did not have this feeling but what I realize is different between the two semesters is how I study. This semester I did a lot more reading and learning to understand the concepts than just trying to memorize the slides or information. I realized that by just memorizing I was just studying for the test. However, by reading and
utilizing as many resources as possible to understand the concepts I have actually retained more information throughout the semester than I did when I was just trying to memorize. This has come to benefit in two ways, one is that this where my sense of calmness with finals is coming from. As I review the information it is more of a reminder than a relearning (or re-memorizing) process. Also, for this upcoming fall knowing these concepts I believe will make the transition from classroom to clinical a little smoother. Research has shown clearly that the ability to memorize facts does not necessarily imply understanding of a concept. While we may strive to understand concepts we may never arrive at perfect understanding of a subject, however we can deepen our understanding beyond the superficial. "Understanding" can be defined as the capability to apply a concept in a non-textbook or classroom context; use a concept to make sense of complex, real-world situations.

A significant challenge that has been faced this semester is my fiancé moving to Alabama for military training. Having him here with me last semester I was comforted and content. This semester has been a bit more of struggle mostly due to loneliness. However, with modern technology he is never more than a phone call or FaceTime session away. While I may be missing his presence I feel that I have benefited in it by being more independent and focused. It is easy to get distracted when you are really enjoying the company of another person.

Conclusion

Although at times it feels like I am in an uphill battle in this program it is to my surprise to get to this point and look back and realize what I have accomplished and didn’t realize at the time. While I know there are still many more challenges ahead it is encouraging to see progress.
References:

SUMMER 2012
<p>| Research Article Critique | Keir’s Theory Critique |</p>
<table>
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<tr>
<th>Element of critique</th>
<th>Comments by critics</th>
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| What are the theoretical foundations for this theory? | • Hydrophilic and Hydrophobic properties  
  a. Protein molecules intruding into the water affect the water structure.  
  b. Clusters of hydrogen-bonded water are constantly reforming due to the influence of hydrophilic and hydrophobic states of the amino acid side on the protein.  
  • Chreode Pathways  
  a. As a result of the clusters of hydrogen-bonded water molecules cavities are present, “these passage ways are called chreodes.”  
  b. Chreodes “facilitate neurotransmitter molecules diffusion through water close to the receptor protein surface.” |
| Provide an overview of the theory in clear language. | 1. Diffusion of molecules across protein surface to receptors through water.  
  2. The role the pathways (chreodes) play in interruption of neurotransmitter molecules to bring on anesthetic effects.  
  3. External agents (nitrogen) influence sleep in a similar way to that of non-anesthetic molecules. |
| How is this theory classified? (practice, prescriptive, descriptive, etc) | • Kiers theory falls under the classification of explanatory.  
  a. “Explanatory theory identifies how the properties and components relate to each other and accounts for how the discipline functions.”  
  b. In this theory the components are general anesthesia, and natural sleep with the relationship of nitrogen. The theory seeks to explain the similar effects nitrogen plays in producing anesthesia and sleep. |
| What are the major concepts of this theory? | • General anesthesia: “the induction of a state of unconsciousness with the absence of pain sensation over the entire body, through the administration of anesthetic drugs. It is used during certain medical and surgical procedures.”  
  • Sleep: “a period of rest for the body and mind, during which volition and consciousness are in abeyance and bodily functions are partially suspended; also described as a behavioral state, with characteristic immobile posture and diminished but readily reversible sensitivity to external stimuli.”  
  • Nitrogen: “A nonmetallic element that constitutes nearly four fifths of the air by volume, occurring as a colorless, odorless, almost inert diatomic gas, N_{2}, in various minerals and in all proteins. Atomic number 7” |
| What are the relationships among the concepts? | • Nitrogen, “At some point there is enough nitrogen to interfere with a wide variety of chreodes causing some decline in their function.”  
  1. Natural Sleep: “Nitrogen is taken into the body with each breath and is distributed throughout like a nonspecific, volatile anesthetic.”  
  2. General Anesthesia: “Nitrogen is known to produce anesthesia and is well known as the cause of the deep diving condition of nitrogen narcosis.” |
| How can this theory be used in practice? | The theory can be used in practice because it demonstrates a specific population, sleep deprived individuals that are affected by this theory. Kier informs the reader that “sleep deprivation is hypothesized to be an excess accumulation of nitrogen, resulting in a smaller amount of anesthetic drug required to create the conditions for chreode disruption.” |
Is this theory structured to reflect evidence from measurement or is this theory too esoteric to invite measurement?  
The theory doesn’t really offer a way in which it could be measured clinically. Instead as mentioned above it seeks to explain a relationship among concepts. Because the theory is explaining an event happening on such a small scale it would be hard to exclude and control all outside variables such as the amount of nitrogen a person is exposed to on a daily basis or any other health conditions that might effect the formation of chreodes pathways.

References

Quantitative Article Critique:

CRNA Prescribing Practices: The Washington State Experience

Louise Kaplan, Marie-Annette Brown, Dan Simonson

Critiqued by

Magen Kacir and Michelle Freshcoln

Texas Christian University

2012
Introduction

In 2005 the state of Washington granted authority to certified registered nurse anesthetists (CRNAs) to prescribe schedule II through IV controlled substances to their scope of practice. A 2011 AANA Journal article presented a study conducted by Dr. Louis Kaplan, Dr. Marie-Annette Brown, and Dan Simonson, a CRNA, to evaluate how the recently extended scope of practice is being utilized by those affected by the change. This was a descriptive study. Information was gathered through a survey method. This critique will review the ethical aspects, research problems, literature reviews, conceptual and theoretical frameworks, research design, quantitative sampling designs, data collection procedures, data quality, quantitative analyses, and the discussion Kaplan et al presented in their study.

Ethical Aspects

The researches did not need to take extra steps to prevent harm to the participants because the participants were not subjected to any physical harm or psychological distress. The participants in this study were mailed a questionnaire and therefore received the benefit of the results without any potential risk or discomforts experienced. Both society and the participants benefited from the study without any cost to the participants other than their time to fill out the questionnaire. No type of coercion or influence was used to recruit participants. The questionnaire used “was mailed in 2006 to CRNAs licensed in Washington with addresses in Washington, Oregon, and Idaho.” The participants were also not deceived in any way. Consideration of vulnerable subjects is not applicable to this study due to the fact that participants were not put at risk in anyway. The participants’ privacy was protected in that only demographic data was used such as gender, education and age. The study received “institutional review board approval.”
Research Problems, Research Questions, and Hypotheses

The research problem presented is what extent are CRNAs with the option to prescribe scheduled II through IV controlled substances using the increased scope of practice. This can contribute to CRNA practice in that it can give them a fully autonomous scope of practice.\(^1\)\(^{(p. 24)}\) There is a good match between the research problem and paradigm in that in this case the researchers are seeking to see how CRNAs with prescriptive authority are “limited by law adapt their practice to prescribing constraints and then transition to a new scope of practice when the law changes.”\(^1\)\(^{(p. 24)}\) The problem is addressed as a statement of purpose, as previously mentioned. The purpose is located in a separate paragraph title “Study Purpose” making it clear and concise. The wording of the purpose of the study could have been slightly better in that it could’ve have included what factors were analyzed in relation to the adoption of prescriptive authority. However the study group was identified as CRNAs within Washington, Oregon, and Idaho.\(^1\)\(^{(p. 26)}\) This is a descriptive study; the researchers are attempting to “describe a group of individuals on a set of variables, to document their characteristics. Descriptive data allow researchers to classify and understand the scope of clinical phenomena, often providing the basis for further investigation.”\(^2\)\(^{(p. 22)}\) Because this is a descriptive study, there is not a defined hypothesis but rather a purpose of the study. This study has two purposes the first being to describe Washington State CRNA prescribing practices and workforce and practice characteristics. A secondary purpose of the study was to analyze factors related to Washington State CRNAs’ adoption of prescriptive authority. As previously mentioned this study does not state a hypothesis and therefore is not directional or non-directional because the researchers are not seeking to either to predict or not predict the relationship between to variables.\(^2\)\(^{(p. 867-868)}\) The
study also does not have a research hypothesis because the researchers are not stating their true expectations of the results. \[^2\, (p\, 135)\] However, it is possible to say that that the purpose of the study could be a null hypothesis in that there may be no relationship or difference between the dependent and independent variables (having prescriptive authority or not have the prescriptive authority.) \[^2\, (p\, 135)\]

**Research Literature Reviews**

A figure within the article is presented that summarizes the status of CRNA prescribing across the nation. As per the article “this figure is the result of a review of the statues and rules of each state, consultation with boards of nursing staff when clarification was necessary, and review by interested participants in several CRNA electronic mailing list.”\[^1\, (p\, 25)\] The most recent research reports cited is, “Recommended Scope of Practice of Nurse Anesthetist and Anesthesiologist Assistants” from American Society of Anesthesiologist in 2010. The review of literature relies mainly on research reports ranging from 1988 to 2010. The content within in the reports comes from CRNA and Anesthesiologist sources.

The review supports the need for new research in that this study only looks at a section of an entire country and profession. In order to fully understand if having the ability the prescribe schedule II through IV controlled substances impacts the CRNA practice a study on a larger and more depth scale would need to be preformed. The review of literature is divided up into two sections, the first being **CRNA Prescriptive Authority** and the second **Prescribing Medications**.  The review is concluded with the statement, “limitations in CRNA prescriptive authority are in part a result of inter-professional challenges between CRNAs and anesthesiologist. To confront practice barriers, nurse anesthetist and others need data about CRNA prescribing practices.”\[^1\, (p\, 25)\] The style of the review is appropriate, it does not rely heavily on quotes but rather paraphrases
the literature reviewed. The researchers present a lot of facts regarding current CRNA practice and the requirements for prescribing medications. However, it could be construed as bias by not presenting why CRNAs do have limits on their prescriptive authority. The reviewer uses appropriate language. The review of literature is well written and easy for the reader to understand why the research is being conducted based on the literature reviewed and the current lack of literature on the specific topic.

**Conceptual and Theoretical Framework**

The theoretical framework for this research is based on that “there is little literature regarding CRNAs and prescriptive authority. No research about prescriptive authority for CRNAs was located in PubMed, CINAHL, the Cochrane Library Clinical Evidence, the National Guideline Clearinghouse, and the American Association of Nurse Anesthetist (AANA) website.”

1 (p 24)

Conceptual framework is an organized way of thinking about how and why a project takes place. 3 The major concepts of this framework are expressed opinions of CRNAs that have the ability to or have obtained prescriptive authority and how this adaptation affects the autonomy and prescribing practices of CRNAs. The framework is consistent with the paradigm, which is “a set of concepts that constitute a way of viewing reality in an intellectual community.”

1 (p 873) The paradigm is “CRNAS who are limited, by law, adapt their practice to prescribing constraints.” 1 (p 24) This is consistent with the framework that seeks to understand whether this restraint affects autonomy and practices of CRNAs. The research purpose and framework does flow naturally between the two. The conceptual framework is addressed in the purpose of the study, the study seeks to “describe Washington State CRNA prescribing practices and workforce and practice characteristics.” 1 (p 26)
Conceptual definitions are not spelled out for the reader however, an understanding of the conceptual framework can be found in the literature review section. It provides a view of how the country as a whole stands on CRNA prescriptive authority, prescribing medications, as well as background on the prescriptive authority in Washington State. These sections help the reader know how and why the study is taking place. The conceptual framework does guide the study methods in that the questionnaire covered demographic characteristics, practice setting characteristics, and prescriptive authority. The research findings are tied back into the conceptual framework, the study found that “most CRNAs were aware of the new option of full prescriptive authority with schedule II through IV medications. However, only 30% took advantage of this option. Most respondents without prescriptive authority considered the Nurse Practice Act provision to ‘select, order, and administer’ as the foundation of their practice.”

**Research Designs in Quantitative Studies**

The design used in this study is descriptive, or more specifically developmental research. Descriptive research “attempts to describe a group of individuals on a set of variables. Descriptive data allow researchers to classify and understand the scope of clinical phenomena, often providing the basis for further investigation.” This study falls under the descriptive definition because little research has been done in this area and, through this survey, a basis is established for future research. No intervention was used in this research therefore it does not fall under experimental, quasi-experimental, or pre-experimental design. Because “adoption of changes in scope of practice among advance practice nurses is often slow and uneven” the researchers did not seek to manipulate the independent variable (the CRNAs being surveyed) due to lack of literature regarding this issue and instead was seeking to establish a basis for further research. This is a cross-sectional study that is “based on observations of different age or
developmental groups at one point in time, providing the basis for inferring trends over time.” 2 (p280) “The typical respondent was 51 years of age, white, and equally likely to be male or female.” 1 (p 26) It was also noted that “respondents were highly experienced, with an average of 19 years as a CRNA…only 12.5% had practiced 5 or fewer years.” 1 (p 26)

The comparisons within this study were between subjects. The researchers were surveying various CRNAs in order to see how prescriptive authority of schedule II through IV controlled substances affected their practice. This type of comparison is the most appropriate for demonstrating the relationship of how of prescriptive authority affects the autonomy of the CRNA practice. This study is described as survey or questionnaire that was first mailed in late 2006 to CRNAs licensed in Washington, Oregon, and Idaho. 1 (p 26) The researchers did not seek to control external or intrinsic factors because the results of this study more or less laid a baseline or foundation for future research in this area. By not seeking to control internal or external factors there is more room to improve in future research that may seek to answer more specific questions such as does prescriptive authority in experienced versus less experience CRNAs affect patient outcomes. This type of study and question would need control of external and internal factors.

The interval validity or degree to which the relationship between the independent and dependent variables is free from the effects of extraneous factors, is not well accounted for. 2 (p 869) This is concluded based on the fact that the questionnaire was mailed to the CRNAs with no documentation within the article about the direction they were given when asked to fill it out. It possible that some the subjects that responded, answered the questionnaire together and thus is not actually reflective of their own personal opinion making this a threat to the internal validity. The inferences about the relationship among the study variables are perplexing. After looking at
table 2 within the article 44.4% of the participants that responded said that they use the “select, order, and administer” provision of the Nurse Practice Act and that 35% do not want to prescribe medications. 1 (p 27)

Because there was no discrimination in the criteria of those that participated in the study the external valid, or degree to which the results of this study can be generalized, seems like it could be applicable to a larger group of people. However, on closer examination the study may be too generalized and did not have a large enough sample size to really generalize the findings. The questionnaire was only mailed to CRNAs within the Washington, Oregon, and Idaho area that included about 436 CRNAs. The researchers also only received a 65% response to the questionnaires mailed out. 1 (p 26) While no discrimination of participants usually leads to a wide variety of participants and thus makes the finds more applicable. However, the sample size and location really hinder the externally validity of this study. With only 283.4 responses that only makes up about 0.78% of the total number of CRNAs in the United States today, it’s hard to say these finds could really be used on a larger scale. Limitations of the study include the need for “additional information about physician supervision of CRNA prescribing [to] provide the basis for recommendations for change in professional and public policy.” 1 (p 29) Another limitation is “what barriers limit CRNAs from practicing to the full scope of their ability.” 1 (p 29) The researchers address the limitation as implications for further research.

Quantitative Sampling Designs

The target population for the study is CRNAs. CRNAs with a Washington license living in the states of Washington, Oregon, and Idaho were eligible to participate in this study.1(p26) Results were only printed of those who were licensed and practicing in Washington, therefore this study can only truly be generalized to states with similar laws regarding prescriptive
authority.

The sampling selection procedure is described in terms of who was eligible to receive the survey, however it is not mentioned how many surveys were sent out. It is unknown whether every CRNA received a survey or if there was a selection process.

The sample plan yielded a response of 436 responders. Due to specific criteria only 203 surveys were used for the study. The factor which contributed to less than half of the responses being used was the authors limited the study to only those that practiced in the state of Washington, this leads to a potential bias. If the results could be affected by varying opinions in relation to geographic location, it could not be accounted for in this study.

The sample size of 203 appears to be sufficient. CRNAs from a variety of work environments are surveyed, however, there is no power analysis or other rational to justify the sample size or to suggest what size population they find the results sufficient to represent.

Data Collection Procedures

The research data was collected by use of a questionnaire. The questionnaire was refined by investigators and validated by content and clinical experts. There does not appear to be a bias interfering with the accuracy of data collection. The data collectors were evaluators of previous Washington State Surveys and are considered to be content experts. The surveys were mailed to the CRNAs. There is no standardization of the conditions the CRNAs were in at the time of completing the survey, but due to the nature of the study this factor is unlikely to affect the results.

The burden of this study on the participants was in the form of time used to respond to the survey. A lengthy survey will affect the number of people to respond. This may also have an
effect on the quality of answers provided on open-ended questions.

**Data Quality in Quantitative Studies**

There is a strong congruence of data between variables conceptualized in the introduction and operationalized in the methods sections. The method section presents the same material found in the introduction and proceeds to elaborate on it. Data was collected by content and clinical experts with previous experience in state wide surveys. The results came in the form of a survey.\(^1\text{(p26)}\) Having a hard copy of the responses, and the expertise of the committee chosen to evaluate those responses, minimized the chance of measurement errors.

There is a minimal amount of literature available regarding prescriptive authority for CRNAs.\(^1\text{(p24)}\) All results generated from the study come from evidence found within this study. Therefore this study is found to be both reliable and valid. The only data presented in the report that did not come from survey results is given to show which states have what type of prescriptive authority and the facts of how many CRNAs are using this authority. “For example, in December 2008, only 1 of 1,282 CRNAs in Louisiana had applied for prescriptive authority.”\(^1\text{(p24)}\) The data is referenced appropriately, and there is no reason to believe that this information is unreliable.

**Quantitative Analyses**

All data is represented in the form of descriptive statistics and sufficiently reflect the major characteristics of the researcher’s data set. The descriptive statistics are used appropriately and properly convey the information it is aimed to convey. Inferential statistics deal with testing hypothesis and using sample data to make generalizations concerning population.\(^2\text{(p869)}\) Inferential statistics were not used nor would it be appropriate for this study. No hypotheses were
presented for this research study for statistical test to be performed on.

Data was reported in a statistical manner to reflect the responses of the surveys. Tests were not performed to manipulate the statistics. Multivariate procedures were not used in this study. Variables were presented independently of other variables. This does not affect the validity of this type of study.

The statistical data presented reflects the purpose of the paper, which is to describe prescribing practices of CRNAs in Washington State.\(^1\)\(^{p24}\) The results are aimed to further knowledge on current practices. There was no hypothesis for this study.

The statistical information presented in this study is complete. No needed information is omitted from the study. Tables are clear, appropriately titled and labeled. The information supports the data presented in the study and helps clarify the results rather than seeming redundant. All results are objectively reported. No bias is seen in the data reports.

**Discussion**

The objectives of the study are met. Demographic knowledge and reasons surrounding prescriptive authority practice decisions are clearly reported. The results accurately reflect the information gathered from the study.

A minimal amount of speculation, such as the statement, “Possibly, CRNAs are reluctant to promote prescribing legislation because of a concern that physicians might respond by withdrawing from collaborative arrangement,” is included in suggesting possible reasons for study results, however excessive, needless speculation is not included.\(^1\)\(^{p28}\) The results remain objective. The statistical results are significant because they reflect the demographics for the
CRNAs that participated in the study. This is a needed aspect of the report.

All objectives of the study are met. Data is reported clearly, supported by tables, and interpreted appropriately. Specific limitations of the study include further research “needed to determine what barriers limit CRNAs from practicing to the full scope of their ability.”1(p29) The data presented is the data discussed. There is only a small amount of literature previously published on this subject, therefore the majority of data presented comes from the results of this study.

**Conclusion**

Overall, this study was well executed and well presented. Ethical aspects were not an issue, the research problem is significant and is consistently addressed through the study, the literature review is appropriate, and the theoretical framework supports the study. The research design and the quantitative sampling designs are addressed. The data collection procedures, data quality, and quantitative analyses are justified for this type of research. This study benefits the field of nurse anesthesia and encourages room for further research.

**References**


Additional Work

Standards for Nurse Anesthesia Practice

Standard I

Perform and document a thorough pre-anesthesia assessment and evaluation.

Standard II

Obtain and document informed consent for the planned anesthetic intervention from the patient or legal guardian, or verify that informed consent has been obtained and documented by a qualified professional.

Standard III

Formulate a patient-specific plan for anesthesia care.

Standard IV

Implement and adjust the anesthesia care plan based on the patient’s physiologic status.

Continuously assess the patient’s response to the anesthetic, surgical intervention, or procedure.

Intervene as required to maintain the patient in optimal physiologic condition.

Standard V

Monitor, evaluate, and document the patient’s physiologic condition as appropriate for the type of
anesthesia and specific patient needs. When any physiological monitoring device is used, variable pitch and threshold alarms shall be turned on and audible. The CRNA should attend to the patient continuously until the responsibility of care has been accepted by another anesthesia professional.

**Standard VI**

Document pertinent anesthesia-related information on the patient’s medical record in an accurate, complete, legible, and timely manner.

**Standard VII**

Evaluate the patient’s status and determine when it is safe to transfer the responsibility of care. Accurately report the patient’s condition, including all essential information, and transfer the responsibility of care to another qualified healthcare provider in a manner that assures continuity of care and patient safety.

**Standard VIII**

Adhere to appropriate safety precautions as established within the practice setting to minimize the risks of fire, explosion, electrical shock and equipment malfunction. Based on the patient, surgical intervention or procedure, ensure that the equipment reasonably expected to be necessary for the administration of anesthesia has been checked for proper functionality and document compliance.

**Standard IX**

Verify that infection control policies and procedures for personnel and equipment exist within the practice setting. Adhere to infection control policies and procedures as established within the practice setting to minimize the risk of infection to the patient, the CRNA, and other healthcare providers.

**Standard X**

Participate in the ongoing review and evaluation of anesthesia care to assess quality and appropriateness.

**Standard XI**
Respect and maintain the basic rights of patients.

Reflective Evaluation

Self-Reflection: Summer 2012

Magen Kacir RN, BSN

Texas Christian University – Doctorate of Nurse Practice in Nurse Anesthesia

July 27, 2012
Introduction

The first large phase of the nurse anesthesia program is complete and it feels like a really big accomplishment for only being the halfway point. When I started the program a year and a half ago being able to get to this point seemed like a tremendous amount of work, and it has been every bit the amount of work I anticipated it would be. Perhaps that is why it feels like such an accomplishment.

Reflection

When I started the didactic portion in the spring of 2011 I was able to ease into the transition of being back in school by taking the courses online and still being able to work full time. By the time fall came around as much as I tried to mentally prepare myself to being a full time student again it didn’t really sink in until day one. Once I had finally got my bearings of not only being a student but a graduate student I seemed to be able to manage somewhat of a mini social life as well as my studies. By far now looking back the spring of 2012 was when it really sank in and felt like anesthesia school, the curriculum became more anesthesia focused, but the amount of anesthesia information was overwhelming at times. This summer I have enjoyed learning even more about anesthesia specialties and skills. Obstetrical and pediatric anesthesia seem intimidating, both specialties are foreign worlds to me that I am sure I will soon be immersed in.

Conclusion

While I may feel accomplished at this point I am still aware that there is an even more challenging phase awaiting me, clinical. A time and a place to take all the knowledge I have
learned over the past year and half and combine it with learning new skills and decision making in a brand new environment. While I do feel uneasy about entering this new phase I also feel excitement to see where I will be at this time next year.
FALL 2012
Clinical Case Report

Hemoglobin Trigger for Red Blood Cell Transfusion

Magen L. Kacir, BSN

Texas Christian University School of Nurse Anesthesia
It is a long standing practice to use the “10/30 rule” with a hemoglobin below 10 g/dL and a hematocrit below 30% as a trigger for red blood cell (RBC) transfusion. This has been based on the physiological considerations related to anemia and concern over oxygen delivery to tissues. Oxygen delivery is determined by cardiac output (CO) multiplied by arterial oxygen content. Arterial oxygen content includes both hemoglobin-bound oxygen as well as less significant dissolved oxygen. Thus maintaining an appropriate hemoglobin concentration helps to provide adequate oxygen delivery to tissues during anemia and hemorrhage. Within the last thirty years a shift in blood transfusion practices has taken place. This is largely due to the increased awareness of risk such as infections and allergic reactions that are associated with blood transfusions. The spleen is considered a highly vascular organ and blood reservoir that contains large quantities of concentrated red blood cells. This case report will discuss the role RBC transfusion plays in fluid management during a large blood loss associated with an open splenectomy.

**Case Report**

A 42 year old, 131 kg, 185.4 cm caucasian male was scheduled for an open splenectomy. His medical history included lumbago, hypertension, obesity, arthralgia/myalgia, nephrolithiasis, Dupuytren’s contracture, left renal cystic lesion, right metatarsal fracture, and degenerative joint disease. Surgical history included right hand surgery, left foot surgery, and bone marrow biopsy without anesthesia-related complications. Home medications included oxycodone/acetaminophen.

The patient had computed tomography imaging with radiographic findings of two neoplastic splenic lesions. The lesions were confirmed with four to five month interval imaging over the course of a year, which created suspicion for neoplastic process. Preoperative laboratory values included; hemoglobin 14.1 g/dL, hematocrit 42.8%, platelet count 254 x 1000/mm³, sodium 132
mMol/L, chloride 105 mMol/L, potassium 3.7 mMol/L, BUN 8 mg/dL, creatinine 0.9 mg/dL and white blood cell 11 x 1000/mm³. The patient’s preoperative vitals included; blood pressure 122/68 mm Hg, pulse 91 beats per minute, respirations 16 breaths a minute, oxygen saturation on room air 97%, and oral temperature 98.7 degrees Fahrenheit. The patient was categorized as American Society of Anesthesiology (ASA) class III due to hypertension, renal lesions, obesity and chronic degenerative joint disease. The anesthetic plan was general endotracheal anesthesia with a standard intravenous induction. No preoperative medication was ordered and an 18g peripheral IV was placed in the holding area.

The patient was transported to the operating room. Standard monitors were applied and the patient was pre-oxygenated. Intravenous induction medications were given including fentanyl 100 mcg intravenously (IV), lidocaine 100 mg IV, propofol 200 mg IV, and succinylcholine 80 mg IV. Direct laryngoscopy displayed a Cormack-Lehane Grade 1 view with successful placement of an 8.0 endotracheal tube. Sevoflurane was used to maintain end-tidal concentrations at 2%. Volume-controlled mechanical ventilation was utilized with a tidal volume of 750 mL and respiratory rate of 8 breaths/minute to maintain an end tidal CO₂ between 30-35 mm Hg.

Thirty minutes into the procedure an acute episode of significant blood loss occurred, losing approximately 800 mL. A hemoglobin was subsequently evaluated to be 12.1 g/dL. Albumin 5% 250 mL was administered, followed by a second bottle after another 500 mL of blood loss. Another hemoglobin evaluation resulted in 10.9 g/dL. Two units of red blood cells (PRBC) were infused over 20 minutes. Another 1,000 mL of blood was lost during removal of the spleen an hour and half into the procedure. After infusion of the 2 PRBCs and removal of the spleen a third hemoglobin evaluation resulted in a hemoglobin of 10.9 g/dL. A third PRBC was infused. This was followed by an additional 700 mL of blood loss after removal of the spleen
during ligation of the vessels. A fourth PRBC was infused. The patient ended up receiving four units of PRBCs, 2 liters of lactated ringers, 1.5 liters of normal saline, and 500 mL of 5% albumin. The patient remained hemodynamically stable throughout the procedure. Sevoflurane was titrated off slowly and spontaneous respirations began. The patient was able to spontaneously inhale tidal volumes of 300 mL or greater and maintained a regular respiratory rhythm of 13 breaths a minute. The patient opened his eyes and followed commands while moving all extremities. The patient was extubated, maintaining a regular respiratory rhythm and 99% oxygen saturation on room air. The patient was transferred to the PACU in stable condition.

**Discussion**

Extensive blood loss can occur during an open splenectomy placing any patient at risk for intraoperative coagulopathies, anemia, and hemodynamic instability. Not only because of decreased oxygen delivery and end organ perfusion, but the risks of allogeneic blood transfusion itself. Blood transfusion practices have shifted. Re-examination of blood transfusion practices came about in the 1980s when apprehension arose over blood transfusion infections and cost. Blood transfusion is a known immunosuppressant and a risk for nosocomial infection. Blood products are also an increasingly limited resource that should be used based on evidence. It is not certain how well or when the red blood cells that are transfused function to increase oxygen delivery to tissues. This is due to the fact that donor red blood cells that are stored lack 2,3 diphosphoglycerate (2,3-DPG). 2,3-DPG decreases oxygen affinity for hemoglobin and thus causes more hemoglobin-bound oxygen to be released to tissues. In addition, allogeneic red cells that are transfused have a shorter life span than those of the recipient. It is also important to consider that the rise in the hemoglobin level could suppress erythropoietin and consequently result in the benefits of the transfusion being short-lived or reversed.
There is no obvious benefit or risk associated with the use of a low or high hemoglobin transfusion threshold on the effects of morbidity and mortality.\textsuperscript{4} However, a specific population group that may benefit from a transfusion at a higher hemoglobin threshold are patients with coexisting cardiovascular disease. Patients may be at increased risk for myocardial ischemia in the presence of anemia due to an insufficient increase in coronary blood flow.\textsuperscript{5} The precise hemoglobin concentration at which myocardial ischemia occurs cannot be generally determined since this may depend on the degree of coronary stenosis and how many vessels are involved.\textsuperscript{1}

Ideally, alternatives or prevention of RBC transfusion would be most beneficial to the patient. Preventative measures can be taken preoperatively with autologous blood donation and recombinant erythropoietin.\textsuperscript{1} However the major disadvantages include preoperative erythropoietin is expensive and takes 5-7 days before hemoglobin concentration begin to increase.\textsuperscript{1} In addition, the cost efficacy with autologous donation may be low due to the high percentage of pre-donated autologous blood that is discarded.\textsuperscript{1} Preventative measures that can be taken by the anesthetist perioperatively include; maintenance of normothermia given that hypothermia reduces blood coagulation, especially platelets.\textsuperscript{1} It is also the first aim in surgical patients to obtain normovolemia through infusion of crystalloids and colloids in order to optimized cardiac function prior to an RBC transfusion.\textsuperscript{1}

Clinical indications that a RBC transfusion is desirable and not based on a hemoglobin transfusion trigger include a variety of signs. Once normovolemia and anesthesia are optimized then global inadequate tissue oxygenation can be distinguished.\textsuperscript{1} Clinical signs include hemodynamic instability such as tachycardia and hypotension.\textsuperscript{1} Further signs include; oxygen extraction ratio > 50%,\textsuperscript{8,9} a mixed venous oxygen saturation (SvO\textsubscript{2}) <50%,\textsuperscript{9} a mixed venous oxygen partial pressure < 32 mm Hg\textsuperscript{8} and a decrease of oxygen consumption (VO\textsubscript{2}).\textsuperscript{9}
The best current evidence proposes that transfusion can safely be withheld as long as hemoglobin remains above 7 g/dL and the patient is not actively bleeding. This policy appears to be safe even in patients with underlying cardiac disease. Because the spleen is a highly vascularized and blood reservoir organ, extensive blood loss may be anticipated during an open splenectomy. Consequently, best evidence based practices on PRBC transfusion should be reviewed. Within the case report presented the patient did not meet the clinical signs criteria that would have indicated a blood transfusion was desirable. The patient received crystalloids and colloids in order to remain normovolemic despite the large loss in blood. The patient never demonstrated signs of hemodynamic compromise but rather remain hemodynamically stable perioperatively. Additionally three hemoglobin checks were preformed perioperatively with the lowest being 10.9 g/dL. As a result, the determination to administer a RBC transfusion should be based on the physiological benefit to the patient and not based on laboratory values.

References:


Additional Work

Texas Association of Nurse Anesthetist Fall 2012 Meeting, San Antonio TX

1. Business Meeting Attendance -
   a. An opening speech by the current President Steven R. Leach with update that Texas still currently in not presently participating in "opt-out" of the federal requirement for physician supervision of CRNAs. Next the bylaws were presented for amending. Lastly, the election results were read and an acceptance speech by the new president was given.

2. Educational Session Attendance -

   2012 TANA Fall Annual Convention
   September 21-23, 2012
   San Antonio, TX

Friday September 21

0700-0800 Improving Clinical Preceptorship
Rachel Davis, CRNA, MS. Elizabeth Oliver, CRNA, M. Elida R. Santana CRNA, MS.
   This presentation will be more applicable once I have graduated and begin to mentor students. The presentation discussed what has been found in the literature as a way to establish an educational program for CRNA preceptors in order to provide the student with the best clinical experience as possible.

0800-0900 Offsite Anesthesia: To Hell and Back
Elida R. Santana, CRNA, MS.
   The presentation discussed the increased potential risk involved with offsite anesthesia. The presenter shared two personal experiences and discussed how to handle the difficulty faced with offsite anesthesia.

0930-1130 What’s the Latest in Cardiovascular Drugs
Myron H Arnaud, CRNA, MS.
   The presenter discussed current medications being used to treat cardiovascular diseases. The presenter reviewed pharmacological concepts of how the drugs work the way they do. The presenter also shared what new drugs that may be coming out including myosin activators, calcium sensitizers, and natriuretics.

1400-1500 Treating and Prevention PONV: The Evidence is in
Joseph Pelligrini, CRNA, PhD
   The presenter discussed the best medication regimens that should be used to prevent PONV based on the literature. Ultimately the presenter stated that a combination of Decadron and Zofran were the best combination to help prevent postoperative nausea and vomiting.
1530-1630  Trauma Anesthesia Update
Caleb Rogovin, CRNA, MS, CCRN, CEN
The presenter presented various trauma cases and how fluid resuscitation, blood administration and electrolyte replacement should be handled. Ultimately there is no “standard” to handling a trauma victim but rather should be treated on an individual basis.

1630-1730  Anesthesia Jeopardy
Caleb Rogovin, CRNA, MS, CCRN, CEN.
The presenter used the game Jeopardy to summarize the previous presentation.

Saturday  September 22

0700-0800  What Where You Thinking?
Anita Bertrand, CRNA, MS.
The presenter demonstrated research being done to show brain function as it is related to addiction since addiction is a significant problem among the profession. The research being done is to try to understand the brain function as it relates to addiction and how this can be used for treatment.

1130-1330  TANA Fall Annual Business Meeting and Luncheon
The business meeting discussed how Texas is currently still not participating in the “opt-out” of physician supervision. The election results were announced and amendments to the bylaws were done.

1545-1500  Student Session – What You Need to Know about Interviewing
James Walker, CRNA, DNP
Dr. Walker presented how to put together a curriculum vitae as well as how to dress and conduct yourself in the interview.

Attended:  17 educational hours
Attended:  2 business meeting hours

Magen Kacir, RN, BSN  Sacred Heart Pensacola
Professional Oral Presentation

As a clinical group at Sacred Heart Hospital my classmates and I were asked to give a presentation to the operating room staff on the importance of room temperature and thermoregulation of our patients. Additionally, we were asked to speak on the importance of maintaining a quite environment during induction and emergence from general anesthesia in regards to the various stages of anesthesia and patient safety. Provided is the hand out distributed to the operating room staff during our presentation.
Normothermia 36-38 °C
Mild hypothermia 32.2-35 °C
Moderate hypothermia 28-32.2 °C
Severe hypothermia < 28°C

**Methods of Heat Transfer**
- Radiation – 60%
- Evaporation – 22%
- Conduction – 7.5%
- Convection – 7.5%

**Sources/Causes of Heat Loss**
- Cold bed
- Cold IV fluids
- Room temp
- Ventilator
- Open abdomen
- Muscle relaxants/ anesthetics
- Regional anesthetics

**Effects of Hypothermia**
- Decrease platelet count, impaired function
- Vasconstriction
- Impaired coagulation cascade
- Decrease leukocyte count, impaired immune function
- Tissue hypoxia
- Cardiac arrhythmias & ischemia
- Shivering → increase O₂ consumption (40-100%)
- Decrease clearance of drugs
- Increase risk of infection, poor wound healing

**Treatment**
- Warm room temp-best
- Prewarming pt
- Warm IV fluids/irrigation
- Warm bed
- Monitoring
- Keep the head/ feet covered

**Stages of Anesthesia**

**Stage 1** Stage 1 anesthesia, also known as the "induction," is the period between the initial administration of the induction medications and loss of consciousness.

**Stage 2** Stage 2 anesthesia, also known as the "excitement stage," is the period following loss of consciousness and marked by excited and delirious activity. During this stage, respirations and heart rate may become irregular. In addition, there may be uncontrolled movements, vomiting, breath holding. Since the combination of spastic movements, vomiting, and irregular respirations may lead to airway compromise, rapidly acting drugs are used to minimize time in this stage and reach stage 3 as fast as possible.

**Stage 3** Stage 3 anesthesia, also known as "surgical plane," follows the excitement stage and is marked by a return of regular respirations.

**Guedel's classification** is a means of assessing depth of general anesthesia introduced by Arthur Ernest Guedel.

**Stage II Signs: "Excitement Stage"**
- Vomiting
- Coughing
- Irregular Respiration
- Breathing
- **Laryngospasm** - Laryngospasm involves more than spastic closure of the vocal cords. An infolding of the arytenoids and the aryepiglottic folds occurs; these structures are subsequently covered by the epiglottis.

**How to reduce complications associated with stage II:** Having a quiet operating room during induction and emergence from anesthesia is essential. This is due to the fact that hearing is the last sense to be lost during induction and the first to recover after general anesthesia. Decreasing stimulation such as noise during induction/emergence from anesthesia will keep the patient safe as they progress through the stages and decrease the associated complications.
Clinical Log

Clinical residency, or phase II of the Doctor of Nursing Practice – Anesthesia program consist of clinical experiences that increasing responsibility for anesthesia patient care under tutorial guidance is afforded. The application of theoretical knowledge to the realities of clinical practice is a dynamic process that enhances and deepens learning in addition to preparing the graduate to function effectively and competently as a professional. The following case logs are examples of clinical cases completed within the first practicum of the clinical residency at Sacred Heart Hospital, Pensacola Florida.

Demographics & Anesthesia Info

Clinical Site: Sacred Heart Hospital  
Gender: Male  
Admit Type: Ambulatory/Outpatient  
Age: 33  
Anes Physician Codes:  
CRNA Codes: Primary: 1  
Physical Status - Class/ASA: 3  
Trauma/Emergency: No  
Position: Lateral  
Anatomical Category (Main): Extremities  
Anatomical Category (Detail): Shoulder Arthroscopy with Rotator Cuff Repair  
Anesthesia Type (Main): General Anesthesia  
Intravenous Induction  
Emergence from Anesthesia  
Tracheal Intubation - Oral  
Anesthesia Type (Detail): GA-Endotracheal  
Intub-Oral - Rapid Sequence  
Medications (Main):  
Inhalation Agents  
IV Induction Agents  
IV Agent - Muscle Relaxants  
IV Agent - Opioids  
IV Agent - Other  
Medications (Detail):  
Sevoflurane  
Propofol  
Vincristine  
Suxamethonium  
Fentanyl  
Glycopyrrolate  
Neostigmine  
Ondansetron  
Anesthesia Procedures (Main):  
Anesthesia Procedures (Detail):  
Delays & Indicators  
Delay Start of Case > 20 min:  
Delay Leaving OR > 15 min:  
Indicators (Intra-Op):  
Indicators (Post-Op):  
Other Questions About This Case  
Clinical Notes
Demographics & Anesthesia Info

Clinical Site: Sacred Heart Hospital
Gender: Female
Admit Type: Inpatient
Age: 48

Anes Physician Codes:
CRNA Codes: Primary: 1

Physical Status - Class/ASA: 3
Trauma/Emergency: No

Position:
Anatomical Category (Main): Head - Intracranial
Anatomical Category (Detail): Aneurysm

Anesthesia Type (Main): General Anesthesia
Intravenous Induction
Emergence from Anesthesia
Tracheal Intubation - Oral

Anesthesia Type (Detail): GA-Endotracheal

Medications (Main): Inhalation Agents
IV Induction Agents
IV Agent - Muscle Relaxants
IV Agent - Opioids
IV Agent - Other

Medications (Detail): Sevoflurane
Propofol
Atropine
Fentanyl

Anesthesia Procedures (Main): Mechanical Ventilation
Arterial - Intra-arterial BP Monitoring

Anesthesia Procedures (Detail):

Anesthesia Times: [ Start: 11:27 ] → [ Finish: 14:19 ]

Delay & Indicators

Delay Start of Case > 20 min:
Delay Leaving OR > 15 min:
Indicators (Intra-Op):
Indicators (Post-Op):

Other Questions/About This Case

Clinical Notes
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<td>Transsphenoidal pituitary tumor resection</td>
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Reflective Evaluation

Self-Reflection: Fall 2012

Magen Kacir RN, BSN

Texas Christian University – Doctorate of Nurse Practice in Nurse Anesthesia

November 30, 2012
Introduction

Beginning the clinical phase of the program has really made the reality of becoming a Certified Registered Nurse Anesthetist real! It is scary and exciting all at the same time. Being a new student to the operating room arena is intimidating when all eyes are on you and watching every move you make.

Reflection

The pressure has really been on this practicum. It has been intimidating stepping into an environment that is unfamiliar and not always welcoming. Additionally, this is the place to bring together everything we’ve learned up to this point. It is time to combine knowledge and skill. While I have been fortunate enough to not have been yelled at by a surgeon up to this point I have been hammered with questions by the anesthesia staff. During the interrogation of my anesthesia knowledge I wish nothing more to blend in with the wall and be left alone. However, in hindsight I am glad to be quizzed even if I don’t know the answer or feel stupid at the time. I feel this way because it allows me to identify areas that are weak and ultimately makes me better.

Conclusion

This practicum has been humbling as I am once again starting at the very bottom and learning my role in this new environment. I feel very much like I am struggling to keep my head above water at this point. Each day is a challenge of it’s own as I am still mastering the fundamentals of anesthesia.
SPRING 2013
Medical Mission Trip: Advantageous Knowledge to Student Nurse Anesthetists

Magen L. Kacir RN, SRNA

Harris College of Nursing and Health Sciences, School of Nurse Anesthesia

Texas Christian University
Abstract: This essay shares lived experiences from an underserved area of the world and hopefully serves to encourage both students and other anesthesia providers to volunteer for a future medical mission trip. Being part of a mission trip is a valuable educational experience. The lack of basic equipment emerged as the biggest challenge of this experience as well as the inability to obtain an accurate medical history if any from the patients due to the language barrier, daily diversity from case to case also proved challenging. Medical missions provide an enormous learning opportunity in which students are given the rare opportunity to integrate textbook, clinical, and culture concepts in a meaningful way.

Keywords: anesthesia, medical mission, Philippines

Unique experiences are part of the thrills and challenges of being a nurse anesthesia student, however, being part of a medical mission during nurse anesthesia school is an extremely powerful experience and invaluable to my personal and professional growth. An anesthesiologist who is a member of the Association of Philippine Physicians of Florida Panhandle Inc. sponsoring the medical mission trip invited me to be a part of a team traveling to San Fernando, Pampanga, Philippines. Anesthesia providers from around the country, including Minnesota Mayo Clinic, California, Louisiana, and Arkansas traveled to a small, 25-bed hospital in the Bulaon, population 132,000, formed on a lava flow after Mt. Pinatubo erupted in 1991. Having this privilege to work with a diverse group of providers presented the challenge of not only learning different approaches to anesthesia administration but additionally the challenge of learning in an environment unlike any imaginable. The motivation for this article is to share lived experiences from this underserved area of the world and encourage other anesthesia providers both students and CRNAs to consider volunteering for a future medical mission trip.

Medical missions have been pursued for centuries as a source of medical help, as well as a desire to educate, experience, and understand other cultures.¹ The purpose of a medical mission trip is to provide medical and surgical care to underserved and vulnerable patients. Medical personnel and non-medical personnel volunteer their time and pay the expenses necessary to arrive at the location of the mission. Medical missions are beneficial to both the recipients and providers. Missions provide healthcare practitioners a chance to learn in various unfamiliar
environments as well as the opportunity to give to those who are not as fortunate to have readily access to healthcare.²

I observed the operating room environment to be different right from the start. Two operating room (OR) tables with minimal equipment or storage cabinets on the white walls, two air conditioning units and no windows. The white tiled floor rooms had been mop and the room had a sterile cold feel to them. The typical OR environment in the United States is structured for one patient and one OR team. The HIPAA and established infection control practices provide protection for individuals in the US.³ However, no such patient privacy laws or infection control practice standards exist in the Philippines. It was not uncommon to be in the middle of a surgery while a second patient would walk into the OR and lie down on the second OR table to begin preparation for their surgery. In addition to performing two surgeries in the same room at the same time, the number of people coming in and out of the room, whether part of the surgical team or not, doubled as well.

Additional challenges of the medical mission included the presence of older equipment or absence of equipment. The operating rooms were not equipped to perform general anesthesia due to lack of monitors and up-to-date equipment. However, at least half of the cases required general anesthesia. The anesthesia machine that was provided was made by Kimura Medical™ the compact 15 design. The machine included one halothane vaporizer, three flow meters for oxygen, nitrous, and air (oxygen being the only one available), inspiratory and expiratory outlet, a scavenging hose, and a reservoir bag with an APL knob right on top of the bag. Therefore, if the APL valve was open, the provider standing next to it was inhaling the anesthetic gas. A scavenging hose was connected to the machine but was separate from the APL valve; therefore the APL valve would need to be closed in order for the gas to be scavenged out of the room. Because no halothane was available, the vaporizers were filled with sevoflurane we had brought
with us. Using the different partial pressures of the gases we attempted to estimate the equivalent minimum alveolar concentration (MAC) on the dial of the vaporizer. It was difficult to tell whether filling the vaporizer with sevoflurane caused an underestimation of the dialed in MAC or if the vaporizers were the problem. Unless the vaporizer was turned all the way up, the patient would move as if they were not receiving adequate anesthesia. It was later disclosed that the vaporizers had not been used in over 20 years and thus not properly calibrated. The lack of being able to know exactly how much gas was being delivered in combination with no machine available to measure end tidal concentrations made providing anesthesia solely based on meticulous assessment of the patient. It became important to be very in tune with each patient’s respiratory pattern as well as their hemodynamic changes heart rate in between manual blood pressure cuff readings. Only one monitor possessed the ability to obtain automatic noninvasive blood pressure measurements and pulse oximetry so it was passed back and forth between the two patients during operations. I believe I developed newfound vigilance emerged during this medical mission as the environment challenged all of my anesthesia senses in a different way I had ever known.

A 32-year-old healthy male arrived for a laparoscopic cholecystectomy. No known medical problems and no surgical history were present. Induction of general anesthesia ensued with standard intravenous doses of propofol and succinylcholine. Shortly after intubation, as the patient was being draped he began moving, coughing, and rapidly became hypertensive and tachycardic. The vaporizer dial was turned to 4% on the halothane-filled-with-Sevoflurane vaporizer to increase the amount delivered. The patient’s heart rate, blood pressure, and respiratory rate did not return to baseline until the vaporizer was maxed out at 4% on the pseudo-Sevoflurane vaporizer. It remained at 4% until the surgeon began to close the skin. The patient’s respiratory pattern, oxygen saturation level and blood pressure remained stable and the end tidal
concentration was assumed until the gas was turned off at the end of the case. Not having an end tidal gas monitoring to titrate the depth of anesthesia led to longer wake ups. Often patients took ten minutes or more to emerge from general anesthesia after the dressing had been applied and drapes came down.

Further challenges of a medical mission that are beneficial to the education of a nurse anesthesia student are diversity of patients requiring surgery. A typical day started with an adult female thyroidectomy, followed by cleft palate surgery on a seven year old boy, laparoscopic cholecystectomy, and then a hysterectomy under a spinal anesthesia. I recall an emergent caesarean section with placental abruption. The patient was visibly upset and sobbing as she walked into the operating room. A subarachnoid block was attempted, but not effective, with immediate conversion to general anesthesia. What a new challenge for any nurse anesthesia student!

Mission trips have recently evolved as an excellent opportunity to learn based on current evidence. Recently, a guide on improving student learning has been developed as an initiative of the U.S. Department of Education’s Institute of Education Sciences (IES) which serves as a central and trusted source of scientific evidence for what works in education. The actions recommended within the guide such as using quizzes to promote learning can applied to the anesthesia learning environment on a medical mission. Having the opportunity to be exposed to various types of anesthesia from case to case was in essence much like a real-time quizzing using experiential learning. Not being able to establish a routine, such as drugs to administer or positioning, which can be done when you do the same types of cases all day, challenged me to access both old and new knowledge and information on a daily basis. These experiences became an excellent method of self-assessment and assisted me in both strengths and weaknesses. For example, I had not previously been exposed to obstetrical patients and exposure to this
population in this environment provided the challenge I needed. Also, I found that I needed to enhance my emergence technique, because simple and basic equipment such as suction was not always available and needed to be shared. Now, looking back retrospectively and thinking about the many patients I cared for I was thankful that I learned how to keep up with the patient flow within this unique environment and experienced no known anesthesia complications.

Medical missions are valuable to anyone. Medical missions provide an enormous learning opportunity in which students are given the rare chance to integrate didactic, clinical, and culture issues within a healthcare domain that cannot be replicated anywhere on earth.\textsuperscript{5} Medical missions provide students with the opportunity to care for patients from diverse socioeconomic backgrounds and languages.\textsuperscript{6} Medical missions address the focus of curriculum and accreditation standards such as public health, culture competence, and patient-centered care.\textsuperscript{5} It has been suggested that short-term medical missions be integrated as standard curriculum in all healthcare education.\textsuperscript{5}

It was such a privilege to be given a chance to participate in the medical mission to the Philippines. I truly believe that I gained experiences and knowledge that will last a lifetime, and that I might not otherwise have experienced through my current clinical residency program. In addition to the enrichment of my education, I received great satisfaction in my patient care. The gratitude expressed by the patients during our post-operative visits cannot be put into words. I hope someday I can be a part of another mission trip, but this time as an experienced nurse anesthetist.
Mission Accomplished in the Philippines

A Sacred Heart team recently returned from one of the most impoverished places on earth after spending a week providing free surgical and medical care to hundreds of people in need. The group of SHHS physicians, two OB/GYN residents and several nurses were part of a 44-person team of healthcare professionals from the U.S. who participated in the outreach to people living in San Fernando, a town in the province of Pampanga, Philippines.

The 25-bed Ricardo Rodriguez Memorial Hospital where they served is located in the Bulao settlement, which was formed on a lava flow after the volcanic eruption of Mt. Pinatubo in 1991. The poor were resettled there after the volcano, according to Dr. Miguel Mancao, anesthesiologist, who has been participating on mission teams to the Philippines every two years since 1987. The government-operated hospital, located about 45 minutes from the old U.S. Clark Air Force Base, had just recently undergone an expansion.

Upon their arrival, the team saw approximately 140 people waiting in line for surgery on the first day. “On the second day, the hospital was full,” says Dr. Mancao. The team started their cases every day at 7 a.m. Typically, four surgeries would be underway at one time, with two patients per tiny OR room. The team shared equipment among the operating tables, worked in low-lighting conditions, and sometimes didn’t even have enough suction equipment. Dr. Mancao recalls that the team dentist had one dental chair to use, but it took too long for patients to get into and out of the chair, so he switched to a regular chair which helped expedite care.

Together, the team performed 850 pediatric consults, 800 medical consults, 116 surgeries and 1,000 dental visits and procedures. Dr. Mancao appreciates Sacred Heart’s support for the trip in the form of medical equipment, supplies and free medications. (Meds for blood pressure and diabetes, as well as antibiotics and prenatal vitamins, were distributed.) Physicians and associates paid their own airfare and contributed to the cost of the hotel accommodations, and associates used their own PTO to participate.

The OB/GYNs were stand-outs on the trip! Dr. Barbretta Baldwin, OB/GYN, and Dr. Lisa Bean, OB/GYN, saved the life of an expectant mom in her 20’s who was diagnosed with placenta previa. Drs. Baldwin and Bean performed an emergency C-section and delivered a healthy baby boy! They also pitched in on cases beyond the OB/GYN realm of care. For example, Dr. Jairan Duke, OB/GYN, was a first-timer on this medical mission and “was such a hard worker,” says Dr. Mancao. “She was outstanding and jumped right in to help with hernia repairs.”

Dr. Baldwin also assisted Dr. Paula Pyle on thyroid surgeries and Dr. Ted Ortega on plastic surgery cases. One of the most life-changing cases, she recalls, is the removal of a grapefruit-sized section of a woman’s thyroid, a benign abnormality that the patient had been living with for 10 years. “It was my first mission trip, and it definitely won’t be my last,” says Dr. Baldwin. “The people there are extremely hospitable; the patients are so appreciative of the care we gave them, and that makes it a very rewarding experience.”

continued on page 8 . . .

Healthcare that is safe • Healthcare that works • Healthcare that leaves no one behind
It was the third trip to the Philippines for Barbara Guilfoyle, RN, of the Main OR at SHHP. "Dr. Mancio pulls this trip together each time and always does it with a smile," says Barbara. "He's amazing. He makes sure everyone is comfortable and has what they need. And I also want to say that we accomplished this mission with the help, support and donations of our friends and co-workers at Sacred Heart. We felt their love and support for our mission every day."

"With the whole team, there was just a beautiful spirit of cooperation. It's just a beautiful thing to see," says Barbara. "Everyone is smiling and laughing; everyone jumps in wherever needed – even the doctors are cleaning rooms!"

Barbara says the less-than-optimal conditions did not faze anyone. "You just make-do with what you have, think on your feet, and learn to improvise," she says. "I think it makes us better at what we do here. And it's such a life-changing experience for these patients, while it's just a tiny slice of our lives. These people have so little. Your heart just swells up! You remember why you do this job in the first place. If I could, I would just mission-hop the rest of my life!"

Mission-trip participants from the Pensacola area included:
Dr. Barbrnette Baldwin, OB/GYN Resident
Dr. Lisa Bean, OB/GYN Resident
Dr. Jairan Duke, OB/GYN
Dr. Norman Haines, GI
Dr. Ted Ortega, Plastic Surgery
Dr. Paula Pyle, ENT
Dr. Miguel Mancio Jr., Anesthesiology
Dr. Adelaide Torres, Internal Medicine
Dr. Dewey Torres, General Surgery
Bibiana Key, RN, Children's Hospital
Janet Mancio, RN
Tonya Renfroe, RN, Surg. Ctr.
Renee Ercoll, RN, ACCU
Susan Haines, RN
Harland Aaron Dagen, RN Manager with Dr. Pyle's office
Beth Hammou, CRNA, SHHP OR
Barbara Guilfoyle, RN, SHHP OR
Letty Javier, ARNP, of Escambia Community Clinics

In addition, three Texas Christian University student nurse anesthetists who are doing their clinicals at SHHP participated: Anne Cousin, Michelle Freshcorn and Magen Kacir.

We apologize if we have inadvertently left out anyone's name from the list of those who participated on this medical mission to the Philippines.

Planning a Medical-Mission Trip?

Please let us know if you are planning a trip within or outside the U.S. to provide medical care to people in need. We would love to feature your trip in “Snips & Snaps!” Call Linda Dunwoody at 416-1154 or send an e-mail to ldunwoody@shhpens.org.
References:


   
   

   
   


Epidural Space Identification: Air vs. Saline in Decreasing Epidural Complications

Magen L. Kacir, RN, BSN, CCRN

Harris College of Nursing and Health Sciences

School of Nurse Anesthesia, Texas Christian University

Spring 2013
Abstract

**Statement of the Practice Problem:** Does identification of the epidural space with saline compared to air in adult patients decrease epidural catheter placement complications.

**Proposed Solution:** To identify which medium that is associated with fewer epidural catheter placement complications.

**Methodology:** The ACE Five Star model was used to translate knowledge and findings into current practice recommendations.

**Findings:** Neither air or saline when used for the loss of resistance (LOR) technique in identification of the epidural space proved to be a superior medium in decreasing epidural catheter complications.

**Conclusions:** Review of current literature supports current practice that 3 mL or less of either air or saline can be used to identify the epidural space without increasing risk of epidural catheter placement complications.

**Introduction**

The epidural space in adults is currently identified using air or saline. Both techniques are widely used and accepted. Nevertheless, a debate exists as to which is a better technique in terms of efficacy (e.g., inadequate analgesia, associated epidural complications). Epidural catheter complications include difficult catheter insertion, intravascular catheter insertion, paresthesias, accidental dural puncture, post-dural puncture headache, or partial block. Complications can be devastating for patients’ quality of life as well as costly for institutions. This paper seeks to explore current literature related to epidural insertion techniques to determine if there is enough evidence to support air or saline as the preferred method for identification of the epidural space.

Epidural anesthesia is the most common method of pain relief during labor. More than 50% of women ask for an epidural for relief of labor pain than any other method of pain relief.

Complications have been documented with both air and saline techniques, when identifying the epidural space. The use of air has been cited to cause pneumocephalus, uneven blocks, nerve root compression, and even spinal cord compression. The pneumocephalus mechanism involves inadvertent puncture of the dural layer during epidural injections, which may cause a severe headache. The headache of pneumocephalus usually has an immediate onset.
and is aggravated by any motion, and is not relieved by lying down. As little as 2 ml of air can cause pneumocephalus symptoms. The air is usually reabsorbed after 2 days and the headache usually resolves within 5 days of the dural puncture. If enough volume of air enters the venous circulation through the engorged epidural venous plexus a venous air embolism can result. Using air for identification of the epidural space has been linked to increased incidence of unblocked segments as air bubbles inhibit absorption and spread of local anesthesia and opioids. Persistent neurologic deficits have been cited due to expanded by the use of nitrous oxide, causing acute and/or permanent nerve root damage or, even worse, spinal cord compression.

Saline as a medium for identifying the epidural space also does not have a perfect track record. Saline has been associated with local anesthetic dilution, recognition delay for inadequate block, as well as resembling cerebral spinal fluid. Using saline may make it difficult to identify inadvertent dural puncture, as fluid dripping from the epidural needle could be saline or cerebral spinal fluid (CSF). Additionally, if >3 mL volume of saline is used to identify the space this could produce an inadequate sensory block, likely due to dilution of the injected local anesthetic. This delays the onset of the block supposedly due to the same reason and could make it difficult to diagnose a poorly working epidural catheter or catheter that has migrated outside of the epidural space.

Methodology

The ACE Star Model serves as a useful evidence-based framework to evaluate and guide the knowledge transformation process for the use of saline over air as the LOR technique for identification of the epidural space. The model has five points that portray the various stages of knowledge as it is discovered and moved into practice. The five points of the star model include; 1) discovery of research, 2) evidence summary, 3) translation to guidelines, 4) practice integration, 5) process, outcome evaluation.
ACE Five Star Model

Discovery of Knowledge:
Best evidence has not been determined between air or saline for epidural catheter placement.

Evidence Summary:
Air
- Can identify dural puncture
- Can cause patchy block
Saline
- Can dilute local anesthetic
- Decreases pneumocephalus, venous air embolism, and unblocked nerve roots.
1,8,10,11,13

Process, Outcome Evaluation:
An ongoing assessment of post-epidural outcomes should be performed by evaluating technique-related complications post-delivery.4

Practice Integration:
Current best evidence is identification of the epidural space with less than 3 mL of saline or less than 1 mL of air.4,8

Translation into Guidelines:
Air - Use < 1 mL of air with LOR4
Saline - Use 2-3 mL of saline with LOR4
A thorough literature review was conducted to determine if air or saline proved to be superior when identifying the epidural space. Databases searched included PubMed Central (EBSCO Medline with Full Text) and the Cochrane Library. All searches publication between January 2003 to December 2012, English, male or female and excluded articles related to subjects less than 19 years of age.

PubMed Central (EBSCO Medline with Full Text) was the first database searched. Limitations in the search included, publications from 2003 to 2010. Key terms used were “epidural space” IN TX All Text AND “saline” IN TX All Text AND “air.” An additional limitation included “English.” Results of the search were 269 articles. Twelve articles were reviewed. Nine articles were excluded after review was due to additional procedure processes bring considered in the studies such as subdural saline injection for acute epidural hematoma. Three remaining articles met inclusion criteria and were included in this synthesis.

An advanced search of the Cochrane Library database was performed. The limitation for results within Cochrane Library included no restriction on search by product or search by record status, date range 2003 to 2013. Title, abstract, keywords used were “epidural space, saline, air” Two articles were located. These articles were further reviewed and included in the synthesis of literature.

Levels of Evidence

A valuable hierarchy has been developed to classify studies by different levels of evidence. Levels are used to describe the strength of various types of research design related to studies focusing on interventional, diagnostic, and prognostic, Randomized-control trials (RCT) are the highest level of evidence for intervention. The lowest level of evidence is the contribution of expert opinion or fundamental research that does not have direct clinical application. The Oxford Centre for evidence-based Medicine was the hierarchy used for this
Articles incorporated included reports from one meta-analysis of RCT, three randomized control studies, and one cohort study. Table 1 ranks the articles included in descending order beginning with the highest level of evidence and summarizes findings.

Table 1.

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<td>Meta-Analysis, prospective randomized controlled trials (RCT)</td>
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<tr>
<td>Gadall F, Lee SHR, Choi KC. et al.</td>
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<td>RCT</td>
<td>Level I</td>
<td>100</td>
</tr>
<tr>
<td>Segal S, Arendet KW.</td>
<td>2010</td>
<td>Cohort</td>
<td>Level II</td>
<td>929</td>
</tr>
</tbody>
</table>
Critique of the Evidence

The evidence reviewed included 3 randomized controlled trials, 1 cohort study, and 1 meta-analysis randomized controlled trials. The meta-analysis was conducted to test the hypothesis that loss of resistance with liquid reduced complications with epidural placement. The analysis examined RCTs published between 2003 and 2010. Total samples of 5,846 adult patients with epidural catheter insertion only or a CSE were included. Collectively findings from these studies concluded no difference existed whether saline or air was used for the LOR technique in decreasing associated complications of epidural catheter placement. The statistical analysis were performed using Stata software (Version 10, Stata Corporation, College Station, TX).\(^1\) Stata was used to calculate the pooled risk difference estimates and 95% confidence intervals were specified by a random effects model using the method of DerSimonian and Laird.\(^1\)

Another large RCT studied the effect of injection 10 mL of saline before epidural catheter threading and the incidence of intravenous catheter placement during combined spinal-epidural labor analgesia. Using 100 laboring parturients requesting CSE for labor analgesia received either no epidural injection or a 10 mL saline injection before epidural catheter placement. The authors concluded injecting 10 mL of saline prior to epidural catheter placement in a CSE decreased the incidence of intravenous placed catheters from 20% to 2%.\(^8\) This is likely due the fact that injected saline tends to force the dura away from the advancing needle by the saline ejected from the syringe.\(^8\) The introduction of fluid into the epidural space before catheter insertion also serves to reduce the incidence of epidural vein cannulation.\(^9\) An important variable in this study and limitation likely affecting the results was the type of catheter used. A less flexible multiport epidural catheter was used. The study only used Portex® (Sims, Portex Inc., Keene, NH, USA) multiport epidural catheter.
A retrospective study was preformed which analyzed 929 labor analgesics. The study was preformed to assess clinical practice compared RCT. RCT suggest the superiority of saline for LOR technique, however the study looked at whether in actual clinical practice if the anesthesia provider using their preferred technique would produced similar analgesic outcomes with either air or saline. Throughout the duration of the cohort, 52.6% were performed with LOR to air and 47.4% to saline. No differences were reported in unsatisfactory block or in the incidences of initial comfort, paresthesia, asymmetry, physician-administered additional medication, catheter replacement, IV or intrathecal placement, or dural puncture between the groups.

Additionally, two more RCT were reviewed. One RCT was conducted to determine if there was any difference between air and saline during the LOR technique and the onset and quality of analgesia. The study looked at 50 parturitents and found that women who received saline had fewer hotspots but their blocks were associated with less pain relief compared with woman who received air during the LOR technique. The second RCT was carried out to observe if saline or air for the LOR technique effected the success of spinal analgesia or epidural catheter efficacy in a CSE. The study examined 345 patients and found that spinal analgesia success, epidural catheter replacement, and drug consumption were not different between the use of air or saline for the LOR technique.

Limitations within the evidence are variation in patient demographics between studies. Some studies had no restrictions on the type of patients included while one study only included patients with an American Society of Anesthesiologist (ASA) physical status II or below and weight not greater than 114 kg. Furthermore, of the three RCT studies two of them randomized providers to the LOR technique requiring the provider to use a less-preferred technique 50% of the time. Use of the less-preferred technique may result in less successful epidural space identification and therefore may exaggerate the difference between the techniques.
Despite the limitations presented the studies examined concluded that neither air nor saline for the LOR technique are associated more with epidural catheter complications. The studies examined are outlined in Table 2 including sample size, limitations and findings.
<table>
<thead>
<tr>
<th>Authors</th>
<th>Sample</th>
<th>Design</th>
<th>Major Findings</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norman D, Winkelman C, Hanrahan E, Hood R, Nance B.</td>
<td>50</td>
<td>Experimental Design, RCT</td>
<td>Air and saline less than 3 mL are equally safe during the LOR technique.</td>
<td>- Variability in amount of air or saline received (did not exceed 3 mL and not less than 1 mL).</td>
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<td></td>
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<td></td>
<td>- Variation in cervical dilatation.</td>
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<td></td>
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<td></td>
<td></td>
<td>- Only 5 providers performing LOR and collecting data.</td>
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<tr>
<td>Segal S, Arendt KW.</td>
<td>929</td>
<td>Retrospective Cohort</td>
<td>Analgesic outcomes the same for both mediums. However, when using the CSE technique air is associated with fewer failure.</td>
<td>- Training level of operators differed between the two media.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Self reported number of attempts.</td>
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<tr>
<td>Grodin LS, Nelson K, Verson R, et al.</td>
<td>345</td>
<td>RCT</td>
<td>CSE epidural catheter efficacy is the same with air or saline for LOR. Epidural catheter failure is significantly higher if initial clear fluid returned to the spinal needle during the CSE technique.</td>
<td>- American Society of Anesthesiologist physical status II or below.</td>
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<td></td>
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<td>- Weight not greater than 114 kg.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Labor analgesia using a combined spinal and epidural (CSE).</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>- Vertex singleton pregnancy.</td>
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<tr>
<td>Schier R, Guerra D, Aguilar J. et. al.</td>
<td>4422</td>
<td>Meta-Analysis, RCT</td>
<td>Loss of resistance technique with liquid instead of air reduces incidence of PDPH in chronic pain patient.</td>
<td>- End points and techniques were not uniform or clearly defined across various studies.</td>
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<td></td>
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<td>- Pool estimates may be dominated by one study with large numbers.</td>
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<tr>
<td>Gadall F, Lee SHR, Choi KC, et al.</td>
<td>100</td>
<td>RCT</td>
<td>Injecting 10 mL of saline through the epidural needle after intrathecal injection and before threading epidural catheter reduced accidental venous catheter placement.</td>
<td>- Use of multiport, harder, catheters. Portex® (Sims, Portex Inc., Keene, NH, USA).</td>
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</table>
Discussion

Theories exist explaining why air or saline is better or worse in terms of achieving adequate analgesia. Unlike saline, air is compressible thus injecting saline into the epidural space may move nerves out of the way preventing paresthesias or intravascular placement. Saline may also push the dura away preventing dura puncture and post dural puncture headache.\textsuperscript{9} Air or air bubbles may delay the onset or quality of epidural anesthetic properties thus resulting in a partial block.\textsuperscript{11}

The composition of air is 78.62\% nitrogen, 20.9\% oxygen, and 0.04\% carbon dioxide.\textsuperscript{11} Currently it is not known whether there is competitive interaction for the receptor sites or if air molecules affect the local anesthetic molecules before diffusion across cell membranes.\textsuperscript{11}

Saline also can interfere with the onset and quality of an epidural anesthetic. Saline with local anesthetic molecules is an accepted method to dilute the strength of local anesthetic drugs but not modify or degrade them.\textsuperscript{11} The volumes used for dilution directly corresponds to the reduction in potency.\textsuperscript{11}

The best intervention is to limit the volume of injected fluid and air in the epidural space to less than 3 mL to avoid the unblocked nerve roots or diluted local anesthetic. Review of the literature demonstrates that leading education programs such as The New York School of Regional Anesthesia (NYSORA) are educating based on current evidenced-based recommendations.

Conclusion

Current literature does not recommend saline or air as a better medium for identification of the epidural space. However, saline may reduce complications associated with epidural catheter placement due to its incompressibility and thus providing more space for the catheter
within the epidural space. It is also suggested that further research be done on the types of catheters inserted (multiport or single port) and if there is a correlation of epidural catheter placement complications with one or the other as alluded to while reviewing the evidence.

References


Poster Presentation

The purpose of scientific posters is to present work in the form of statement of the research problem. The research problem presented was which is a better medium, air or saline, for the loss of resistance technique when identifying the epidural space. A narrative review of current research was conducted. The review concluded that neither air nor saline was a better medium for decrease epidural catheter complications. However, recommended practice guidelines were presented in order to decrease risk associated with each medium.

Submitted to the Research Symposium, AANA annual meeting, TANA fall meeting.
Additional Work

Mid-Year Assembly Contest

On a daily basis, CRNAs encounter a multitude of political and policy issues. Currently, a major concern for CRNAs, and more importantly patients, are cuts to Medicare. With an increasing national debt the federal government has to consider areas to cut funding. A proposed 29.5 percent cut to Medicare payments would substantially decrease access to healthcare and pain management services to patients in rural areas in which CRNAs are the sole anesthesia provider. While Congress has approved a short-term relief from the cuts to Medicare reimbursement these cuts continue to be a prospect. Over 20 percent of the U.S. population lives in rural areas according to the U.S. Department of Health and Human Services. It is imperative that Congress pass long term relief from the threat of reduction in Medicare reimbursement and thus a cut in access to anesthesia services to a significant number of Americans.

Having the opportunity to attend the American Association of Nurse Anesthetist Mid-Year Assembly would afford me the opportunity to become a well-rounded CRNA. My knowledge of national matters affecting CRNAs is currently limited. Therefore, it is imperative that through my educational journey I become knowledgeable about not only patient care and evidenced-based practice, but also the political aspects of being a nurse anesthetist at institution, state and national levels.

Given the opportunity to attend this meeting would allow me to not only gain knowledge of national topics faced by CRNAs but also state specific issues. During the meeting I will be able to network and discuss various topics facing other states by being able to meet CRNAs from around the country. A strong CRNA is a connected CRNA, and thus it is essential to attend meetings in order to get to know other members of the association. Also, I would like to learn
what steps are being taken to address a long-term solution to reducing the potential of Medicare cuts.

    Being able to disseminate the knowledge I gain from this assembly will be possible through various methods. One of these outlets includes my clinical site, which has a large number of CRNAs eager to listen to information affecting our profession. The nurse anesthetists at my clinical site are involved with the students, and are aware of when we are absent. Thus, my absence from clinical to attend this meeting provides the perfect opportunity to discuss the information I learned at the meeting. Also, I will be able to share the newly acquired knowledge with my fellow classmates. When talking with classmates it is a common conversation to discuss where we’ve been and what we’ve been doing and learning. To be able to share information with classmates about our future profession will help to encourage all of us to get involved and be aware national and state issues that will be effecting our daily lives. This process has actually already started through a discussion with a recently graduated CRNA who attended last years assembly and shared her experience with me.

    Thank you for taking the time to consider me as a candidate to represent Texas Christian University School of Nurse Anesthesia at a national meeting with CRNAs from around the country. If given the opportunity to attend the Mid-Year Assembly the increased knowledge of the profession would contribute enormously to my goal of becoming a well-informed CRNA.
References:


2. Center for Rural Affairs. Shortage of health care workforce hits rural America.  
Reflective Evaluation

Self-Reflection: Spring 2013

Magen Kacir BSN, CCRN

Texas Christian University – Doctorate of Nurse Practice in Nurse Anesthesia

May 8, 2013
Introduction

Everyone has said that the time in program will fly by, and it really has. I can hardly believe I have already completed half of the clinical practicum. I have been fortunate enough to be learning at a great clinical site that affords me a variety of opportunities. During this practicum I have been able to rotate through pediatrics and obstetrical anesthesia without also having to deal with the hassle of moving. I have grown leaps and bounds from the first practicum and have gained some confidence along the way.

Reflection

I was given the opportunity at the beginning of the practicum to go on a medical mission trip the Philippines with the Association of Philippine Physicians of Florida Panhandle Inc. The mission trip was lead by one of the anesthesiologist within the Panhandle Anesthesia group at Scared Heart Hospital. Although I did not yet feel confident in my skills or knowledge of anesthesia at that point I was still grateful for the opportunity to learn how to do anesthesia with next to nothing and a language barrier. To say the mission trip was challenging would be understatement. Even for the experienced anesthesia provider not having adequate supplies or information to perform the task at hand is challenging. As a new anesthesia student to the clinical arena the days were overwhelming. I was still not confident I knew how to perform anesthesia as I had been taught up to that point let alone know how to deviate from my perceived normal. Regardless, I will still able to learn a great deal by working with various anesthesia
providers from around the country. I hope everyone takes advantage of the opportunity to participate in a medical mission trip and are able to experience the gratitude of the patients and priceless experience and knowledge gained.

During this practicum I also began my rotations through pediatric and obstetrical anesthesia. I have found pediatrics to be the most challenging thus far. I have never been a pediatric nurse nor do I have children of my own, therefore my lack of life experience with children is perhaps what makes my perception of them challenging. Aside from the knowledge I must know to perform safe pediatric anesthesia there is still the bedside nursing manner that I have not quite mastered. As strange as it may sound I don’t have the natural connection that I do with adult patients. Maybe I am just a little up tight and need to learn how to relax and be silly and playful in order to make that connection with children that makes them feel comfortable to leave their parents and go with a strange lady in funny looking pajamas and matching hat.

While pediatric anesthesia may not necessarily be my nitch I have discovered this practicum that I really enjoy obstetrical (OB) anesthesia. Although my few first weeks in OB were rocky, as I was learning the new skills of combined spinal and epidurals as well as epidural placements for labor analgesia, after some practice and gained confidence I have found that I look forward to the days I get to rotate through OB. While I know it is not something I would start out doing in the first few years of my career out of school I could see myself down the line doing OB anesthesia full time.

**Conclusion**

This practicum thus far I would say I have grown and experienced the most in every aspect, from knowledge to skills and confidence in myself. I would this practicum
has been when all the hard work from the past two and half years has finally started to coming together. I can now see why we have done everything we have up to this point and truly value now what I may have not previous valued.
SUMMER 2013
Clinical Case Report

Anesthetic Management of Transnasal Resection of Pituitary Tumor

Magen Kacir, RN, BSN

Harris College of Nursing and Health Sciences

Texas Christian University

June 23, 2013
The pituitary gland is a pea-sized endocrine gland located at the base of the brain.¹ The pituitary helps control the release of hormones from other endocrine glands, such as the thyroid and adrenal glands.¹ The pituitary also releases hormones that directly affect body tissues, such as bones and the breast's milk glands.¹ These hormones include: Adrenocorticotropic hormone (ACTH), Growth hormone (GH), Prolactin, Thyroid-stimulating hormone (TSH).¹ Pituitary tumors are irregular growths that develop in your pituitary gland.² Some pituitary tumors cause excessive production of hormones that regulate important functions of your body.² Other pituitary tumors can restrict normal functions of your pituitary gland, causing it to produce lower levels of hormones.² Almost all pituitary tumors are benign. How serious a pituitary tumor is depends on whether it is causing health problems by pressing on the pituitary gland or other parts of the nervous system. Or whether the tumor is producing (secreting) excess hormones.³ This case report will discuss the complex anesthetic considerations and management of transnasal pituitary tumors.

**Case Report**

A 23-year-old, 182.9 cm, 77.1 kg male presented for a transnasal resection of pituitary adenoma. The patient’s past medical history included blindness, syncope due to dysautonomia, atrial fibrillation, alpha-1 antitrypsin deficiency, Addison’s disease, hypogondadism. Surgical history included an esophagogastroduodenoscopy (EGD). Preoperative laboratory values included; hemoglobin 13 g/dL, hematocrit 39%, platelet count 205 mg/dL, sodium 140 mEq/L, potassium 3.5 mEq/L, chloride 100 mMol/L, carbon dioxide 30 mMol/L, blood urea nitrogen (BUN) 5 mg/dL, creatinine 0.8 mg/dL, glucose 85 mg/dL, partial thromboplastin time (PTT) 24.1 seconds. The patient presented
for resection of pituitary adenoma for treatment of presumed hypogonadism and pituitary insufficiency.

The patient was transferred to the operating room from the pre-operative holding area. Upon arrival, noninvasive monitors were applied. Initial vital signs included a blood pressure of 148/80 mmHg, heart rate of 79 beats per minute, respirations 20 breaths per minute, oxygen saturation 98%. Oxygen 10 L/min was administered by mask. A lactated ringers (LR) infusion was initiated via the fluid warmer. An intravenous (IV) induction was performed using fentanyl 150 mcg, lidocaine 60 mg, propofol 200 mg, and cisatracurium 10 mg. A MAC 3 blade was used for direct laryngoscopy and an 8.0 mm endotracheal tube was used to intubate the trachea. Endotracheal tube placement was confirmed by equal and bilateral chest rise, breath sounds, and end tidal CO₂. Once the airway was secured a mechanical ventilator was used to manage ventilation. Oxygen flows were reduced to 1 L/min and desflurane 6.6% was used to maintain anesthesia. An esophageal temperature probe was placed orally and connected to the monitor. The patient’s temperature was 36.2 degrees Celsius. An oral gastric tube was placed and connected to suction. Minimal gastric secretions were removed. A triple lumen central line was placed in the left subclavian vein by the anesthesiologist. The student nurse anesthetist placed an arterial line in the left radial artery. Both the arterial line and central line were connected to the monitor and demonstrated adequate waveforms. The central venous pressure (CVP) was 12 and arterial line blood pressure was 132/55. An adult lower bair hugger was placed on the patient and connected to warm air. Cisatracurium was used to maintain neuromuscular blockade, which was monitored by a neuromuscular stimulator placed on the left forearm. The patient’s bed was unlocked and the bed was rotated ninety degrees to the right. The bed was then re-locked and the patient was
prepped and draped by the surgical team. The patient received a stress dose of hydrocortisone 100mg IV perioperatively. A low dose phenylephrine drip IV was required. The drip was run at 0.05 mcg/kg/min and maintained the patient’s blood pressure within 20% of the pre-operative baseline. The patient remained hemodynamically stable throughout the procedure. Towards the close of the case the phenylephrine drip was discontinued and the patient received odansetron 4 mg IV, glycopyrolate 0.4 mg IV, and neostigmine 2 mg IV. A train of four (TOF) was obtained and the patient began spontaneous ventilation without any assistance. The patient was extubated after establishing a regular respiratory pattern, eyes open, and following commands. The surgeon to his satisfaction performed a neurological assessment and the patient was transferred to the post anesthesia care unit (PACU). The patient received 1200 mL of LR and the estimated blood loss was 100 mL.

**Discussion**

The pituitary gland is positioned at the base of the brain, behind the bridge of the nose. The pituitary gland resides within a hollowed out area of the sphenoid bone called the sella turcica. The pituitary has two lobes, the anterior and the posterior lobe. The anterior lobe is referred to as the adenohypophysis and the posterior lobe is referred to as the neurohypophysis. Each of the two lobes of the pituitary gland contains different types of cells and produces different types of hormones. The posterior lobe produces two hormones, vasopressin and oxytocin. The anterior lobe makes up about 80% of the pituitary gland. It regulates growth, metabolism, and reproduction through the hormones that it produces. Hormones released by the anterior lobe include; Human growth hormone (HGH or GH), Thyroid-stimulating hormone (TSH), Adrenocorticotropic hormone (ATCH), Follicle-stimulating hormone (FSH), Luteinizing hormone (LH), and
Prolactin

Pituitary adenomas are frequently benign tumors of the pituitary gland. Pituitary tumors may secrete one or more hormones in excess. These tumors are called secretory pituitary adenomas and are usually found due to hormonal imbalances that affect bodily functions. Most pituitary adenomas are in the anterior lobe of the pituitary gland. There are multiple types of pituitary tumors that are based on size and the type of hormone secreted. The most common symptoms of an adenoma include; headaches, vision problems, menstrual cycle changes, mood swings or behavior changes, erectile dysfunction, weight change.

Several treatment options are available for pituitary adenomas. Medical therapy is very effective for treating some hormone-producing pituitary tumors. The medication can stop a tumor from producing excess hormones or shrink it so it does not press on the pituitary gland or other parts of the nervous system. Radiation therapy is another method of treatment for a pituitary adenoma. However, radiation therapy does not usually work quickly. It can take several months or years to control the tumor’s growth or stop hormone production. Radiation therapy may be administered if the tumor cannot be removed safely, does not shrink with medication, or reoccurs after surgery. Furthermore, surgical removal of the tumor via a transphenoidal approach remains as a treatment options.

Particular anesthetic considerations should be addressed that are pertinent to a pituitary tumor resection. Pituitary adenomas that secrete excessive amounts of growth hormone may lead to acromegaly. Acromegalic patients are among the most challenging for the anesthetist. Excess growth hormone produces hypertrophy of the soft tissues of
the mouth, nose, tongue, turbinates, soft palate, epiglottis and aryepiglottic folds.\textsuperscript{6} Hoarseness should alert the anesthetist to the possibility of laryngeal stenosis.\textsuperscript{6} Mask ventilation and tracheal intubation may be challenging in acromegalic patients.\textsuperscript{6} A careful airway assessment using conventional criteria should be performed.\textsuperscript{6} Obstructive sleep apnea is an associated feature in acromegalic patients and may be a factor in perioperative airway compromise.\textsuperscript{6} Patients with chronic obstructive sleep apnea may also develop right heart failure from pulmonary hypertension, thus the need to avoid nitrous oxide.\textsuperscript{6}

Controlled hypercapnia, to a maximum PaCO$_2$ of 60 mmHg, has been described as an effective and simple method of temporarily raising ICP to displace the suprasellar portion of a tumor down into the sella.\textsuperscript{6} Limiting PaCO$_2$ to 60 mmHg minimizes the deleterious side-effects.\textsuperscript{6}

Specific anesthetic consideration must be recognized in patients with panhypopituitarism. These patients are susceptible to water intoxication and hypoglycemia and are sensitive to central nervous system depressants, such as general anesthetics.\textsuperscript{6} Lack of adrenocorticotropic hormone (ACTH) secretion requires glucocorticoid replacement to reduce pressure on the surrounding neural tissue and prevent a hypoadrenal crisis.\textsuperscript{6} Perioperatively, these patients are extremely sensitive to anesthetic agents, and vasopressor agents may be needed to maintain blood pressure.\textsuperscript{6}

The anesthetic management of patients undergoing pituitary surgery continues to present many anesthetic challenges. The anesthetist must therefore have a good understanding of the varied presentations of pituitary disease and their implications for
the patient’s perioperative state. Furthermore, the transsphenoidal approach is associated with specific issues the anesthetist must anticipate and manage.

References:


Health Policy Paper

Administration of Epidural and Spinal Anesthesia for Obstetrical Patients

Health Policy Issue

Magen Kacir, RN, BSN

Instructor: Dr. J. Dru Riddle, DNP, CRNA

Harris College of Nursing and Health Sciences

Texas Christian University

June 13, 2013

NRAN 81353
The management of labor and delivery pain is frequently addressed with regional anesthesia. However, regional anesthesia may not be suitable for patients with thrombocytopenia due to the risk of neuraxial hematoma. A platelet count of at least 100,000/mm$^3$ has traditionally been considered necessary for the safe administration of neuraxial anesthesia. This threshold most likely originated from the results of a 1972 study that correlated platelet counts with bleeding times. Appraisal of 1,083 human studies determined that the bleeding time is no longer considered a reliable method of assessing the risk of bleeding for a single individual. While most authorities do not give an absolute platelet count below which a regional anesthetic is contraindicated it has been recommended that an epidural anesthetic be withheld if the platelet count is <100,000 mm$^{-3}$. Currently the policy for neuraxial anesthesia administration for the Panhandle Anesthesia Associates group requires that a complete blood count (CBC) be drawn within 24 hours to assess platelet count. Additional pre-assessment test are at the discretion of the surgeon and/or anesthetist.

**Issue:** There is currently no strong evidence to suggest the minimum platelet count that is required to ensure the safe administration of neuraxial anesthesia by an anesthesia provider to a parturient.

**Policy objectives:**

The objective is to establish a policy in which neuraxial anesthesia/analgesia can be safely administered to provide relief and comfort to parturient with minimal risk for development of a spinal or epidural hematoma.
Policy options:

1. Coagulation studies such as prolonged prothrombin time (PT), prolonged partial thromboplastin time (PTT), and international normalized ratio (INR) should be assessed in addition to platelet count.¹

2. A set value for platelets, of 100,000 mm³ or greater, is required for neuraxial anesthesia may be administration in parturients.

3. Neuraxial anesthesia administration is at the discretion of the anesthetist.

For a patient with a platelet count less than 100,000/mm³ additional hemostatic abnormalities may be present such as prolonged prothrombin time (PT), prolonged partial thromboplastin time (PTT), and reduced fibrinogen concentration.¹ In addition to a CBC, coagulation studies may be useful. In patients at risk for coagulopathy, a normal or nearly normal international normalized ratio (INR) is required for the safe performance of neuraxial anesthesia.¹ The INR test result is given as a number.⁴ The number is a ratio: the ratio of the sample’s Prothrombin Time (PT – a measure of clotting), to the Prothrombin Time of a normal sample of blood.⁴ A result of 1.0 up to 1.5 is therefore normal.⁴ An INR lower than the desired range means the blood clots too easily.⁴ An INR result higher than the desired range means the blood does not clot easily and may be difficult to stop bleeding should it occur.⁴ Elements that prevent excessive bleeding include platelet activation and the activity of clotting factors that circulate in the blood.⁵ Based on the inclusion of clotting factors in the assessment to prevent bleeding the following policy recommendation has been created.

¹
RECOMMENDED POLICY: ADMINISTRATION OF EPIDURAL
AND SPINAL ANESTHESIA FOR OBSTETRICAL PATIENTS.

Neuraxial anesthesia administration requires a complete blood count (CBC) to be drawn
within 24 hours to assess platelet count. In addition to a CBC, coagulation studies should
be drawn at the same time, which includes a PT, PTT, and INR.

Impediments:

Barriers to the implementation of the revised policy include cost of additional
blood work. It may be difficult to justify incurring the cost of further test when the cost of
one test has been sufficient for a number of years. A second obstacle to the
implementation is the education of staff of change in policy. Unit meetings may only be
held once a month. Thus it may take time for education on the changed policy to make
it’s way to every staff member who may have had the day off or been on vacation when
the policy change was first presented.

Conclusion:

Presently the administration of neuraxial anesthesia in obstetrical patients has
been based on an arbitrary platelet value based on outdated studies. Current research
discusses excessive bleeding as being multifactorial, which includes platelet activation
and clotting factors. Thus the addition of coagulation studies to pre-assessment blood
work provides a more accurate assessment of the risk of developing a hematoma while
receiving neuraxial anesthesia.
References:


Reflective Evaluation

Self-Evaluation: Cumulative

Summer 2013

Magen Kacir, RN, BSN

Texas Christian University – Doctorate of Nursing Practice

July 13, 2013
It is hard to believe that I am writing my final reflective evaluation. After many many months of test, papers, projects, early mornings and late nights the finish line is within reach. To say it’s been easy or what I expected going into this endeavor would be misleading. There have been multiple occasions that I have wanted to throw in the towel but through the support of friends and family have found the motivation to continue. Continuing through trying times has allowed me to come out the other side a strong and more knowledgeable person.

This final piece of my portfolio is to reflect on how my project as met the competencies for the CRNA practitioner at the clinical doctorate level.

I. Biological Systems, Homeostasis, and Pathogenesis

a. Case Report One
   i. Hemoglobin Trigger for Red Blood Cell Transfusion
      1. Rationale for Selection:
         a. Discuss the role RBC transfusion plays in fluid management during a large blood loss.
      2. Pertinent Evidence and Reflection:
         a. The best current evidence proposes that transfusion can safely be withheld as long as hemoglobin remains above 7 g/dL and the patient is not actively bleeding. This policy appears to be safe even in patients with underlying cardiac disease.
         b. Determination to administer a RBC transfusion should be based on the physiological benefit to the patient and not based on laboratory values.

b. Case Report – Summer 2013
   i. Anesthetic Management of Transnasal Resection of Pituitary Tumor
      1. Rational for Selection:
         a. Discuss the complex anesthetic considerations and management of pituitary tumors.
      2. Pertinent Evidence and Reflection:
         a. Excess growth hormone produces hypertrophy of the soft tissues of the airway. Mask ventilation and tracheal intubation may be challenging in acromegalic patients.
b. Consideration must be recognized in patients with panhypopituitarism. Susceptibility to water intoxication and hypoglycemia and are sensitive to central nervous system depressants, such as general anesthetics.  

c. Anesthetist must have a good understanding of the varied presentations of pituitary disease and their implications for the patient’s perioperative state. Furthermore, the considerations of the transsphenoidal approach.

II. Professional Role

a. Oral Presentation to Sacred Heart Hospital Operating Room Staff (nurses, surgical techs, orderlies)
   i. The importance of room temperature and thermoregulation of our patients. As well as the importance of maintaining a quite environment during induction and emergence from general anesthesia in regards to the various stages of anesthesia and patient safety.
      1. Intra-professional collaboration: Teamwork and delegation of the various segments of the presentation between fellow classmates and myself.
      2. Inter-professional collaboration: Communication breakdowns are a common reason for errors in the operating room. Taking time to sit down and convey important factors for patient’s safety can reduce adverse events.

III. Healthcare Improvement

a. Research Poster
   i. Epidural Space Identification: Air vs. Saline in Decreasing Epidural Complications
      1. The epidural space in adults is currently identified using air or saline. Both techniques are widely used and accepted. Nevertheless, a debate exists as to which is a better technique in terms of efficacy. This narrative review seeks to explore current literature related to epidural insertion techniques to determine if there is enough evidence to support air or saline as the preferred method for identification of the epidural space.
   ii. Evidence-Based Practice Recommendations:
      1. The best intervention is to limit the volume of injected fluid or air into epidural space.  
         a. Limiting air to < 1 mL to avoid the unblocked nerve roots.
         b. Limiting saline to < 3 mL to avoid diluted local anesthetic.
IV. Practice Inquiry
   a. Medical Mission
      i. San Fernando, Pampanga, Philippines
         1. Together, the team performed 850 pediatric consults, 800 medical consults, 116 surgeries and 1,000 dental visits and procedures.
         2. Exposure to a variety of populations (adult, elderly, children, parturient). Diversity in clinical setting and systems (multiple operations in one room, very old and unfamiliar anesthesia machine.)

V. Technology and Informatics
   a. Perioperative Warmers (p. 6)
      i. Technology:
         1. Convective Warming Devices: Bair Huggers
      ii. Improvement in patient care:
         1. Convective warmers produce slightly better patient outcomes than conservation warmers and are more cost effective.

VI. Public and Social Policy
   a. Administration of Epidural and Spinal Anesthesia for Obstetrical Patients
      i. Current Practice and Policy:
         1. Recommendation that an epidural anesthetic be withheld if the platelet count is <100,000 mm$^{-3}$. Currently the policy for neuraxial anesthesia administration for the Panhandle Anesthesia Associates group requires that a complete blood count (CBC) be drawn within 24 hours to assess platelet count. Additional pre-assessment test are at the discretion of the surgeon and/or anesthetist.
      ii. Issue:
         1. There is currently no strong evidence to suggest the minimum platelet count that is required to ensure the safe administration of neuraxial anesthesia by an anesthesia provider to a parturient.
      iii. Recommended Policy:
         1. Neuraxial anesthesia administration requires a complete blood count (CBC) to be drawn within 24 hours to assess platelet count. In addition to a CBC, coagulation studies should be drawn at the same time, which includes a PT, PTT, and INR.

VII. Health Systems Management
   a. Oxygen Administration To Acute Myocardial Infarction Patients
      i. International Situational Analysis:
         1. Cost to Implement
         2. Human Resources Necessary
         3. Marketing
         4. Operations Analysis
      ii. External Situational Analysis:
         1. Demographics
2. Economic
3. Legal and Policy
4. Social and Technological Information

VIII. Ethics
   a. Responsibility to Patients
      i. Advocates for patient’s wellbeing and prevention of harm.
   b. Competence
      i. Maintaining current registered nurse licensure and associated continuing education.
      ii. Seeking higher level of education for advance practice.
   c. Responsibility as a Professional
      i. Texas Association of Nurse Anesthetist Fall Meeting, 2012
   d. Responsibility to Society
      i. Collaboration with operating room staff to provide safe surgical environment.
   e. Endorsement of Products and Services
      i. Fluid Warmers
   f. Research
      i. Epidural Catheter Complications

Specific challenges faced this summer semester included; rotation to offsite areas for anesthesia. These areas included MRI, CT, Endoscopy, and EP Lab. Additionally I was able to complete my first robotic case with the Da Vinci. The offsite anesthesia areas proved to be challenging due to the inaccessible immediate back up help if needed. Environment added to the challenges of the anesthesia, typically the MRI or Endoscopy suites are very small and are not conducive to general anesthesia if required. If a patient had to be emergently intubated while in MRI the patient would have to be intubated from the side due to the head of the bed being occupied by the MRI machine. Also, in the endoscopy rooms the anesthesia cart is in the hallway because there is no room for it in the room. This requires organization and careful preparation by the nurse anesthetist to have available in the room what may be needed in case of an emergency.

Strengths that I have acquired up to this point in my training are confidence in my anesthetic skills such as intubation and anesthesia evaluation and management. I have also learned to become more of an independent thinker. In the beginning I simply
accepted to do what I was told because I felt that I didn’t know any better at the time. However, I have become more confident with a little experience under my belt and now feel secure in collaborating with anesthesia team on the anesthesia plan for the patient.

A weakness of mine that I am currently working on is bringing up my knowledge and preparation to level of board exam ready. I recently took my first mock board exam and needless to say the score was not pleasant. I realize that I may have developed some confidence in my clinical skills however in order to be a top-quality anesthesia provider I must make sure my knowledge matches my skills.

The portfolio project has helped my professional development in more ways than one. It has demonstrated the multifactor approach that is required for advance practice nursing. The portfolio displays the transition from a registered nurse to an advanced practice nurse. The first few pages demonstrate how nursing can become task oriented or linear in thought process. However, through the progression of the program I have proven the growth and self-sufficient knowledge and skills required of an advanced practice nurse. Examples of this critical thinking and growth can been through the multiple case studies and research projects as well as through the medical mission trip to the Philippines. The ability to be self sufficient and exhibit growth is of particular importance for a Certified Registered Nurse Anesthetist because of the movement towards more states opting out of physician supervision and thus allowing CRNAs to practice independently of the anesthesia care team model. I have learned and acquired a great deal over the past two and half years and realize that this is only the beginning of my life long learning career as a CRNA.