

Regis University

## ePublications at Regis University

---

Regis University Student Publications  
(comprehensive collection)

Regis University Student Publications

---

Summer 2013

# Comparison of Neonatal Nurse Practitioner Needle Thoracostomy Procedural Competency After Completion of an Online Module Or Standard Textbook Review

Carol M. Wallman  
*Regis University*

Follow this and additional works at: <https://epublications.regis.edu/theses>



Part of the [Medicine and Health Sciences Commons](#)

---

### Recommended Citation

Wallman, Carol M., "Comparison of Neonatal Nurse Practitioner Needle Thoracostomy Procedural Competency After Completion of an Online Module Or Standard Textbook Review" (2013). *Regis University Student Publications (comprehensive collection)*. 207.  
<https://epublications.regis.edu/theses/207>

This Thesis - Open Access is brought to you for free and open access by the Regis University Student Publications at ePublications at Regis University. It has been accepted for inclusion in Regis University Student Publications (comprehensive collection) by an authorized administrator of ePublications at Regis University. For more information, please contact [epublications@regis.edu](mailto:epublications@regis.edu).

**Regis University**  
Rueckert-Hartman College for Health Professions  
Loretto Heights School of Nursing  
**Doctor of Nursing Practice Capstone Project**

# **Disclaimer**

Use of the materials available in the Regis University Capstone Collection ("Collection") is limited and restricted to those users who agree to comply with the following terms of use. Regis University reserves the right to deny access to the Collection to any person who violates these terms of use or who seeks to or does alter, avoid or supersede the functional conditions, restrictions and limitations of the Collection.

The site may be used only for lawful purposes. The user is solely responsible for knowing and adhering to any and all applicable laws, rules, and regulations relating or pertaining to use of the Collection.

All content in this Collection is owned by and subject to the exclusive control of Regis University and the authors of the materials. It is available only for research purposes and may not be used in violation of copyright laws or for unlawful purposes. The materials may not be downloaded in whole or in part without permission of the copyright holder or as otherwise authorized in the "fair use" standards of the U.S. copyright laws and regulations.

Comparison of Neonatal Nurse Practitioner Needle Thoracostomy Procedural  
Competency after Completion of an Online Module or Standard Textbook Review

Carol M. Wallman

Submitted as Partial Fulfillment for the Doctor of Nursing Practice Degree

Regis University

August 8, 2013

Copyright © 2013 Carol M. Wallman. All rights reserved. No part of this work may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the author's prior written permission.

## **Executive Summary**

### **Comparison of Neonatal Nurse Practitioner Needle Thoracostomy Procedural Competency after Completion of an Online Module or Standard Textbook Review**

#### **Problem**

This project addresses the ongoing procedural competency assessment of Neonatal Nurse Practitioners (NNPs) practicing within a children's hospital (CH) system. The initial and ongoing assessment of Advanced Practice Registered Nurses (APRNs) has become a focus of attention for several national organizations.

Currently the NNP department within this CH has a competency committee that annually gathers documentation of high-risk procedures, patient contacts, maintenance of a professional portfolio, and annual participation in a skills day including neonatal resuscitation simulation. However, there is currently no mode for procedural competency assessment. This proposal included the development and implementation of an online review module and application of a standardized format for evaluation of NNP procedural performance. The question addressed was: Is the completion of an online module effective review for NNPs for neonatal thoracostomy by needle aspiration as evaluated by the Leicester Clinical Assessment Tool (LCAT) comparable or better than a standardized textbook review?

#### **Purpose**

This project included the development and implementation of an online review module and application of a standardized format for evaluation of NNP procedural performance of neonatal needle thoracostomy.

#### **Goals**

The goals of this Capstone Project include developing and implementing evidence based, financially favorable, and sustainable systems for procedural competency review and evaluation of NNPs.

#### **Objectives**

The short-term objective was to analyze the effectiveness of an online module for NNP review of needle thoracostomy and assessment of procedural performance utilizing the Leicester Clinical Assessment Tool. A long-term goal was to implement a coordinated, high, and evidence based approach to NNP procedural review and performance assessment.

#### **Plan**

The project utilized a two-group descriptive, quantitative, pre-experimental design. Participants were randomized to either online or textbook review. Expert NNPs, blinded to the randomization, evaluated 45 NNPs' procedural performance on neonatal needle thoracostomy in a simulated setting utilizing the LCAT. Data was analyzed using IBM SPSS version 21.

#### **Outcomes and Results**

The online module overall was more effective than textbook review ( $p < 0.005$  at 0.007), equivocal for procedural performance, safety, and infection prevention, yet superior in communication ( $p < 0.05$  at 0.008) and teamwork ( $p < 0.005$  at 0.024) as scored by the LCAT. This project provides a framework for future NNP procedural assessments.

## **Acknowledgments**

I would like to take this opportunity to thank the many individuals who have contributed to my success in completing this project. First I would like to thank my husband Elry, my children, Bryan and Sarah, and finally my parents, Paul and Claire. Their love, support and confidence in my ability to complete this pulled me through on a daily basis.

I would also like to thank my many mentors and colleagues who supported and guided me throughout this process. First, I must acknowledge Cris Finn, PhD, RN, FNP, MS, MA, FNE, my DNP capstone chair, who guided and encouraged me on a regular basis. Also, Anne Marie Kotzer PhD, RN, CPN, FAAN, Nurse Scientist, for her shared research expertise and encouragement as my facility advisor. Catherine Witt PhD-c, RN, NNP-BC was my clinical mentor and guided my project development and assisted in data collection and was a constant encouragement. I would also like to acknowledge my NNP colleagues and friends, Linda McCarney, RN, MS, NNP-BC, Pamela Heaberlin RN, MS, NNP-BC, and Nora Scott, RN, MS, NNP-BC who supported my educational pursuit and embraced my project by participating in obtaining consents from fellow NNPs and helping out in anyway I needed. A special thanks to Pamela Heaberlin who arranged the scheduling of subjects, completed the blinded randomization process, and managed the project website. Her help and ongoing support has been amazing. My supervisor, Elizabeth Welch-Carre RN, MS, NNP-BC, supported my project and gave me the freedom to pursue my goals; thank you.

Finally, I would like to praise God for putting this desire within my heart and giving me the faith to follow through with this dream. During challenging times I was able to focus on His words from Psalm 46:10 “Be still and know that I am God”.

## Table of Contents

I. Preliminary Pages .....	i
A. Copyright Statement .....	i
B. Executive Summary .....	ii
C. Acknowledgements .....	iii
D. Table of Contents .....	iv
E. List of Tables .....	vii
F. List of Figures .....	viii
G. List of Appendices .....	ix
II. Problem Recognition and Definition.....	1
III. History of Competency Assessments.....	3
IV. Current Neonatal Nurse Practitioner Competency Program at CH.....	4
V. Problem Statement and Question .....	5
VI. Theoretical Foundations .....	6
A. Nursing Theory Application .....	6
B. Technological Competency as Caring.....	6
C. From Novice to Expert.....	7
VI. Learning Theory Application .....	8
A. Constructivism .....	8
VII. Change Model .....	8
VII. Systematic Review of Literature .....	10
A. Online Learning .....	11
B. Objective Structured Clinical Exams .....	13

C. Needle Thoracostomy .....	14
VII. Market Risk Analysis .....	15
A. Stakeholders and Project Team .....	18
B. Cost-Benefit Analysis .....	19
VIII. Mission, Vision and Goals .....	20
IX. Conceptual Model .....	21
X. Methodology .....	25
A. Risks and Benefits .....	27
B. Consent Process .....	28
C. Privacy Protection .....	29
D. Timeframe .....	29
E. Budget .....	30
XI. Findings and Results .....	30
A. Demographics .....	31
B. LCAT Results .....	36
C. Instrumentation .....	39
XII. Discussion .....	41
A. Evidence Based Practice Question .....	41
B. Theoretical Support .....	42
XIII. Limitations .....	43
XIV. Contributions to Advanced Practice Nursing .....	43
XV. Recommendations for Further Study .....	44
XVI. Conclusion .....	44



XVII. References .....	47
XVIII. Appendices.....	54

## **List of Tables**

I. Age of Subjects.....	31
II. Number of Needle Thoracostomies Performed in Past Year on Live Patient.....	33
III. Number of Needle Thoracostomies Observed in Past Year .....	33
IV. Perceived Barriers to Needle Thoracostomy Procedures in Past Year.....	34
V. T Test Comparing LCAT Summary Scores Between Online and Textbook Review Participants.....	37
VI. T Tests Comparing LCAT Communication Scores Between Textbook and Online Review Participants .....	38
VII. T Tests Comparing LCAT Scores Between Textbook and Online Review for Teamwork .....	39

## **List of Figures**

I. SWOT Analysis of Capstone Project .....	18
II. Conceptual Model .....	24
III. Capstone Project Timeline.....	30
IV. Previous Online Experience .....	35
V. Participant rating of helpful components of online module.....	35
VI.LCAT Summary Scores.....	36

## **List of Appendices**

A. LCAT Scoring Tool .....	54
B. Review of Literature.....	56
C. Capstone Project Educational Presentation.....	77
D. E-Mail Script.....	81
E. Collaborative Institutional Training Initiation Completion Certificate.....	83
F. Regis Institutional Review Board Approval .....	84
G. Colorado Multiple Institutional review Board Approval .....	85
H. Neonatal Needle Thoracostomy On-line Module .....	86
I. Demographic Questionnaire .....	91
J. Participant Consent.....	94

This Capstone Project discussed the problem recognition, definition, market risk analysis, project objectives, budgetary needs, resources, and evaluation plan for the project; Comparison of Neonatal Nurse Practitioner Needle Thoracostomy Procedural Competency after Completion of an Online Module or Standard Textbook Review. Additionally the nursing and learning theoretical underpinnings and change model have been presented.

### **Problem Recognition and Definition**

The role of the Advanced Practice Registered Nurse (APRN) has evolved in professionalism and expertise over the past several years becoming an integral part of healthcare in the United States. As the profession has matured it has become necessary to align the important aspects of education, accreditation, certification and licensure of APRNs to both increase their access to and safety of their patients. In 2008, the APRN Consensus Work Group and the National Council of State Boards of Nursing (NCSBN) APRN Advisory Committee collaborated to develop the Consensus Model of APRN Regulation: Licensure, Accreditation, Certification, and Education (APRN Consensus Work Group & the National Council of State Boards of Nursing APRN Advisory Panel, 2008). This consensus model provides a detailed outline of criteria required for recognition as a nursing specialty and includes the requirement that individual specialty organizations “define competencies for their area of nursing specialty practice” (APRN Consensus Work Group & NCSBN APRN Advisory Committee, 2008, p.29). Building upon the recommendations from this work group the National Association of Neonatal Nurse Practitioners (NANNP) developed a tool kit addressing orientation, initial competencies, and on-going competencies for the Neonatal Nurse Practitioner (NNP) (NANNP, 2010). This tool kit provides guidelines for the orientation of new NNPs and for the maintenance of competencies for the experienced NNP. Procedures an NNP performs may vary based on

individual practice settings. However, NANNP identified three essential procedural competencies for an NNP required for emergent neonatal resuscitation; including endotracheal intubation, placement of an umbilical line, and needle thoracostomy (NANNP, 2010). The development of standardized, institution specific guidelines utilized for assessing maintenance of procedural competence is also a recommendation of NANNP (NANNP, 2010). The NANNP further states “the development of modules that can be shared across programs and institutions will assist with faculty development and decrease faculty time spent developing new content” (NANNP, 2010 p.12). The NANNP recommendations include the following guidelines for the content of standardized education stating the education should include the

- a. Use of universal precautions
- b. Use of a time-out
- c. Review and discussion of consent issues when securing of informed consent is appropriate
- d. Review of the procedure, including summary of indications, contraindications, complications, equipment required, and step-by step technique
- e. Assessment and management of the patient’s comfort and pain (NANNP, 2010, p.10).

The need for the development of institution specific guidelines for on-going review of competencies is further supported by the Institute of Medicine’s (IOM) 2011 report (IOM, 2011), as well as their call for practices to encourage life-long learning among health care professionals (IOM, 2009). Furthermore, the Joint Commission (JC), a national hospital accrediting organization, requires hospitals to provide evidence of competency assessment of their

employees (JC, 2009). The need for the development of these institutional specific educational offerings and competency evaluation provided the basis for this project.

### **History of Competency Assessments**

The assessment of APRN competency has recently become a focus of many organizations. However, the desire to ensure on-going competency beyond the issue of licensure is not new. Early recommendations from the United States Department of Health, Education and Welfare recommended physician periodic examinations, and in 1971 a similar recommendation stated competency assessments and education should be provided by associations and states (Whittaker, Carson, & Smolenski, 2000). Participation in continuing education was a means of assuming competency for many years, yet in 1994 the state of Colorado removed continuing education as a means of assuring competency due to what they perceived as a lack of evidence that on-going education guarantees competence (Whittaker, Carson, & Smolenski, 2000). National specialty certification is another means of determining competence and is required of all practicing NNPs at this CH. The National Certification Corporation (NCC) has a mandatory continuing competency specialty assessment program, yet this addresses only knowledge content and does not address procedural competency (NCC, 2012). Additionally, the JC requires hospitals to assess the competency of employees when hired and then regularly during their employment (Whittaker, Carson, & Smolenski, 2000). The American Nurses Association (ANA) has historically been active in determining means of assessing nurses' competency and continues to address this ongoing issue. The ANA supports the ongoing acquisition of knowledge regarding best practices for determining competencies and agrees assessing the impact a combination of continuing education and national certification has on nursing competency is essential (Whittaker, Carson, & Smolenski, 2000). Defining competency has also challenging, yet

having a mechanism in place to assess procedural technique consistent with an evidenced based approach to care provides initial information regarding the APRN knowledge base and performance.

### **Current Neonatal Nurse Practitioner Competency Program at CH**

The NNP department of this CH has an NNP Competency Committee and Educational Coordinators who annually track NNPs professional portfolios including completion of advanced procedures and patient management. CH also requires all regular staff NNPs to attend an annual Skills Day for review of procedural content, an open book exam, and simulated practice for neonatal resuscitation and advanced procedures. Simulated practice has recently been shown effective as a means for evaluation of NNP acquisition and maintenance of competencies (Cates & Wilson, 2011). NNPs at CH have not routinely been evaluated for procedural competence in a formal manner. The CH Competency Committee's review of procedures for 2011 revealed needle thoracostomy was the least frequently performed essential procedure as defined by NANNP (CH, NNP Competency Committee; 2011, NANNP, 2010). Three annual needle thoracostomy procedures were completed by only 14% of CH NNPs, while three umbilical line placements were performed by 80% and three endotracheal intubations by 91% of NNPs (CH, NNP Competency Committee, 2011). The low frequency in needle thoracostomy attempts guided the decision to focus on this essential procedure for competency review and evaluation for this Capstone Project.

The NNP department at CH has clinical practice contracts with a variety of hospitals along the front range of Colorado, and CH NNPs live in a vast geographic region. Online learning has been cited as effective in education of neonatal nurses and the geographic



challenges within the CH NNP department highlight the need to evaluate the effectiveness of an online module for NNP continuing education (Altimier, 2009).

### **Problem Statement and Question**

This evidence based practice project utilized a format addressing the Population being addressed, application of an Intervention, a Comparison and the Outcome; represented by the acronym, PICO (Zaccagnini & White, 2011). The PICO for this project was as outlined below:

**Population:** NNPs practicing within the NNP department at CH

**Intervention:** Development, implementation and evaluation of an online module for neonatal thoracostomy by needle aspiration

**Comparison:** NNPs were randomized into two groups. The experimental group completed the online module. The control group completed standardized textbook review. The Leicester Clinical Procedure Assessment Tool (LCAT) was utilized to assess NNPs for procedural competence (McKinley et al., 2008), (Appendix A).

**Outcome:** Results of the LCAT were compared between the experimental and control groups.

**Problem Question:** Is the completion of an online module effective review for NNPs for neonatal thoracostomy by needle aspiration as evaluated by the LCAT comparable or better than a standardized textbook review?

This problem question provided an example of a nurse-sensitive outcome of advanced practice nursing since it addressed knowledge of disease and treatment (Kleinpell, 2009). Identifying nurse-sensitive as opposed to patient sensitive outcomes has provided a link to evaluating specific nursing roles to health outcomes (Kleinpell, 2009). The NNPs who participated in this project were assessed regarding the application of the disease process

necessitating thoracostomy by needle aspiration and the treatment process itself in the performance of thoracostomy by needle aspiration.

### **Theoretical Foundations**

Theoretical foundations for this project included nursing and learning theories and the application of a change model. Nursing theories applied included the middle range theories of Rozzano Locsin's theory of Technological Competency as Caring and practice of knowing persons in nursing states (Locsin, 1999, 2010), and Patricia Benner's From Novice to Expert (Benner, 1984, 2001). The learning theory effective in online learning and applied in this project was Constructivism (Kala, Isaramalai, & Pohthong, 2010). Rosswurm and Larrabee's change model was applied to this project to facilitate the change process required for successful implementation.

### **Nursing Theory Application**

#### **Technological Competency as Caring**

Rozzano Locsin's middle range theory of Technological Competency as Caring and practice of knowing persons in nursing supports viewing of a harmonious coexistence between understanding technological competency and caring and states; "A human being is a person, regardless of bio-physical parts or technological enhancements" (Locsin, 2010, p. 462). Locsin further states: "The ultimate purpose of technological competency in nursing is to acknowledge the person as a focus and that various technological means can and should be used in the practice of knowing persons in nursing" (Locsin, 2010, p. 461).

The use of advanced technologies in the provision of nursing care in clinical settings is a major concept of this theory and is an expectation for nurses, specifically NNPs. Nurses use various technologies to assess and assist patients on a routine basis. A technology may be a

system, a process, an instrument, or a tool. It is expected that nurses be competent in an increasing foray of technologies and procedures on any given day. The theory of Technological Competency as Caring assumes technology is effectively used in the practice of knowing the person in nursing, consistent with caring in practice (Locsin, 2010). The combination of technical competency and caring are integral in this theory and made it applicable to this project. The straightforward concept of combining technological competency and caring nicely blended with promoting a caring and holistic approach to the essential NNP procedural skill of needle thoracostomy.

### **From Novice to Expert**

Patricia Benner's theoretical framework From Novice to Expert was also applied in this project (Benner, 2001). The NANNP supports utilizing Benner's framework as a basis for developing educational content as well as competency evaluation (NANNP, 2010). In her original work, Benner was one of the first to describe nurses' skill acquisition as evolving over time and including content knowledge through a sound educational basis combined with clinical experiences (Benner, 1984). Benner further describes effectiveness in management of rapidly changing situations as a competency for expert nurses (Benner, 2001). This competency includes providing rapid and skilled assessment and intervention in life threatening and emergency situations (Benner, 2001). Competencies within Benner's Novice to Expert theory are congruent with the expected competencies delineated by NANNP (Benner 2001; NANNP 2010). Rapid assessment of a neonatal pneumothorax and appropriate intervention with needle thoracostomy is an essential NNP competency per NANNP (NANNP, 2010). Building on this theory of diverse performance based on novice to expert status, a variable evaluated in this

project was the determination of years of clinical experience and recent practice experience with needle thoracostomy in relation to demonstration of procedural competence.

### **Learning Theory Application**

#### **Constructivism**

Constructivism is a learning theory identified as effective in online learning activities and was utilized in the development of the online module for this project (Kala, Isaramalai, & Pohthong, 2010). Constructivism supports the transformation from teacher centered learning to student engaged learning (Kala, Isaramali & Pohthong, 2010). Three factors of constructivism identified as effective in online learning modules include enhancing an active learning environment, facilitating social interaction, and creating quality-learning materials (Kala, Isaramalai & Pohthong, 2010). For this project the main aspects of constructivism utilized include an active learning environment and the creation of quality learning materials. Due to technological constraints within the hospital system the online social interaction was limited; however social interaction was present during the objective standardized clinical examination and the skills day activities.

#### **Change Model**

Introduction of a new model for NNP procedural competency evaluation within the CH NNP Department included change from previous practice. The six steps in shaping the process and product of change outlined by Rosswurm and Larrabee's model were applied to this project as follows:

1. Assessed the need for change in practice.
  - a. Identified by the recommendations for competency assessment by the NANNP (NANNP, 2010), the IOM (IOM 2009, 2011), and the JC (JC, 2009).

2. Linked the need with interventions and outcomes:
  - a. Recommendation to develop institution specific learning opportunities tied to competency evaluation supported the development of an online module for procedure review of neonatal needle thoracostomy for evaluation of procedural competence in comparison to NNPs having completed textbook review (NANNP, 2010).
3. Synthesizing best evidence:
  - a. Utilization of information obtained from systematic review of the evidence for online learning module effectiveness and performance evaluation utilizing objective structured clinical examination (Altemier, 2009; McKinley, Strand, Gray, Schuwirth, Alun-Jones & Miller, 2008;).
4. Design a new change in practice:
  - a. Development of the online learning module
5. Implementation and evaluation of the practice change:
  - a. Development of an online module and comparison of NNP procedural competency between NNPs completing the online module versus textbook review as further outlined in the methodology discussion.
6. Integrating and maintaining the practice change:
  - a. Future goal to assess potential implementation of on-going procedural competency assessment within CH department (Pipe, 2007, Rosswurm & Larrabee, 1999).

### **Systematic Review of Literature**

A systematic review of the literature addressing the major components of this project was conducted (Appendix B). The key words utilized included online learning, neonatal nurse practitioner procedure competency evaluation, and neonatal needle thoracostomy. The search included Google Scholar, CINAHL, and Cochrane Library Reviews. The first concept and keyword researched was ‘competency evaluation’ utilizing CINAHL with full text results between 2006 and 2012 and revealed 1261 results. The search was then narrowed to ‘nursing competency evaluations’ resulting in 530 results, followed by ‘nursing procedure competency evaluation’ resulting in 13 results and finally ‘advanced practice nursing competency evaluation’ resulting in only one article describing evaluation of advanced practice nurses completing sigmoidoscopy.

‘Competency evaluation’ was next searched via Google Scholar and revealed an initial 47,200 results, this was further narrowed to 18,200 results for ‘nursing competency evaluation’, and 14,600 results for ‘nursing procedure competency evaluation’. The Google Scholar search was further narrowed to ‘advanced practice nurse competencies combined with online learning’ and the search results dropped to 8,420. Finally, consistent with the project proposal objectives the search was further narrowed to the use of ‘Objective Structured Clinical Examinations (OSCE) for competency evaluations,’ physician and nursing student articles were deleted. The end result was 11 articles analyzing the use of OSCEs, 11 online learning articles and six competency specific articles. Furthermore, one article addressing the use of simulation for NNP continuing education was kept.

A Google Scholar search for ‘needle thoracostomy’ from 2006-2012 revealed 1,340 results, when narrowed to ‘needle thoracostomy and neonatal’ there were actually more results at

1,540. With the search further narrowed to ‘needle thoracostomy + needle + pneumothorax’ there were 302 references, yet no scholarly articles noted. This resulted in textbook references and articles describing chest tube placement, none specifically addressing needle thoracostomy. A CINAHL search of ‘needle thoracostomy’ from 2006-2012 resulted 31 results, when narrowed to ‘neonatal, newborn or infant needle thoracostomy’ the results decreased to two, one article was deleted since it actually addressed children, one article was retained.

Cochrane reviews revealed few articles related to search key words. The keywords of ‘online learning’, ‘objective structured clinical examinations’, ‘advanced practice registered nurse competency evaluations’, ‘competency reviews’ and ‘procedural competency reviews,’ and ‘needle thoracostomy’ all revealed zero results. One systematic review on the value of continuing education was included; furthermore there were two reviews on newborn and neonatal management of pneumothorax yet both focused on surfactant administration and endotracheal intubation at birth.

### **Online Learning**

Online learning has risen over the past decade as a result of a variety of benefits being identified. However, the format of web-based learning varies greatly among educational providers. A recent systematic review of 266 studies identified 89% of courses using written text, 55% multi-media, and 32% on-line communication via e-mail, threaded discussions, chat, or videoconferencing (Cook, Garside, Levinson, Dupras, & Montori, 2010). Additionally, 77% of courses utilized enhanced instructional methods in addition to text and 50% used patient case studies, self-assessment questions, or feedback. (Cook, Garside, Levinson, Dupras, & Montori, 2010). Nurses, followed by physicians, have been identified as the largest group of health care professionals utilizing the Internet in an integrative review on Internet use for continuing

education for health care professionals (Cobb, 2004). This integrative review further identified five studies showing on-line courses effective in imparting new knowledge and three studies showing its effectiveness, yet lack of superiority to traditional classroom teaching (Cobb, 2004). On-line courses have been effective in general undergraduate nursing courses (Dorrian & Wache, 2009), neonatal nursing courses (Fortune, 2007), neonatal nursing orientation courses (Altimier, 2009), as well as graduate courses for advanced practice nurses (Debourgh, 2003; Zukowsky et al., 2011).

Internet learning for clinical skills education has little published support. One integrative review of published research addressing on-line learning for clinical skills in nursing found 12 articles meeting defined search criteria (Bloomfield, While, & Roberts, 2008). The studies that met inclusion criteria had small sample sizes and weaknesses in design, leading the authors to conclude there is limited empirical evidence available addressing the use of online learning techniques for teaching clinical skills in nursing (Bloomfield, Roberts, & White, 2010). However, one study Bloomfield, Roberts, & White, (2010) demonstrated the use of on-line learning as an effective strategy in teaching hand washing theory and skills to entry level nursing students. No articles or research studies specifically addressing the use of on-line educational techniques to teach NNPs procedural skills were identified.

Three main factors have been identified as impacting the overall effectiveness of online learning activities; confidence by the student and instructor in using a computer, the instrument utilized to evaluate the learning, and the quality of the on-line learning materials (Kala, Isaramalai, & Pohthong, 2010). In addition to the overall effectiveness of online learning, other benefits have been identified including reaching students at great geographic distances, significant cost savings, and student satisfaction (Altimier, 2009; Fortune, 2007; Twigg, 2003).



The NNP department at CH employs NNPs living over 200 miles apart from each other and practicing at clinical sites that are over 100 miles apart supporting the use of an online module to address the vast geography the NNP department covers.

### **Objective Structured Clinical Exams**

Successful use of OSCE's (Khattab & Rawlings, 2008), and similar scoring tools such as Objective Structured Assessment of Technical Skills (OSATS), (Bould, Crabtree, & Naik, 2009) and Objective Structured Clinical Assessments (OSCAs), (Ward & Willis, 2006) are well described in the literature in the evaluation clinical skills in staff nursing (Major, 2005), advanced practice nursing, (Walsh, Bailey, & Koren, 2009; Ward & Willis, 2006; Wilbeck, Murphy, Heath, & Thomson-Smith, 2011) and medicine (Bould, Crabtree & Naik, 2009; Newble, 2004; Nothnagle, Reis, Goldman, & Diemers, 2010). Effective assessment of competency in procedural and clinical skills is another focus of nursing and medical literature. For APRNs clinical outcomes are the results of combining clinical judgment, knowledge, technical skills, and previous experience (Kleinpell & Gawlinski, 2005). The outcome measured in this proposal was NNP demonstration of effective thoracostomy by needle aspiration as evaluated by the use of an objective standardized clinical exam (OSCE) tool.

A systematic review of assessment and certification tools by McKinley et al., (2008), identified seven themes that emerged in the checklists utilized for competency evaluations: preparation, infection control, communication and working with the patient, team working, safety, procedural competence, and post procedural care. However, frequent mention of the lack of a holistic approach of OSCEs was mentioned (McKinley et al., 2008). Based on these findings and the goal to have one generic tool for assessment of clinical skills that provided a holistic approach McKinley et al., (2008) created the Leicester Clinical Procedure Assessment Tool

(LCAT). The tool was created after completion of a literature review, focus groups and non-participant observations were conducted, and a modified Delphi study with prior definitions was completed (McKinley et al., 2010). The LCAT is a “generic, multi-professional holistic assessment tool with high content and face validity (70%) and acceptable reliability at 0.79”, with the potential of eliminating the need for multiple procedure specific checklist tools (McKinley et al., 2010,p.619). The LCAT will be utilized for assessment of NNP performance of neonatal thoracostomy by needle aspiration.

### **Needle Thoracostomy**

Thoracostomy by needle aspiration is considered an essential procedure for NNPs competency according to the NANNP (NANNP, 2010). It is performed as an emergency procedure to evacuate air in a pneumothorax causing hemodynamic instability in the patient. A pneumothorax is the extravasation of air into the lung parenchyma and pleura spaces (Zukowsky, 2009). The most common time for the presentation of a pneumothorax is in the neonatal period with 0.08% of all live births and 5% to 7% of infants with a birth weight of less than 1500g experiencing a pneumothorax (Litmanovitz & Carlo, 2008). Pneumothoraces are more common in infants with respiratory distress syndrome, meconium aspiration syndrome, pulmonary hypoplasia, receiving assisted ventilation, and having required resuscitation at birth (Litmanovitz & Carlo, 2008). Emergency evacuation of a pulmonary air leak performed with thoracostomy by needle aspiration is indicated to provide relief to the patient with a hemodynamically significant pneumothorax, often as a temporary measure while the patient is assessed for the potential need for a thoracostomy tube placement (Rais-Bahrami, MacDonald, & Eichelberger, 2012). Contraindications for evacuation of pulmonary leak include small air leaks where the patient has stable vital signs and the air collection is likely to resolve spontaneously without compromise of

the patient (Rais-Bahrami, MacDonald, & Eichelberger, 2012). Potential complications of this procedure are significant and include lung perforation, damage to a major vessel causing hemorrhage, nerve damage, and equipment failure (Rais-Bahrami & MacDonald, 2012). The precarious nature of a neonate with a clinically significant pneumothorax and the risks associated with the performance of a thoracostomy by needle aspiration make it essential for NNPs to have clinical competence in this skill (NANNP, 2010).

### **Market Risk Analysis**

A systematic evaluation including strengths, weaknesses, opportunities, and threat (SWOT) analysis was conducted in regards to the proposed Capstone Project. The SWOT Analysis is an effective and convenient method for assessment of internal and external factors associated with projects or products within an organization (Fortenberry, 2010). Strengths within a project are those attributes that enhance the potential success of a project. Strengths identified for this Capstone Project included, project based on national guidelines for development of competency review programs, institutional and department support within CH, peer support and feedback included in development of project, evidence based intervention and, use of existing supplies and classroom space within CH. Furthermore, successful implementation could improve competency evaluation for NNPs within CH, and serve as a model for other institutions' NNP competency evaluation programs. Additional strengths included a committed and collaborative project team including CH NNP Clinical Coordinator, NNP Educational Coordinator, experienced practicing NNPs within CH, DNP Capstone Chair, DNP faculty mentor, CH Nurse Scientist Mentor, and DNP coursework faculty. Finally, the lack of budgetary impact since the project was conducted within previously budgeted time at an annual NNP Skills Days at CH was a significant strength for implementation and sustainability.

Weaknesses identified included limited population sample size preventing generalizability of outcomes, along with potential resistance by practicing NNPs at CH for change in practice requiring demonstration and evaluation of procedural performance. Strategies identified to overcome weaknesses included NNP department education of national standards and evidence based data for competency evaluations. Additionally, the development of the Capstone Project in a comprehensive and easy to follow manner could potentially increase the replication by other students or NNP departments and therefore increase the generalizability of combined data and outcomes.

Opportunities for this Capstone Project included the potential for being a model for other competency evaluations programs within CH as well as nationally. Presentation of the Capstone Project and outcomes at a national professional organization conference and publication in a professional journal will increase visibility of outcomes and potential becoming a role model for other NNP competency programs.

Potential threats identified included limited NNP agreement for participation, limited stake holder buy-in and lack of institutional or administrative support. Strategies identified and implemented to prevent these potential threats included developing the Capstone Project to be conducted within already established training times at an Annual NNP Skills Day, educating NNP team regarding national standards and evidence based finding regarding competency evaluations. Furthermore the Capstone project was discussed in detail with NNP administration and leadership prior to formal development of the plan to enhance buy-in for the project.

Utilization of the SWOT Analysis modeled after a format provided in Fortenberry (2010, p. 186) is illustrated in Figure 1. The development of the SWOT analysis for this project included identifying institutional strengths, weaknesses, opportunities and threats directly related

to this project. Identified strengths included the project being based on national guidelines for competency evaluation, evidence based interventions, institutional and departmental support, the use of existing classrooms and supplies, use of time during existing annual NNP Skills Day for implementation, lack of budgetary impact, a committed and collaborative team, and finally the potential to serve as model for other unit and institutional competency evaluation projects.

Limitations identified for this project included a limited available sample size, inability to generalize the findings, and the potential resistance to a change from current NNPs.

Opportunities identified included potential presentation of project and outcomes at a national professional organizational meeting, publication in a professional journal and becoming a role model for other NNP programs regionally and nationally. Potential threats identified included limited NNPs consenting for the study, and limited stakeholder and administrative buy-in.

Figure 1. SWOT Analysis of Capstone Project

<b>Strengths</b>	<b>Weaknesses</b>
<ul style="list-style-type: none"> <li>• National guidelines for competency evaluation</li> <li>• Evidence based interventions</li> <li>• Institutional and departmental support</li> <li>• Use of existing classrooms and supplies</li> <li>• Use of time during existing annual NNP Skills Day for implementation</li> <li>• Lack of budgetary impact</li> <li>• Committed and collaborative team</li> <li>• Potential to serve as model for other unit and institutional competency evaluation projects</li> </ul>	<ul style="list-style-type: none"> <li>• Limited available sample size</li> <li>• Inability to generalize findings</li> <li>• Potential resistance for change by CHCO NNPs</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• Potential presentation of project and outcomes at a national professional organizational meeting</li> <li>• Potential publication in a professional journal</li> <li>• Potential role model for other NNP programs regionally and nationally</li> </ul>	<ul style="list-style-type: none"> <li>• Potential limited NNP consenting to participate</li> <li>• Potential limited stake-holder buy-in</li> <li>• Potential limited administrative buy-in</li> </ul>

### Stakeholders and Project Team

Stakeholders for this project were individuals affected by the project. Direct stakeholders included CH staff, including, nursing, medical, administration, team members, APRN Advanced Practice Council members, and project leader. Ancillary stakeholders included patients, insurance providers, regulatory agencies, and community members.

Project team members included the DNP student as team leader, advisors to the team leader, administration, and fellow NNPs. The team leader was responsible for project development including completion of a systematic review, development of the online module, education of potential NNP participants regarding project content and aims, Institutional Review

Board submission, development of implementation design, data analysis, and dissemination of findings. Advisors to the team leader included the Capstone Chair, a CH Nurse Scientist, and Director of the Regis University NNP Program. The combination of these experts' advice and counsel guided the team leader at all facets of project development, implementation and analysis. Fellow NNP team members participated by completing Collaborative Institutional Training Initiative (CITI), obtaining consent from participants, and one particular member managed the organization of all consents, completed the randomization process the team leader was blinded to, and managed the website holding the online module. NNP administrative support was provided by the NNP Coordinator and consisted of ongoing encouragement and support for project development and completion as well as budgetary support for the online module development and purchasing of textbooks and agreement for inclusion of project implementation at annual skills day review.

### **Cost-Benefit Analysis**

Incorporating the use of an online module for the review presentation regarding the essential NNP procedure was based on several factors including, wide geographic variability of NNPs living and practicing within the CH system, flexible availability for ongoing use, effectiveness of online learning and cost benefits. CH NNPs live and practice in a varied geographic range. The availability of an online module to be accessed from home or a clinical practice site was appealing. While empirical data is limited on the use of online learning for clinical skills an integrative review did find support for its effectiveness (Bloomfield, While, & Roberts, 2008).

Providing a model for didactic content to be readily available for staff to review during slow periods at work and or at home reduces the cost of needed educational in class time paid.

With 70 NNPs and four hours the average time spent doing power point in class presentations at previous skills sessions the cost was substantial. An average NNP hourly wage is \$55 so when multiplied by four hours time for 70 NNPs the cost was \$15,400.00 annually solely for presentation time. This did not include time for development of the presentations. The other format trialed included the provision of textbooks for review. The standard textbook utilized was *Atlas of Procedures in Neonatology*, (Rais-Bahrami, MacDonald, & Eichelberger, 2012) and sold for \$129.00 book. To meet the same availability standards as online learning 70 books purchased for staff would cost \$9,030.00. This is less expensive than in class time yet still significantly more costly than the free availability of online modules. The only cost for online modules would be the development and periodic update costs of the modules which would be rolled into the salary of the NNP Education Coordinators, approximately 20 hours at \$55 per hours totaling approximately \$1,100. Altimier (2009) describes significant cost savings when implementing online learning modules as compared to direct teaching for neonatal nursing orientation. Furthermore, implementation of the Capstone project within already established annual NNP Skills Days limited any additional costs realized by the CHCO NNP department.

### **Mission, Vision and Goals**

CH was established in 1908 and has defined their mission as “To improve the health of children through the provision of high-quality, coordinated programs of patient care, education, research and advocacy” (Children’s Hospital Colorado, n.d.). The CH mission is carried out through their vision stated as being “the driving force, in partnership with others, in providing children and their families with an integrated pediatric healthcare delivery system” (Children’s Hospital Colorado, n.d.) Development of a program providing a mechanism for assessment of NNP procedural competency aligns with the mission and vision of CH improving children’s



health and high-quality care. The vision for this project was that by the end of 2013 CHCO NNPs would have a high quality and coordinated approach to evaluation of essential NNP procedure competencies. Additionally, CH is a Magnet designated hospital, and embraces the concepts of transformational leadership and change. Embracing a policy that provides evidence based approaches to change and competency assessment was in alignment with Magnet designation philosophy of excellence in practice and engagement of nursing staff (Steinbinder, 2009). The goals of this Capstone Project included developing and implementing evidence based, financially favorable, and sustainable systems for procedural competency review and evaluation of NNPs aligned with the CH mission and vision.

### **Conceptual Model**

Identifying outcomes for APRNs includes evaluating the results of APRN interventions based on the utilization of clinical judgment, scientific knowledge, and past clinical experiences (Kleinpell & Gawlinski, 2005). The benchmark outcome for this proposal was related to the effectiveness of the online learning module as a review for NNPs in essential procedure of thoracostomy by needle aspiration. The formal benchmark was NNPs completing the online module being able to demonstrate competence in performance of thoracostomy by needle aspiration on the neonate as evaluated by the LCAT. An additional benchmark was that the online module was an effective learning tool to review thoracostomy by needle aspiration for the neonate.

The conceptual model for this proposal first defined the project as the development, implementation and evaluation of an online module for thoracostomy by needle aspiration on the neonate; an essential procedure as defined by NANNP for utilization with NNPs practicing at CH (Figure 2). The problem identification was based on the NANNP definition of NNP

essential procedural competencies and call for systematic review of competencies and the development of institutional modules to guide teaching and analysis of procedural competencies (NANNP, 2010). The inputs for a proposal include the factors and resources utilized to enhance the program effectiveness (Kellogg Foundation, 2004). The inputs for this proposal included the NNPs practicing at CH, NNP Education Coordinator collaborators, technical and administrative support provided through CH, NNP scheduling cooperation, NNP Department budget support for NNPs participating in Skills Day, NANNP Competency Guidelines (NANNP, 2010), the LCAT standardized procedure evaluation tool, Clinical Mentor support, IRB approval through both Regis University and Colorado Multiple Institutional Review Board (COMIRB). Additionally, the use of Locsin's Technological Competency as Caring and Benner's from Novice to Expert, as nursing theories guided proposal development. The learning theory utilized throughout was Constructivism.

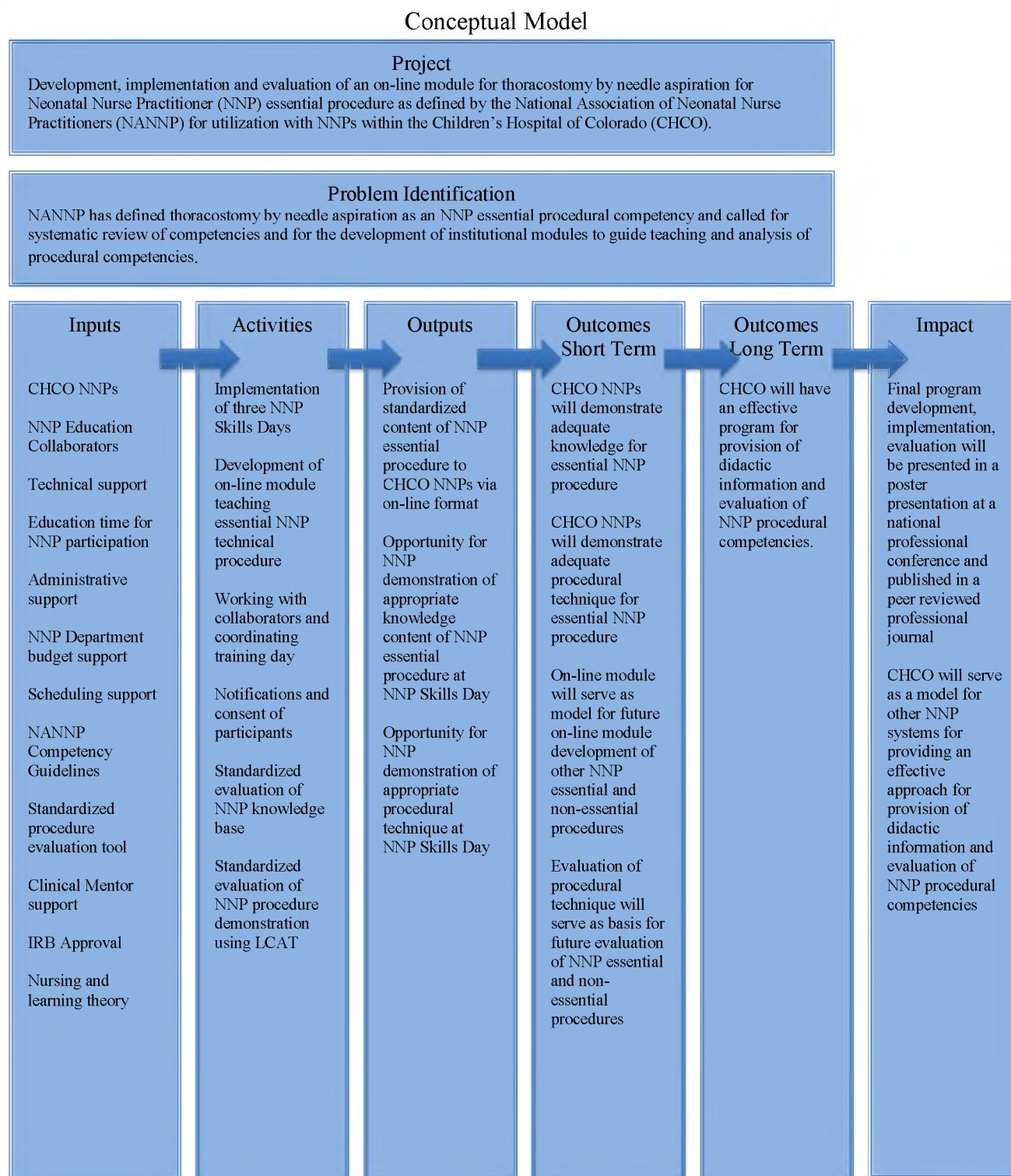
The activities within a conceptual model include the processes, techniques, tools, and planned actions within a proposal (Kellogg Foundation, 2004). The activities in this proposal included the development of the online module for thoracostomy by needle aspiration to be completed by NNPs within CH, the development and implementation of three days of skills training, and evaluation which were utilized for the standardized evaluation of NNP competency in demonstrating thoracostomy by needle aspiration. The evaluations were completed by assessment with the LCAT. The CH NNPs were provided education regarding the program proposal and participants provided informed consent. These activities were completed with the collaboration of other NNP Education Coordinators.

The outputs in a conceptual model reflect the direct result of the programs activities (Kellogg Foundation, 2004). The outputs in this project included the development of an online

module to teach NNPs needle thoracostomy by needle aspiration and the opportunity for NNPs to demonstrate competency of this procedure at the skills day session.

Logic Models also present short and long term goals that address the specific changes in attitudes, behaviors, skills, knowledge, or level of functioning that result from the program implementation (Kellogg Foundation, 2004). The short-term goals for this proposal included CH NNPs demonstrating adequate knowledge and procedural technique for thoracostomy by needle aspiration on the neonate. Additional short-term goals included having the online module serve as a model for future online module development for other essential and nonessential NNP procedures, as well as the use of the LCAT as a standardized clinical assessment tool will serve as a model for evaluating procedural competence in other essential and nonessential NNP procedures. A long-term outcome goal was that CH would have an effective program for provision of didactic information and evaluation of NNP procedural competence.

Figure 2. Logic Model format depicting conceptual model for project



Finally, the Logic Model presents the long term impact goal of the project which address the organization, community, and or system level changes expected to result from the program implementation (Kellogg, Foundation, 2004). The impact goal for this proposal included presentation of the program development, implementation, evaluation, and outcomes presented at a national professional conference and published in a peer reviewed professional journal. Furthermore, the goal was that with the dissemination of the information CH would serve as a model for other NNP programs in providing an example of an effective approach for provision of didactic information via an online format and evaluation of NNP procedural competency utilizing a standardized clinical assessment tool. Figure 2 depicts the Conceptual Model based on the Kellogg Foundation's Logic Model.

### **Methodology**

This project was an evidence-based practice (EBP) project in which a program evaluation or standard of care intervention was conducted. The project was internal to CH with a goal of informing CH of issues in healthcare quality, cost, and satisfaction. Specifically, this study compared the effectiveness of completion of an on-line review module to text book review on Neonatal Nurse Practitioners (NNPs) needle thoracostomy procedural performance in a simulated environment using a mannequin. The NNPs within the CH system live within a vast geography and determination of effectiveness of an online module for procedural performance would potentially aide in determining best practice strategies for continuing education of NNPs. This was also in allignment with the previously mentioned national organizations calling for initial and ongoing competency performance evaluations of health care providers. This Capstone Project is outlined below.

1. The project utilized a two-group descriptive, quantitative, pre-experimental design.

2. All NNPs practicing within the CH system were invited to participate in this study.

Education regarding the study was provided at a regularly scheduled NNP meeting utilizing a Power Point presentation. (Appendix C)

3. Follow-up information was provided via e-mail to include NNPs not in attendance at NNP meeting. (Appendix D)

4. CITI, (Appendix E) trained project team members participated in project development and implementation, and Institutional Review Board Approval from Regis University (Appendix F) and Colorado Multiple Institutional Review Board (Appendix G).

5. Once participants were consented to partake in the project they were randomized into one of two tracks, either standard textbook review or online module review.

6. Participants were asked to review the assigned textbook or online module (Appendix H) within one week of the annually scheduled skills day.

7. At the regularly assigned annual skills day, the participant was asked to complete a demographic questionnaire (Appendix I). These variables questioned in this demographic questionnaire included years practicing as a registered nurse (RN), years practicing as an NNP, clinical practice site characteristics, and recent experience with neonatal needle thoracostomy.

8. The participants were then observed and evaluated by one of two expert NNPs, each with over 20 years of clinical experience along with experience teaching and performance evaluation of both student and experienced NNPs, in the performance of needle thoracostomy utilizing the LCAT. The performance was evaluated in a simulated environment utilizing a neonatal mannequin. The expert NNP completing the performance

evaluation was blinded to the participants' randomization assignment, i.e., textbook or online module review.

9. Data obtained from the demographic questionnaire was summarized using descriptive statistics. Scores from the LCAT observations were compared between the two randomized groups using an independent t-test. The data was also analyzed to determine possible relationships between the outcome variables and the demographics of the study population using correlational statistics. All data was de-identified and entered into the Statistical Package for the Social Sciences (SPSS) for analysis.

10. No additional funding was requested. Research was conducted within PI primary job responsibilities and educational time, and as part of completion requirements for Doctorate of Nursing Practice degree from Regis University. All staff participated voluntarily in the study and were paid for their time within the annual budgeted time for skills day reviews. The NNP budget annually includes eight hours paid for skills day review.

### **Risks and Benefits**

Minimal risks were anticipated for project subjects; NNPs are very familiar with participating in online education for a number of requirements at CH as well as for academic educational courses. A potential minimal risk was mild anxiety related to being evaluated on procedural performance. The principal investigator was a Coordinator of NNP Education for CH and worked with participants clinically and on various projects, yet was not responsible for any formal evaluations of participants and did not work in a supervisory role. NNPs individual decision to participate or not and the results of individual assessments were not known to any managers or be used in any way for performance evaluations and did not impact employment in any manner. Assessments were conducted in a private and supportive environment by CITI

trained expert NNPs and participants were assured results would not be made known to any supervisors and would not impact their employment in any way.

This project involved the comparison of textbook review and online module review to determine if online review is equal to or better than previous practice of textbook review. Both are generally accepted modes of education. The goal was to provide a consistent and up to date process for addressing essential neonatal procedures to establish best practice at various CH NNP practice sites. Potential identification of best practice strategy for evaluation of NNP procedural competency in needle thoracostomy and potentially improving safety and quality of care provided to vulnerable and at risk neonates.

### **Consent Process**

Recruitment occurred within normally established patterns of communication within the CH NNP program including introduction of project at a quarterly NNP meeting and e-mails describing the project. The principal investigator made initial contact within the quarterly NNP meeting and presented a short Power Point presentation. Follow-up contact was made via e-mail by principal investigator, the short Power Point presentation used at the NNP meeting was sent via e-mail to those not in attendance at the quarterly meeting. No more than three attempted contacts were made.

Only the primary investigator and team members who completed CITI training obtained consents. The need to avoid any coercion or undue influence was discussed with team members participating in obtaining consent. Also, the need for confidentiality was discussed, and the consent form was reviewed. The project was explained to NNPs and they were asked to voluntarily participate. It was not revealed to their supervisor whether or not they choose to participate, and the results of their competency evaluation were not revealed to their supervisor.



Consents were obtained in a private manner. Participants were allowed to ask questions regarding the study as they request. Total consented NNPs were 46; with a final sample size of 45, one did not participate due to a medical leave at the time of study implementation.

### **Privacy Protection**

All data collected was managed on a password-protected, restricted access computer. A secure password protected server was utilized. Only the principal investigator, primary team members, facility mentor and Capstone Chair had access to the collected data. There was no identifiable data collected. All hard copy paperwork was kept and transported in a locked portable file; these documents included the consents, demographic questionnaire, and LCAT evaluation tool. Paperwork was transferred to PI private office and transported via the locked and secured file. Data will be secured for a minimum of three years. After the three years all paper information will be shredded.

### **Timeframe**

Project development began in August 2011 and included PICO selection, followed by a systematic literature review, proposal development, online module development, and IRB approval completed December 2012. Obtaining participant consent occurred between January and February 2013. All project data was collected at three prescheduled annual NNP Skills Days in April 2013. Data was analyzed between April and July of 2013 with and formal project write-up completed by the end of August 2013. Additional dissemination of findings is anticipated in 2013 and 2014 through professional presentations and publication. Figure 3 depicts the project timeline.

Figure 3. Project Timeline

*Figure 3. Illustration of timeline for project*

### **Budget**

The budget for this project included time for project development, module development, and purchase of textbooks for each NICU staffed by CH NNPs. The bulk of the budget went to module development, was estimated at approximately \$1,100. This consisted of approximately 20 hours of development time calculated by an average NNP rate of \$55 per hour. Additional cost was the purchase of nine textbooks, *Atlas of Procedures in Neonatology*, (Rais-Bahrami, MacDonald, & Eichelberger, 2012). One textbook was purchased for each NICU site staffed by CHCO NNPs. The textbooks cost \$129.00 each for a total of \$1,161.00. Fortunately, NNP time for participated was included in previously scheduled annual skills day reviews so did not impact this project budget. Total cost for project was \$2, 261.00.

### **Findings and Results**

The SPSS was utilized to analyze population demographics, LCAT aggregate summary and individual scores, and potential correlations between LCAT scores and individual variables. These variables included NNP age, years of experience, needle thoracostomy experience, level of clinical practice site, and randomization to online on textbook review.

## Demographics

Final enrollment included 46 NNPs, with a final N of 45. One consented participant did not participate due to a medical leave. All participants had a Master's Degree in nursing and were certified by the National Certification Corporation (NCC) as an NNP. The percentage of participant age less than 30 years old was 2.2%, greater than 30 but less than 40, 28.3%, greater than 40 but less than 50, 23.9%, and greater to or equal to 50, 45.7% (Table 1).

Table 1

<i>Age of subject</i>				
	Frequency	Percent	Valid Percent	Cumulative Percent
less than 30 years old	1	2.2	2.2	2.2
greater than or equal to 30 years but less than 40 years old	12	28.3	28.3	30.4
greater than or equal to 40 but less than 50 years old	11	23.9	23.9	54.3
greater than or equal to 50 years old	21	45.7	45.7	100.0
Total	45	100.0	100.0	

The participants' years practicing as an RN had a mean of 22.3 years, median of 20 years, mode of 13, with a range from 6 to 45 years. The mean for years practicing as an NNP was 14.5 years, median 11 years, and mode 8 years, with a range from 1.5 to 35 years. The demographic data for age, years of experience as an RN, and NNP were comparable between the textbook and online groups suggesting a homogenous group. Years employed by CH were a mean of 9.1, median 7, mode 4, with a range from 0.5 to 37 years. This represents a large percentage of NNPs over 50 years of age with over 10 years of experience. This demographic is representative

of findings from a recent NANNP workforce survey that reported the majority of practicing NNPs have greater than 10 years of experience (Timoney & Sansoucie, 2012).

The majority of NNPs worked greater than or equal to 36 hours per week of clinical time, 76%, with 17.4 % between 24 and 36 hours per week, and 6.5% between 12 and 24 hours per week. This data was also consistent with the recent NANNP publication which reported the majority of NNPs practiced full time at greater than 35 hours per week (Timoney & Sansoucie, 2012).

Neonatal Nurse Practitioners employed by CH practice at a variety of clinical sites. The various practice sites CH employs reflected 43.5% of participants had their primary practice in a level II NICU, 27% in a Level III, and 17.4% in a level IV NICU. Secondary practice sites were 45% in level II, 37% in level III, and 15.2% in a level IV. These demographics are also consistent with the national survey results having reported the vast majority of NNPs practice in a level III NICU (Timoney & Sansoucie, 2012).

Participants reported limited recent experience with neonatal needle thoracostomy. Only 13% had three or more experiences in the past year, 39% had one or two, and 22% had zero. (Table 2) This is consistent with CH 2011 internal competency data where only 14% of NNPs had three or more needle thoracostomy procedures in the past year (CHCO NNP Competency Committee, 2011). Observation of needle thoracostomies was also limited by participants with 19.6% having observed three or greater in the past year, 26% one or two, and 52.2% zero (Table 3). The most commonly reported perceived barrier for obtaining three or more needle thoracostomy procedures in the past year was lack of patients in clinical setting needing needle thoracostomy reported by 78.3%, followed by competition for procedure by other NNPs, students, residents, fellows, or attending physicians 10.9%. (Table 4). This limited clinical

experience is consistent with the recommendations by NANNP to require annual procedure review of needle thoracostomy rather than actual live experiences due to limited availability of patients requiring this emergent, lifesaving procedure in the clinical setting (NANNP, 2010).

Table 2

*Number of needle thoracostomies performed in past year on live neonatal patient*

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0	22	47.8	47.8	47.8
1 or 2	18	39.1	39.1	87.0
3 ore greater	6	13.0	13.0	100.0
Total	46	100.0	100.0	

Table 3

*Number of needle thoracostomies observed in past year*

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0	24	52.2	53.3	53.3
1 Or 2	12	26.1	26.7	80.0
3 or greater	9	19.6	20.0	100.0
Total	45	97.8	100.0	
Missing System	1	2.2		
Total	46	100.0		

Table 4

*Perceived barriers to obtaining three or more needle thoracostomy procedures on a live neonatal patient in the past year*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lack of patients in clinical setting needing needle thoracostomy	36	78.3	80.0	80.0
	Competition for procedure, i.e. other NNPs, NNP students, residents, fellows, attending physicians	5	10.9	11.1	91.1
	No barriers, have performed 3 or more procedures in past year	3	6.5	6.7	97.8
	12	1	2.2	2.2	100.0
	Total	45	97.8	100.0	
Missing	System	1	2.2		
Total		46	100.0		

All participants were asked to rate their preference for learning; 52.2% preferred online review, 37% preferred live didactic presentations, 6.5% preferred textbook review, and 2.2% preferred a combination of online and didactic review. Responses regarding the online module experience were obtained only from participants randomized to the online review; 92% had previous experience with online module reviews (Figure 4).

Figure 4. Previous experience with online experience

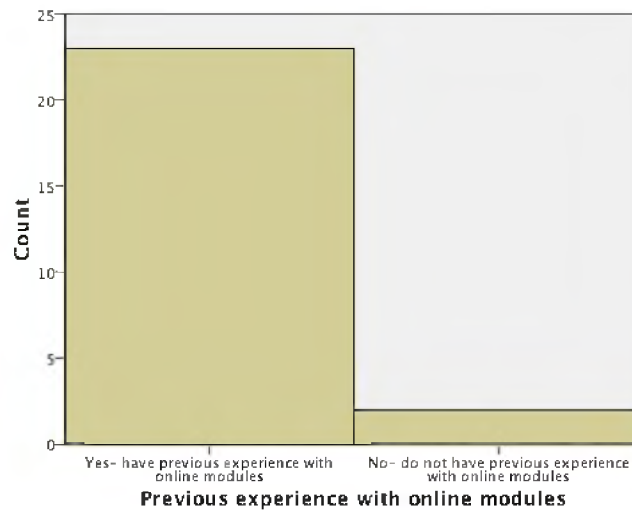


Figure 4. Bar chart depicting the frequency distribution of participant's randomized to online review previous experience with online modules.

The length of the online module was rated as 'just right' by 100% of participants and a 52% found the written content most helpful while 48% reported the picture content as most helpful (Figure 5).

Figure 5. Participant rating of helpful components of online module

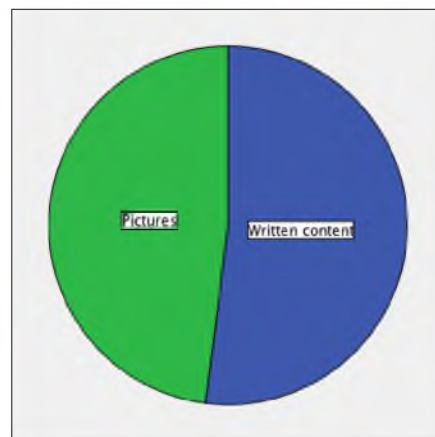


Figure 5. Pie chart depicting online participants rating of most helpful component of online module

## LCAT Results

The LCAT is a holistic objective structured exam that includes five areas of performance assessment; communication and working with the patient and/or family, infection prevention, safety, procedural competence, and team working. (Appendix A) Scores are assigned from zero to three. A score of zero indicates unsafe practice in one or more components with errors or omissions likely to result in harm to the patient. A score of one reflects safe practice with one or more errors or omissions unlikely to result in harm to the patient. A score of two is reflective of competent practice, and three reflective of expert practice. Individual scores are specified for each category and an accumulative score is calculated from the combination of the five individual scores with the highest possible score being 15. The overall mean summary score from both the online module and textbook review participants was 9.91, with a standard deviation of 2.6. When plotted on a histogram the overall mean scores created a near perfect bell curve (Figure 5).

Figure 5. LCAT Summary Scores

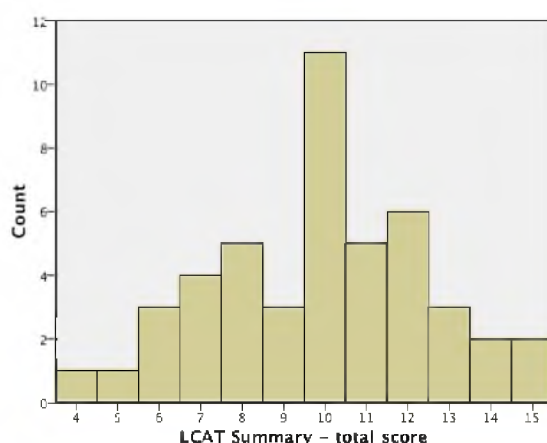


Figure 5. Histogram of LCAT mean summary scores depicting near perfect bell curve

The participants completing the textbook review had an overall mean score of 8.8 with a standard deviation of 2.5 while the online review participants had an overall mean score of 10.88



with a standard deviation of 2.369. This represents a statistically significant difference ( $p < 0.05$ , at 0.007) between the summary scores of the two groups with the online review module having improved summary scores per the Independent Samples T Test calculations (Table 5).

Table 5

*T Test Comparing LCAT Summary Scores between Online and Textbook Review Participants*

Group Statistics					
1 = textbook 2 = online		N	Mean	Std. Deviation	Std. Error Mean
LCAT Summary - total score	textbook review	20	8.80	2.505	.560
	online review	25	10.88	2.369	.474

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
LCAT Summary - total score	Equal variances assumed	.125	.725	-2.854	43	.007
	Equal variances not assumed			-2.836	39.788	.007

Independent Samples Test					
		t-test for Equality of Means			
		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
				Lower	Upper
LCAT Summary - total score	Equal variances assumed	-2.080	.729	-3.550	-.610
	Equal variances not assumed	-2.080	.734	-3.563	-.597

The individual LCAT category scores reveal no statistical difference between the two groups for infection prevention, safety, or procedural competence. Those scores were as follows: textbook/online infection prevention mean scores respectively 2.2 and 2.56, safety 2.05 and 2.36, procedural competence 2.45 and 2.44. However there were statistically significant differences

noted in both communication and team working. Those scores were as follows: textbook/online respectively for communication .55 and 1.4, with  $p < 0.05$  at 0.008; (Table 6) teamwork 1.55 and 2.16 with  $p < 0.05$  at 0.024 (Table 7).

Table 6

*T Tests comparing LCAT Communication Scores Between textbook and online review participants*

Group Statistics					
1 = textbook 2 = online		N	Mean	Std. Deviation	Std. Error Mean
LCAT Scoring on communication and working with the patient and/or family	textbook review	20	.55	.887	.198
	online review	25	1.40	1.155	.231

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
LCAT Scoring on communication and working with the patient and/or family	Equal variances assumed	4.340	.043	-2.712	43	.010
	Equal variances not assumed			-2.792	42.948	.008

Independent Samples Test						
		t-test for Equality of Means				
		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
				Lower	Upper	
LCAT Scoring on communication and working with the patient and/or family	Equal variances assumed	-.850	.313	-1.482	-.218	
	Equal variances not assumed	-.850	.304	-1.464	-.236	

Table 7

*T Tests comparing LCAT scores between textbook and online review for Teamwork*

Group Statistics					
1 = textbook 2 = online		N	Mean	Std. Deviation	Std. Error Mean
LCAT Scoring on Team working	textbook review	20	1.55	.826	.185
	online review	25	2.16	.898	.180

Independent Samples Test					
		t-test for Equality of Means			
		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
				Lower	Upper
LCAT Scoring on Team working	Equal variances assumed	-.610	.260	-1.134	-.086
	Equal variances not assumed	-.610	.258	-1.130	-.090

Independent Samples Test						
		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
LCAT Scoring on Team working	Equal variances assumed	.064	.801	-2.346	43	.024
	Equal variances not assumed			-2.368	42.120	.023

When LCAT summary scores for both the online and textbook review groups were compared to demographic groups of age, hours of clinical time worked per week, number of needle thoracostomies observed or performed in past year, preference of learning style and level of nursery for primary and secondary sites no statistical differences were noted in scores.

### Instrumentation

The LCAT was utilized to analyze the problem question: Is the completion of an online module effective review for NNPs for neonatal thoracostomy by needle aspiration as evaluated

by the LCAT comparable or better than a standardized textbook review? This APRN sensitive outcome addressed the knowledge and subsequent treatment for neonatal pneumothorax requiring needle thoracostomy. The LCAT was chosen since it is a holistic tool measuring five key components: communication and working with the patient and/or family, safety, infection prevention, procedural competence, and team working. The LCAT tool has a high content and face validity at 70% utilizing a Delphi study; and acceptable reliability of 0.79 as a generic, multi-professional holistic assessment tool (McKinley et al., 2010). The tool was created after completion of a systematic review of the literature, focus groups, and non-participation observations were conducted, and a modified Delphi study completed (McKinley et al., 2010).

The online module was developed utilizing basic components of Constructivism learning theory and Benner's From Novice to Expert (Benner, 2010). Furthermore, the module was developed following standardized guidelines for education and evaluation of procedural competence developed by NANNP (NANNP, 2010). In addition the components of teamwork and communication recommended by McKinley (2010) were added to the online module. The module consisted of 24 slides including both text and pictures demonstrating appropriate equipment selection and procedural technique. The goal was for the module to take approximately 15 minutes for completion.

For this study two expert NNPs administered the LCAT, both with over 20 years of NNP clinical, teaching, and evaluation experience, who were blinded to participant randomization. The NNP evaluators agreed upon consistent expectations for scoring participants by the LCAT. Each participant was prompted with a scripted statement prior to initiation of the evaluation. The evaluations occurred in a private simulated setting using a neonatal mannequin and real equipment. Evaluations were completed immediately upon completion of each NNP procedural

performance. Evaluations were coded by number only so analyzed data was not traceable to individual participants, thus protecting the participants identity.

Data were entered and analyzed utilizing SPSS version 21. Demographic data was analyzed for descriptive statistics including mean, median, mode, and range. Independent t-tests were performed for comparison of mean data between groups.

## **Discussion**

### **Evidence Based Practice Question**

Analysis was conducted of the APRN sensitive problem question: Is the completion of an online module effective review for NNPs for neonatal thoracostomy by needle aspiration as evaluated by the LCAT comparable or better than a standardized textbook review? Study participant group demographics were consistent with recent national benchmark data from a NANNP work force survey (Timoney & Sansoucie, 2012) for NNP age, years of experience, and clinical practice sites, and consistent with NANNP Competency Toolkit assumptions regarding limited NNP experience with neonatal thoracostomy (NANNP, 2010). The online module length was rated as 'just right' by 100% of participants with a nearly equal split between participants rating either the written content or pictures as most effective. Participants overwhelmingly had previous experience with online modules (92%). This supports literature that has identified main components to effective online learning activities include; confidence by the student and instructor in using a computer and quality of online learning material created (Kala, Isaramalai, & Pohthong, 2010).

LCAT summary scoring for both the online and textbook group revealed a near perfect bell curve when illustrated on a histogram (Figure 5). While a bell curve is a well-accepted expectation in evaluations (Polit, 2010), it is concerning that a few practicing NNPs

demonstrated the procedure in a manner evaluated as unsafe with the likelihood of causing harm. LCAT scoring for both the control and intervention group revealed competent scoring on infection prevention, safety, and procedural competence. This supports use of either a textbook or online review was effective for these categories of evaluation. However, the online group had statistically significant increased scores on teamwork and communication.

Most concerning was the textbook groups' mean score of 0.55, for communication. A score of less than one is consistent with an observed performance of unsafe practice in one or more components, with errors or omissions likely to result in harm to the patient (McKinley et al., 2010). The decreased scores on teamwork and communication from the textbook group are additionally concerning when considering the evolving body of literature citing communication and teamwork deficiencies as key components to hospital errors (Baker, Salas, King, Battles, & Barach, 2005; Manser, 2009; Salas et al., 2009). Furthermore, supporting the need for effective communication and teamwork, CH has recently joined, a multi-hospital collaborative effort with the mission to eliminate serious harm across all children's hospitals in the United States. Key components to this program training include being accountable for clear, complete and respectful communication, and promoting a questioning attitude (Schwartz, 2013).

### **Theoretical Support**

The data presented 100% agreement for the length of the learning module being 'just right' and an even divide between the most effective components of the module being either the written content or pictures. This supported the learning theory Constructivism that proposes the inclusion of an active learning environment and quality-learning materials enhance effective learning (Kala, Isaramali & Pohthong, 2010). Furthermore, inclusion of both quality written

material and photographs or diagrams in nursing education to enhance learning is supported in the literature as effective (Riley & Manias, 2004).

### **Limitations**

Even though the participation group demographics were reflective of the national benchmark established by NANNP for years of experience as an NNP, working fulltime clinical, and a primary practice site being in a level III unit, it was still a small and homogenous sample size within one health care system. This limitation decreases the ability of findings to be generalized. Furthermore, the study addressed only one of the three essential NNP procedures identified by NANNP (NANNP, 2010). Finally, methodology lacked any before and after testing.

### **Contributions to Advanced Practice Nursing**

This study supports the *NANNP Competencies and Orientation Toolkit* statement, “Evaluation of competencies is ongoing. Thus all NNPs must have a mechanism in place to verify their ongoing competence in knowledge, patient management and procedural skill” (NANNP, 2010, p.1). This also supports the NANNP recommendation of needed annual neonatal needle thoracostomy review secondary to limited clinical exposure to this procedure. Utilization of the LCAT demonstrated either competent or expert practice for safety, infection prevention, and procedural competence in NNPs utilizing either the textbook or online module. However, deficiencies were noted in communication and teamwork in the textbook participants. This highlights the need for directed education regarding teamwork and communication when teaching procedures. These were included in the online module, yet not specifically in the textbook review. The online module included components of communication and teamwork, based on a holistic approach advocated by McKinley (2010), which is not a part of the *NANNP*

*Competencies and Orientation Toolkit* recommendations (NANNP, 2010). The increased scores from the online module review in addition to evolving literature regarding the importance of communication and teamwork in reduction of medical errors lend support for NANNP to consider including teamwork and communication specifically to their recommendations for standardized education content of review modules.

This study also supports the use of the LCAT as an effective module for evaluation of procedural performance for NNPs. This standardized, holistic objective structured clinical evaluation tool has the potential to decrease time needed for the development of a specific tool for each procedural performance evaluation. This was the first documented study utilizing the LCAT for NNP procedural competence assessment making it a landmark.

### **Recommendations for Further Study**

This study lays the foundation for future studies addressing NNP procedural competency and development of online educational modules. Additional studies analyzing the use of the LCAT for NNP procedural competency evaluation are recommended. Additionally, studies directly analyzing techniques for improved scores on communication and teamwork are indicated. Studies addressing online modules as both initial learning activities and as review modules would be beneficial. Finally, studies utilizing an online module for review or teaching of a procedural technique that included a pre and posttest evaluation using the LCAT could be beneficial.

### **Conclusion**

This Capstone Project addressed the empirical and theoretical basis, methodology, conceptual framework, and statistical analysis for the problem statement; Is the completion of an on-line module effective review for NNPs for neonatal thoracostomy by needle aspiration as



evaluated by the LCAT comparable or better than a standardized textbook review? The project was developed as a response to national organizational calls for the development of models for review and evaluation of practitioner competency. Locsin's middle range theory, Competency in Technology as Caring, and Benner's middle range theory, From Novice to Expert, provided the nursing theory framework while Constructivism was utilized as the learning theory for development of the online module. Rosswurm and Larrabee's model for change was applied to this project.

In summary, the participants' demographics in this study were representative of the national benchmark established by NANNP for mean years of NNP experience being greater than 10, the majority of NNPs with a fulltime clinical practice at greater than 35 hours per week, and a Level III or greater unit as a primary practice site. Overall LCAT summary scores showed a statistically significant higher score for the online review group when compared to the textbook review group. Both the textbook and online review were associated with competent LCAT scores for safety, infection prevention, and procedural competence. However, statistically improved scores for communication and teamwork were identified for participants having completed the online review when compared to the textbook review. The online module included information specifically addressed towards communication and teamwork, while the textbook did not. This supports the importance of including specific teamwork and communication information in educational materials. Finally, participants rated the online module length of 24 slides, including both pictures and text as 'just the right length', and there was an equal division among participants regarding the most effective components being either written text or pictures.

Overall, this study answers the problem statement of: Is the completion of an online module effective review for NNPs for neonatal thoracostomy by needle aspiration as evaluated

by the LCAT comparable or better than a standardized textbook review? The answer is: this online module was comparable to a standardized textbook review for procedural performance, safety, and infection prevention yet superior for communication and teamwork as scored by the LCAT.

## References

- APRN Consensus Work Group & the National Council of State Boards of Nursing APRN Advisory Panel. (2008). *Consensus model for APRN regulation: Licensure, accreditation, certification & education*. Retrieved from <https://www.nscbn.org>
- Altimier, L. (2009). Benefits of a flexible neonatal online nursing orientation program. *Newborn and Infant Nursing Reviews*, 9, 83-87. doi: 10.1053/j.nainr.2009.03.014
- Baker, D., Salas, E., King, H., Battles, J., & Barach, P. (2005). The role of teamwork in the professional education of physicians: current status and assessment recommendations. *Joint Commission Journal on Quality and Patient Safety*, 31, 185-202.
- Benner, P. (1984). *From Novice to Expert: Excellence and power in clinical nursing practice*. Menlo Park, CA: Addison-Wesley.
- Benner, P. (2001). *From Novice to Expert, excellence and power in clinical nursing practice* (Commemorative Edition ed.). Upper Saddle River, NJ: Prentice Hall Health.
- Bloomfield, J., Roberts, F., & White, A. (2010). The effect of computer-assisted learning versus conventional teaching methods on the acquisition and retention of hand washing theory and skills in pre-qualification nursing students: A randomized controlled trial. *International Journal of Nursing Studies*, 47, 287-294. doi: 10.1016/j.ijnurstu.2009.08.003
- Bould, M., Crabtree, N., & Naik, V. (2009). Assessment of procedural skills in anesthesia. *British Journal of Anaesthesia*, 103, 472-483. doi: 10.1093/bja/aep241
- Cates, L., & Wilson, D. (2011). Acquisition and maintenance of competencies through simulation for neonatal nurse practitioners. *Advances in Neonatal Care* (11) 321-327. Doi: 10.1097/ANC.0b013e31822a34a0

Centers for Disease Control, National Center for Chronic Disease Prevention and Health

Promotion, Division of Diabetes Translation. (2011). *National diabetes fact sheet, 2011*.

Retrieved from Centers for Disease Control website:

[http://www.cdc.gov/diabetes/pubs/pdf/ndfs\\_2011.pdf](http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf)

Children's Hospital Colorado, Neonatal Nurse Practitioner Competency Committee. (2011).

[NNP Procedure Review]. Unpublished raw data.

Cobb, S. (2004). Internet continuing education for health care professionals: an integrative review. *Journal of Continuing Education in the Health Professions*, 24, 171-180.

Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing, at the Institute of Medicine; Institute of Medicine. (2010). *The future of nursing: Leading change, advancing health*. Retrieved from

[http://www.nap.edu/catalog.php?record\\_id=12956](http://www.nap.edu/catalog.php?record_id=12956)

Cook, D., Garside, S., Levinson, A., Dupras, D., & Montori, V. (2010). What do we mean by web-based learning? A systematic review of the variability of interventions. *Medical Education*, 44, 765-774. doi: 10.1111/j.1365-2923.2010.03723.x

Debourgh, G. (2003). Predictors of student satisfaction in distance-delivered graduate nursing courses: What matters most? *Journal of Professional Nursing*, 19, 149-163. doi: 10.1016/s8755-7223(03)00072-3

Dorrian, J., & Wache, D. (2009). Introduction of an online approach to flexible learning for on campus and distance education students: Lessons learned and ways forward. *Nurse Education today*, 29, 157-167. doi: 10.1016/j.nedt.2008.08.010

Fortenberry, Jr., J. L. (2010). The SWOT Analysis. In *Health Care Marketing Tools and Techniques* (3rd ed., pp. 185-190). Sudbury, MA: Jones and Bartlett.

- Fortune, F. (2007). The virtual learning environment: an alternative, flexible and accessible method of neonatal nurse education. *Journal of Neonatal Nursing*, 13, 231-235. doi: 10.1016/j.jnn.2007.09.005
- Institute of Medicine. (2009). *Redesigning continuing education in the health care professions*. Retrieved from Institute of Medicine website: [www.iom.edu/continueded](http://www.iom.edu/continueded)
- Institute of Medicine. (2011). *The future of nursing: Leading change, advancing health*. Retrieved from [http://www.nap.edu/catalog.php?record\\_id=12956](http://www.nap.edu/catalog.php?record_id=12956)
- Kala, S., Isaramalai, S., & Pohthong, A. (2010). Electronic learning and constructivism: a model for nursing education. *Nurse Education Today*, 30, 61-66. doi: 10.1016/j.nedt.2009.06.002
- Kala, S., Isaramalai, S., & Pohthong, A. (2010). Electronic learning and constructivism: a model for nursing education. *Nurse Education Today*, 30, 61-66. doi: 10.1016/j.nedt.2009.06.002
- Kellogg Foundation. (2004). Using logic models to bring together planning, evaluation and action: Logic model development guide. Retrieved from [www.wkkf.org](http://www.wkkf.org)
- Kenney, J. W. (2006). Theory-based advanced nursing practice. In W. Cody (Ed.), *Philosophical and theoretical perspectives for advanced nursing practice* (pp. 295-310). Sudbury, MA, Jones and Bartlett.
- Khattab, A., & Rawlings, B. (2008). Use of a modified OSCE to assess nurse practitioner students. *Nurse Education*, 17, 754-759.
- Kleinpell, R. (Ed.). (2009). *Outcome assessment in advanced practice nursing* (2nd ed.). New York, NY: Springer.

- Kleinpell, R., & Gawlinski, A. (2005). Assessing outcomes in advanced practice nursing practice: The use of quality indicators and evidence-based practice. *American Association Critical Care Nursing Clinical Issues*, 16(1), 43-57.
- Litmanovitz, I., & Carlo, W. (2008). Expectant management of pneumothorax in ventilated neonates. *Pediatrics*, 122, e975-e979. doi: 10.1542/peds.2008-1269
- Locsin, R. (1999). Development of an instrument to measure technological caring in nursing. *Nursing and Health Sciences*, 1, 27-34.
- Locsin, R. (2010). Rozzano Locsin's Technological Competency as Caring and the practice of knowing persons in nursing. In M. E. Parker, & M. C. Smith (Eds.), *Nursing theories & nursing practice* (3rd ed., pp. 460-471). Philadelphia, PA: F.A. Davis.
- Locsin, R. C. (2001, August 16). The culture of technology: Defining transformation in nursing, from "the lady with a lamp" to 'robonurse"? *Holistic Nursing Practice*, 16(1), 1-4.
- Locsin, R. C. (2010). Rozzano Locsin's Technological Competency as Caring and the practice of knowing persons in nursing. In M. E. Parker, & M. C. Smith (Eds.), *Nursing theories & nursing practice* (3 ed., pp. 460-471). Philadelphia: F.A. Davis.
- Major, D. (2005). OSCEs-seven years on the bandwagon: The progress of an objective structured clinical evaluation program. *Nurse Education Today*, 25, 442-454. doi: 10.1016/j.nedt.2005.03.010
- Manser, T. (2009). Teamwork and patient safety in dynamic domains of healthcare: a review of the literature. *Aca Anaesthesiological Scandinavica*, 53, 143-151.
- McKinley, R., Strand, F., Gray, T., Schuwirth, L., Alun-Jones, T., & Miller, H. (2008). Development of a tool to support holistic generic assessment of clinical procedure skills. *Medical Education*, 42, 619-627. doi: 10.1111/j.1365.2923.2008.03023.x

- McKinley, R. K., Strand, J., Ward, L., Gray, T., Alun-Jones, T., & Miller, H. (2008). Checklists for assessment and certification of clinical procedural skills omit essential competencies: a systematic review. *Medical Education*, 42, 338-349. doi: 10.1111/j.1365-2923.2007.02970.x
- National Association of Neonatal Nurse Practitioners. (2010). *Competencies and orientation tool kit*. Glenville, IL: National Association of Neonatal Nurses.
- Newble, D. (2004). Techniques for measuring clinical competence: objective structured clinical examinations. *Medical Education*, 38, 199-203. doi:10.1046/j.1365-2923.2004.01755.x
- Nothinagle, M., Reis, S., Goldman, R., & Diemers, A. (2010). Development of GPSE: A tool to improve feedback on procedural skills in residency. *Family Medicine*, 42, 507-513.
- Pipe, T. (2007). Optimizing nursing care by integrating theory-driven evidence-based practice. *Journal of Nursing Care Quality*, 22, 234-238.
- Rais-Bahrami, K., & MacDonald, M. (2012). Thoracostomy. In M. MacDonald, J. Ramasethu, & K. Rais-Bahrami (Eds.), *Atlas of Procedures in Neonatology* (5th ed., pp. 255-273). Philadelphia, PA: Lippincott Williams & Wilkins.
- Riley, R., & Manias, E. (2004). The uses of photography in clinical nursing practice and research: A literature review. *Journal of Advanced Nursing*, 48, 397-405.
- Rosswurm, M. A., & Larrabee, J. H. (1999). A model for change to evidence-based practice. *Image - The Journal of Nursing Scholarship*, 31, 317-322. Retrieved from <http://gateway.ut.ovid.com.proxy.medlib.iupui.edu/gw1/ovidweb.cgi> (18 of 19)09/12/2005 14:14:56

Salas, E., Almelda, S., Salisbury, M., King, H., Laszzara, E., Lyons, R., ...McQuillan, R. (2009).

What are the critical success factors for team training in health care? *Joint Commission Journal on Quality and Patient Safety*, 35, 398-405.

Steinbinder, A. (2009). Bumps on the road to magnet designation, achieving organizational excellence. *Nursing Administration Quarterly*, 33, 99-104.

Swartz, J. (2013, July). Target zero, eliminating preventable harm (Newsgroup comment).

Retrieved from [www.childrenscolorado.org](http://www.childrenscolorado.org)

Timoney, P., & Sansoucie, D. (2012). Neonatal nurse practitioner workforce survey executive summary. *Advances in Neonatal Care*, 12, 176-178.

The Joint Commission. (2009). *Standards and FAQ Details, JC*. Retrieved from

[http://www.jointcommission.org/standards\\_information/jcfaqdetails.aspx?StandardsFAQId=31&ProgramId=1](http://www.jointcommission.org/standards_information/jcfaqdetails.aspx?StandardsFAQId=31&ProgramId=1)

Twigg, C. (2003). Improving learning and reducing costs; New models for online learning. *Educause Review*, 28-38.

Walsh, M., Bailey, P., & Koren, I. (2009). Objective structured clinical evaluation of clinical competence: an integrative review. *Journal of Advanced Nursing*, 65, 1584. doi: 10.1111/j.1365-2648.2009.0505.x

Ward, H., & Willis, A. (2006). Assessing advanced clinical practice skills. *Primary Health Care*, 16(3), 22-24.

Whittaker, S., Carson, W., & Smolenski, M. (2000). Assuring continued competency-policy questions and approaches: How should the profession respond? *Online Journal of Issues in Nursing*, 5. Retrieved from <http://www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/>



OJIN/TableofContents/Volume52000/No3Sept00/ArticlePreviousTopic?ContinuedCompetence.html

Wilbeck, J., Murphy, M., Heath, J., & Thomson-Smith, C. (2011). Evaluation methods for the assessment of acute care practitioner inserted central lines: evidence-based strategies for practice. *Journal of the Association for Vascular Access*, 16, 226-233. doi:

10.2309/java.16-4-5

Zaccagnini, M., & White, K. (2011). *The Doctor of Nursing Practice essentials*. Sudbury, MA: Bartlett and Jones.

Zukowsky, K. (2009). Pigtail catheters used in the treatment of pneumothoraces in the neonate. *Advances in Neonatal Care*, 9, 7-16.

Zukowsky, K., Swan, B., Powell, M., Frisby, T., Lauver, L., West, M., & Marsella, A. (2011). Implementing an MSN nursing program at a distance through an urban-rural partnership. *Advances in Neonatal Care*, 11, 114-118. doi: 10.1097/ANC.0b013e318210d075

## Appendix A

### LCAT Scoring Tool



## Criteria for allocation of scores for assessment of clinical procedural skills using LCAT

### Categories of consultation competence:

LEVEL	DESCRIPTOR
	<b>Demonstrates:</b>
0	Unsafe practice in 1 or more components: Errors or omissions are <b>likely</b> to result in harm to the patient
1	Safe practice but one or more errors or omissions Errors or omissions are <b>unlikely</b> to result in harm the patient
2	Competent practice
3	Expert practice

Notes:

- The levels and associated score are used to **describe** the observed performance on a **single** clinical procedure and not to make a judgment of competence or lack of competence compared to an arbitrary 'pass' score.
- Each assessor uses his/her professional awareness to decide whether an error or omission is likely or not likely to harm the patient. Not everyone will agree whether harm is likely or not likely.

### LCAT questions to probe thinking:

#### Pre-procedure

- What patient factors have you considered in planning the procedure and why?
  - How do you propose to carry out this procedure and why?*

#### Post-procedure

- Did anything happen during the procedure which caused you modify your plan for the procedure?
  - What and why?
  - What patient factors did you consider and why?*

### LCAT Assessor's Recording Form

Date \_\_\_\_\_

Name of procedure:		Brief clinical details (as appropriate)	
<b>COMPETENCE CATEGORY</b>	<b>POSITIVE FEATURES</b>	<b>OPPORTUNITIES FOR IMPROVEMENT (OMISSIONS)</b>	<b>PERFORMANCE LEVEL or SCORE</b>
<b>Communication and working with the patient and/or family</b>			<input type="text"/>
<b>Safety</b>			<input type="text"/>
<b>Infection prevention</b>			<input type="text"/>
<b>Procedural competence</b>			<input type="text"/>
<b>Team working</b>			<input type="text"/>
NOTES ON OVERALL PERFORMANCE			<b>OVERALL</b> <input type="text"/>
SPECIFIC STRATEGIES FOR IMPROVEMENT			

Assessor's name \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

## Appendix B

### Review of Literature

	Key Search Word & Data Base & Funding	Research Design and Level of Evidence	Purpose/ Question	Study Population Sample Size, inclusion/exclusion Criteria Power	Instruments	Results	Strengths/ Weakness	Comments
McKinley, R., Strand, J., Ward, L., Gray, T., Alun-Jones, T., Miller, H. (2008) Checklists for assessment and certification of clinical procedural skills omit essential competencies: a systematic review. <i>Medical Education</i> , 338-349 doi: 10.1111/j.1365-2923.2007.02970.	Google Scholar Key words: Objective structured clinical assessments & examinations  No stated funding source	Level of Evidence I  Research Design: Systematic Review	Goal to develop generic criteria for the global assessment of clinical procedural competence and to quantify the extent to which existing checklists allow for holistic assessment of procedural competencies	Systematic Review and qualitative analysis of literature addressing clinical procedural skills assessment tools from 1995 to 2005 Included all English – language papers  Power analysis not cited	Systemic review and qualitative analysis of published clinical procedural skills assessment checklists and enumerated the contents of each, used 18 data bases- Performed 2 phase data extraction, first coding framework and second checking framework against the remaining checklists Goal was to establish themes among the checklists	It is possible to develop generic criteria for the global assessment of clinical procedural skills, Identified 7 themes and 37 sub themes in checklists reviewed	Strengths: Well done systematic review looking at need for and approach to develop a ‘holistic’ Objective structured clinical examination (OSCE) This systematic review was used as the basis for Leicester Clinical Procedure Assessment Tool (LCAT)  Weakness: No studies past 2005 included in review	Excellent application to PICO since it addresses the literature addressing OSCE tools which I will be using in my evaluation of clinical performance skills of Neonatal Nurse Practitioners (NNPs), the LCAT
McKinley, R., Strand, J., Gray, T., Schuwirth, L., Alun-Jones, T., Miller, H. (2008). Development of a tool to support holistic generic assessment of clinical	Google Scholar Key words: Objective structured clinical assessments & examinations	Level of Evidence I  Research Design: Literature review, focus groups, non-participant observation of assessment, national modified Delphi	Can an OSCE be developed that utilizes a holistic approach to assessment since previous criticisms related to OSCE have been the lack of a holistic approach	Health care providers involved in competency reviews from large teaching trust and hospital staff from National Health Service Staff in England  Power analysis not cited	Literature review, focus groups, non-participant observation of assessments, participant evaluation of pilot OSCE, national Delphi study	Development of reliable assessment tool with content and face validity OSCE titled: Leicester Clinical Procedure Assessment Tool (LCAT)	Development of holistic OSCE tool: High possibility of utilizing this tool for NNP Procedural competency assessment	Excellent reference as the publication resulted in the development of a generic and holistic

procedure skills. <i>Medical Education</i> . 619-627 doi: 10.1111/j.1365-2923.2008.03023.x	nations  No funding source cited	Study on OSCE.						c OSCE that I will use in my evaluation of procedural performance for my Capstone Project
Ward, H., & Willis, A.(2006) Assessing advanced clinical practice skills. <i>Primary Health Care</i> . 16. 22-24.	Google Scholar Key Words : Objective structured clinical assessments & examinations  No funding source cited	Level of Evidence: VII  Author opinion and use of current literature to support opinion  Research design: Author opinion offered with supporting literature	What are methods of assessing advanced practice clinical skills with Advanced Practice Registered Nurses (APRNs)?	Author opinion and review of literature of use of OSCE, directed examination of use with nurse practitioners and APRNs  Power analysis not cited	Reviewed literature regarding APRN clinical skills such as communication and history taking, advanced physical examination skills, clinical decision making and diagnostic reasoning, developing and negotiating a treatment and management plan	OSCE is one effective method of assessing APRN student competencies along with clinical placement assessments, and clinical portfolio.	Strength: Looks at various models and use with APRNs  Weaknesses: limited review and low level of evidence	Applicable to Capstone project as it provides support for the use of OSCE specifically for APRNs
Wilbeck, J., Murphy, M., Heath, J., & Thomson-Smith C. (2011). Evaluation methods for the assessment of acute care nurse practitioner inserted central lines: evidence based strategies for practice. <i>Journal for Advanced Vascular Access</i> . 16. 226-233. DOI: 10.2309/ja	Google Scholar Key Words : Objective structured clinical assessments & examinations  No funding source was cited	Level of Evidence V & VII  Two part literature review, assessing competency evaluation methods for APRNs and the use of templates or checklists for evaluation and compliance with competency documentation guidelines	Can identified validated, evidence-based metrics be effective in evaluating ACNP procedural competencies	Literature review:  Power analysis not cited	Two part literature review	Seven studies and on expert consensus were identified related to use of standardized forms and templates/checklists to improve national guideline compliance All studies indicated the use of standardized documentation significantly increased compliance with national guidelines  Consensus exists that written exams and patient outcomes are	Strengths:  GOOD reference to use:  APRN competency evaluation focused  Supports model for OSCE  Defines written exams as outdated for evaluation of procedure competency  Weakness: Low level	Good application to study as it provides support for use of OSCE for evaluation of procedural competency in APRNs

va.16-4-5						outdated and undesirable for use as evaluation tools in competency assessment	of evidence	
Khatab, A., & Rawlings, B. (2008). Use of a modified OSCE to assess nurse practitioner students. <i>Nurse Education</i> . (17) 754-759	Google Scholar Key Words :  Objective structured clinical assessments & examinations  No funding source was cited	Level of Evidence: VI  Descriptive study describing use of OSCE for Nurse Practitioner (NP) students	Is an OSCE appropriate for nurse practitioner student assessment	Describes the use of a modified OSCE to assess NP students in the UK, number of students participating in process not defined in article  Power analysis not cited	Program implementation description	OSCE is effective for NP student assessment	Strength: Detailed description of program implementation utilizing OSCE for NP student assessments  Provides helpful hints for implementation  Weakness: Not research, just program implementation description	Helpful for Capstone project as it provides helpful tips for successful use of OSCE with NPs, yet used in student population
Major, D.(2005). OSCEs-seven years on the bandwagon : The progress of an objective structured clinical evaluation program. <i>Nurse Education Today</i> . 25, 442-454. DOI: 10.1016/j.nedt.2005.03.010.	Google Scholar Key Words :  Objective structured clinical assessments & examinations  No funding source cited	V	Can a 7 year literature review of OSCEs provide support for use in RN curriculum and ongoing competency evaluation since early studies were in medical education	Literature Review  Power analysis not cited	Review of OSCE literature in UK, North America and Australia since 1975	Finding that OSCEs are evolving in holistic approach, and use in nursing education can be effective according to literature	Strength: Supports use of holistic approach in OSCE and summarizes growth of OSCE in UK  Weakness: main focus is on University of Salford progress with use of OSCE in undergraduate nursing programs	Applicable to Capstone as it supports the use of OSCE for evaluation of clinical procedure skills
Newble, D. (2004). Techniques for measuring clinical competence: objective structured clinical	Google Scholar Key Words :  Objective	Level of Evidence: VII  General review of literature, and author opinion	How can high levels of reliability and content validity for OSCE be obtained?	Literature review-not systematic  Power analysis not cited	Step by step approach to effectively using OSCEs with supportive literature	Provides strategies for effective utilization of OSCEs	Strengths: Practical and applicable information provided to guide use of OSCEs	Provides some nice guidelines for evaluating OSCE and

examinations. <i>Medical Education</i> . 38. 199-203. DOI: 10.1046/j.1365-2923.2004.01755.x	structured clinical assessments & examinations No funding source cited						Weakness: not research-low level of evidence and older study	use in clinical competency evaluation
Nothnagle, M., Reis, S., Goldman, R.c, Diemers, A. (2010). Development of the GPSE: a tool to improve feedback on procedural skills in residency. <i>Family Medicine</i> . 42. 507-513.	Google Scholar Key Words : Objective structured clinical assessments & examinations No funding source cited	V Multi-level qualitative study, collecting and interpreting data from process of triangulation + synthesizing data from multiple sources	Can the quality of feedback during procedural skills assessment be improved?	39 Family Practice Medical residents, 13 full time and 17 part time faculty members  Power analysis not cited	Literature review, field notes, interviews, focus groups, analysis of transcripts by two researchers	Provided themes and approaches to enhancing feedback to medical residents during use of OSCE/GPSE Provided five themes for assessing performance, a rating scale quantifying the degree of intervention by the teacher, a global assessment, an rating of case difficulty and suggestions for improvement: Goal to improve feedback and learner self assessment	Strength: Thorough approach, nice summary suggestions,  Weakness: Family Practice resident based, limited transferability to NNP population	Applicable to Capstone project as it provides some guidelines for provision of feedback on performance to enhance participant self assessment
Bold, M., Crabtree, N., & Naik, V. (2009). Assessment of procedural skills in anesthesia. <i>British Journal of Anesthesia</i> , 103. 472-483. DOI: 10.1093/bja/aep241	Google Scholar Key Words : Objective structured clinical assessments & examinations No funding source was	Level of evidence: VII  Author review of literature, not systematic	What is the best approach to assessment of procedural skills in anesthesia?	Literature discussing anesthesia residents and practicing anesthesia physicians and procedural competency  Power analysis not cited	Literature supported opinion of author regarding best practice strategies for assessment of procedural skills in anesthesia  Also addresses steps for determining reliability and validity of OSCE	Identified need for improved procedural skill assessment in anesthesia	Strengths: Acknowledged need for systematic approach to skill assessment Addressed use of OSCE, also addressed future use of high fidelity simulation if developed appropriately.  Weaknesses: Not pure	Applicable to Capstone as it addresses the need for initial on going competency evaluation of clinical skills in practicing anesthesiologists. While

	noted						research, more of a combination of literature review and opinion	not APRN focused it highlights the ongoing concern for procedural competency evaluation across health care provider disciplines
Walsh, M., Bailey, P. & Koren, L., (2009). Objective structured clinical evaluation of clinical competence: an integrative review. <i>Journal of Advanced Nursing</i> . (65) 1584-1595. DOI: 10.1111/j.1365-2648.2009.05054.x	Google Scholar Key Words :  Objective structured clinical assessments & examinations  No funding source cited	Level of evidence: V  Research design: Integrative review	Can an integrative literature review describe the utility of OSCE as strategy of measuring one form of clinical competence?	Integrative review, no sample size provided  Review included medical and nursing literature addressing reliability, correlations, function, cost, factor analysis of the use of OSCE  Power analysis not cited	CINAHL, Cochrane Database, Academic Search Premier, Medline from 1960 to 2008	41 papers met criteria of search and supported use of OSCE to address the complexities of evaluating clinical competence. Addresses gaps in literature psychometric properties of some OSCEs and costs in the application.	Strengths: Thorough integrative review Addresses pros and areas for improvement in use of OSCEs  Weakness: now 3-4 years old. Does not address newer publications since 2008.	Applicable to Capstone as it provides support for the use of OSCE in the evaluation of clinical competence for nurses since most previous studies looked at the use of OSCE in medical education
National Association of Neonatal Nurse Practitioners (NANNP). (2010) <i>Standard for maintaining the competence</i>	NNP Competencies  National Association of Neonatal Nurses	Level of Evidence: VII  Expert consensus presentation of guidelines	Provides guidelines for requirements for NNP procedural competence according to professional organization standards	Not a study, professional organization standards-developed by literature review and expert consensus  Power analysis not cited	Literature review and expert consensus developing guidelines for initial and ongoing competency of NNPs in all domains including procedural	NANNP states NNP require initial and ongoing evaluation of competencies at least annually  Novice NNPs may require more frequent evaluations	Strengths: summary of evidence and recommendations of professional organization Professional	Support for Capstone as it provides guidelines for procedural evaluation development



<i>of neonatal nurse practitioners</i> , Glenville, IL	(NAN N) Website  Funded by NAN N & NAN NP				performance		organizational support for my PICO addressing ongoing procedural competency evaluation for NNPS Weakness: Low level of evidence	ped by NNP experts within the NNP professional organization of NAN N & NAN NP
Committee on the Robert Wood Johnson Foundation Initiative on the Future of Nursing, at the Institute of Medicine; Institute of Medicine. (2010). <i>The future of nursing: Leading change, advancing health</i> . Retrieved from The national Academies Press: <a href="http://www.nap.edu/catalog.php?record_id=12956">http://www.nap.edu/catalog.php?record_id=12956</a>	Key word: Competency evaluation Funding: Robert Wood Johnson/Institute of Medicine	Level of Evidence: VII  Research design: Expert opinion based on review of literature on expert consensus	Addresses the need for life long learning for all nurses and on-going competencies and interprofessional learning	Not a study, professional recommendations based on literature review and expert consensus  Power analysis not cited	Literature review and interprofessional expert consensus opinion	Recommendations for lifelong learning, lifelong evaluation of competencies, and continual review of competency programs	Summary of recommendations of IOM-supports my PICO with interdisciplinary expert consensus for lifelong learning and competency evaluation	Supports Capstone project as it provides recommendation from a respected national organization for lifelong learning and competency evaluation
National Association of Neonatal Nurses. (2010). <i>Competencies and orientation tool kit</i> . Glenville, IL: National Association of Neonatal Nurses.	Key word: NNP competencies National Association of Neonatal Nurses website  Funding: NAN N & NAN	Level of Evidence: VII  Design: Expert Consensus based on literature review	Detailed explanations of all NNP competencies including procedural competencies	Not a study, professional recommendations developed by literature review and expert consensus  Power analysis not cited	Literature review and expert consensus development from a nation-wide task force of NNP experts and reviewed by board of directors	Important reference as it is the NNP professional organizing and outlines specifically which procedure are considered essential and what type of evaluation for review is needed. This reference is a basis for my entire PICO	NANNP recommendations are basis for my PICO-important reference-supports evaluation of essential procedures as developed by NNP national professional organization	Excellent reference for Capstone project as PICO question is directly drawn from NAN NP recommendation for institut

	NP							ions to develop unit based learning modules and form for evaluation of ongoing procedural competencies
<p>Lenburg, C., Kleier, C., Abdur-Rahman, V., Spencer, T., and Boyer, S. (2009). The COPA Model, A comprehensive framework designed to promote quality care and competence for patient safety. <i>Nursing Education Perspectives</i>, (30) 312-317.</p>	<p>Google Scholar</p> <p>Key Words : Nursing Competencies</p> <p>No funding source cited</p>	<p>Level of Evidence: VII</p> <p>Author opinion</p>	<p>Describes approach to competency training in nursing in response to national and state regulations Provides eight core practice competency categories and examples of skills and assessment approaches, literature supported</p>	<p>Focuses on nursing students, yet descriptive opinion not a study</p> <p>Power analysis not cited</p>	<p>Review of literature and concept development, discusses four aspects of competency evaluation including, defining the competencies to be evaluated, defining outcome statements to describe the competencies, identifying effective learning strategies, and performance assessment methods</p>	<p>More research is needed for best practice of competency measurement</p>	<p>Strength: Nursing based, outlines competency assessment strategies nicely</p> <p>Weakness: more of program description and supporting literature than research</p>	<p>Comments: Applicable to Capstone since it provides insight to an approach to assessing competency in nursing performance</p>
<p>Tilley, D. (2008). Competency in nursing: a concept analyses. <i>The Journal of Continuing Education in Nursing</i>, (39) 58-64.</p>	<p>Google Scholar</p> <p>Key Words : Nursing Competencies,</p> <p>No funding source cited</p>	<p>V Research design: Literature review and concept analysis</p>	<p>Can a concept analysis of competency in nursing be helpful</p>	<p>Literature review- not systematic</p> <p>Power analysis not cited</p>	<p>Literature review of nursing, medical, public health, and education literature from 2001-2005 was conducted using CINAHL, and Ovid</p>	<p>Key Points summarized: Competence is focused on the description of the action or behavior, whereas competency is focused on the individual's behavior underpinning the competent performance</p> <p>Little evidence to support continuing education impact on patient outcomes Literature starting to</p>	<p>Strength: Great concept analysis, provides support for the need for competency evaluation in nursing</p> <p>Weakness: Not a systematic review</p>	<p>Applicable to Capstone project since it highlights a concept analysis supporting the need for competency evaluation in nursing</p>

						develop that supports competency evaluation		
Cates, LA. Wilson, D. (2011). Acquisition and maintenance of competencies through simulation for neonatal nurse practitioners. <i>Advances in Neonatal Care</i> (11) 321-327. DOI: 10.1097/ANC.0b013e31822a34a0	Google Scholar Key Words : NNP Competencies  No funding source cited	VI Description of author's practice program	Can simulation be effective for acquisition and maintenance of competencies through simulation for NNPs?	NNPs at large children's hospital in Texas, number of NNPs not stated in article  Power analysis not cited	Program description	Details program for utilization of simulation for NNP procedural competencies and simulation in a large children's hospital, provides anecdotal support for the use of simulation and supports through literature	Strengths: Recent publication, NNP focused, addresses NNP competencies, references same national organizations as my Capstone project  Weakness: program description without measured outcomes.	Applicable to Capstone project as it is NNP focused and describes one large children's hospital's approach to using simulation for NNP competency evaluations. Uses NANN and NANNP guidelines in program development and description
Choudhary, N. Fetcher, R., Soumerai, S., (2005). Systematic review: the relationship between clinical experience and quality of health care. <i>Annals of Internal Medicine</i> . (142) 260-273. Retrieved from www.annals.org	Google Scholar Key Words : Competency evaluations  No funding source cited	Level of Evidence: I  Research design: Systematic review	Systematic Literature review of physician experience and quality of care: Does years of physician experience impact quality of care provided?	Literature review on physician performance based on years of experience  Power analysis not cited	English language articles in MEDLINE from 1996 to 2004 and reference lists of retrieved articles were reviewed: Selected studies including empirical results about knowledge or quality outcomes and included years since graduation or physician age as variables	Physicians in practice longer may be at risk for providing lower quality care and need quality improvement interventions. Over 52% of evaluations reported decreasing performance with increasing years of experience	Strength: addresses issue of on-going need for QI/ competency assessment - identifies concept of years of experience does not necessary equate to increased competency, yet may equate with need for new education	Applicable to Capstone as it provides insight to the possibility of years of experience relationship to quality of evidence based practice

							Weakness: Already older literature (2004) and addresses only physician outcomes Does not address nursing practice	Findings suggest an inverse relationship between years of practice and quality of practice provided with physicians One of my demographic collection tool questions addresses years of experience as an NNP
Winkelman, C. Kelley, C., & Savrin, C. (2012). Case histories in the education of advanced practice nurses. <i>Critical Care Nurses onlineNOW</i> . (32). e1-e17.	CINAHL- Key Words : APRN Competencies  No funding source cited	Level of evidence: VI  Design: exemplar of case history and application to traditional classroom and online learning model	Exemplars, summary information, asks; can case histories be effective for teaching APRN procedures and interventions	APRN students, number of students not provided  Power analysis not cited	Exemplars, definitions of Case Studies	Case histories can be effective as a teaching tool for APRNs in identifying need for certain procedures and interventions	Strength/ Provides support adding a case study to online module that I develop regarding the essential procedure of thoracostomy by needle aspiration  Weakness: low level of evidence	Applicable to Capstone project as it provides support for the use of case histories as an effective learning strategy for APRNs, plan to incorporate a case history into the online

								learning module that is developed
<p>McCarthy, G. et al. (2012) Emergency nurses: procedures performed and competence in practice. <i>International Emergency Nursing</i>. Doi: 10.1016/j.ienj.2012.01.003</p>	<p>CINAHL Key Words : APRN Competencies</p> <p>No funding source was cited</p>	<p>Level of Evidence: VI</p> <p>Single quantitative descriptive study</p>	<p>Can the procedures that ER nurses perform and their associated competencies be identified and evaluated?</p>	<p>Convenience, non-random sample of practicing Emergency Nurses in 11 Emergency rooms in Ireland</p> <p>Power analysis not cited</p>	<p>403 researcher developed questionnaires distributed to 11 ERs in Ireland, measured 119 procedures and competencies were evaluated</p>	<p>Findings: Most competent feelings related to diagnostic reasoning, statistically significant relationship (<math>p &lt; 0.01</math>) between APRNs perceived level of competency and frequency of practice</p> <p>Also, highest perceived mean competency was in nurses with 6-10 years experience</p>	<p>Strengths: Descriptive study Supports increased perceived competency with increased frequency of practice-</p> <p>Weakness: Not NNP specific</p>	<p>Applicable to Capstone as study addresses nurses procedural competency related frequency of procedure performance. My data will be analyzed to determine if an association between frequency of exposure to and performance of procedure and the assessment of procedural competency Supports, concept of choosing thoracostomy for PICO since it has the least</p>

								frequency of all essential procedures among CHCO NNPs.
Lipsky, S.I., Ganor O., Lending, G., Abebe-Campino, G., Morose A., Katzenell U., Ash, N., Glassberg, E. (2012). Training modalities and self-confidence building in performance of life-saving procedures. <i>Military Medicine</i> . (8) 901-906.	CINAHL Key word Competency + procedures  No funding source was cited	Level of evidence: VI  Quantitative descriptive study	Questionnaire to physicians and paramedics, regarding experience and self-confidence for performing life saving procedures including endotracheal intubation, cricothyroidotomy, and needle chest decompression, tube thoracostomy and intraosseous infusion. 299 questionnaires sent,	183 total respondents, 98 Physicians and 85 paramedics practicing as first responders in the Israel Defense Forces  Used a <i>p</i> value of less than 0.5 as statistically significant  Power analysis not cited	Anonymous, structured Questionnaires  Data analysis included linear regression of survey responses	Self-confidence in procedures was positively associated with experience gained from manikins, and supervised or unsupervised patient contacts/procedures. No benefit was demonstrated by animal model use. Most confidence building was unsupervised experienced, next supervised experience and 3 <sup>rd</sup> simulated experience	Strengths: Recent descriptive quantitative study (2012) Addresses life saving procedures including needle thoracostomy for chest decompression. Shows benefit of simulated experience with manikin,  Weakness, Level VI evidence, not APRNs or NNP specifically	Applicable to Capstone project since it addresses training approaches to life saving procedures. My Capstone project addresses needle thoracostomy which can be life saving in the neonates. Addresses the value of a simulated training experience in confidence in procedural performance, consistent with plans for my project application
Stephenson, E. (2008).	Searched my	Level of evidence:	Nice review of on-line	Not a study	Formal Power Point	Provided samples of	Nice provision	Included in

The practical use of technology in nursing education. National Association of Neonatal Nursing (NANN) Preconference workshop. (Lecture notes). (hard copy)	office folders  No funding source was cited	VII  Opinion of nursing educator expert	learning techniques	Power analysis not cited	presentation developed from personal expert experience and literature review	approaches to online learning	of samples of online learning approaches  Weakness: opinion of one nursing expert	review as it provided an early reference and starting point for understanding key words and concepts related to online learning. Provided starting point for my literature review
Altimier, L. (2009). Benefits of a flexible neonatal online nursing orientation program. <i>Newborn and Infant Nursing Reviews</i> , 2, 83-87. Retrieved from www.nainr.com  (Hard copy)	Google scholar Key Words :  Online learning & neonatal nurses  No funding source was cited	Level of evidence: VII  Research design: program description and analysis	Can an online program be effective for a neonatal nursing orientation program	No specific sample size cited: Describes use of 30 online modules: Summary of NICU RN orientation program developed in an on-line format- Also discusses cost savings and cost-benefit analysis- especially costs related to orientation of new nurses vs. retention  Power analysis not cited	No specific instruments used, Provides brief description of format of online modules developed	Describes key features and instructional design features including, web-based, competency based, series of modules, interactive combined with adult learning principals, creative modes of learning, self-paced- outlines cost benefit ratio. Provides support for cost savings for online format	Strength: Nice summary of a successful on-line orientation program in place  Weakness: Not a study, program description , not NNP specific	Applicable to Capstone project as it has an NICU personnel focus and addresses the use of an online module for learning consistent with my plan to develop an online module
Philips, J. (2005). Strategies for active learning in online continuing education. <i>The</i>	Google scholar Key Words :  Online	Level of Evidence: VII  Not a study	Discusses strategies for successful online learning, looks at constructivism briefly	A review presentation- not a study  Power analysis not cited	Not a study, or systematic review	Provides expert opinion of strategies to use for success online learning, also includes the use of constructivism	Strengths: Nice expert opinion on effective approaches and strategies for	Applicable to Capstone since addresses online learning

<i>Journal of Continuing Education in Nursing</i> , 36, 77-83. (Hard copy)	learning & nursing  Funding not cited		and also seven principles of good practice in education as a foundation for active learning. Power not cited as not a study			theory in the development of the online learning	developing online learning  Weakness: Expert opinion, not a study	g and uses constructivism as a learning theory for developing online learning modules, my chosen learning theory for my Capstone project
Copley Cobb, S. (2004) Internet continuing education for health care professionals: An integrative review. <i>The Journal of Continuing Education in Health Professions</i> , 24, 1171-180. (Hard copy)	Google Scholar Key Words : Online learning- health care professionals  No funding source was cited	Level of Evidence: I Research Design: Systematic Review	Review of key articles and research on practices, preferences, and evaluation of on-line continuing education used by health care professionals	MEDLINE, CINAHL and ERIC databases 1990 to 2004 and manual searches of Journal of Cont. Education in Health Professions and Journal of Continuing Education in Nursing  Power analysis not cited	Integrative Review- used categorization according to intervention, subjects, study designs and findings	Determined on-line learning is effective and satisfactory to health care professionals, yet in-person learning still preferred method for continuing education	Strengths: One of first integrative reviews on online learning in continuing education for health care workers  Weakness: Older data as articles reviewed were from 1990-2004	Despite being an older article it is applicable to Capstone since it is one of the first integrative reviews of the literature addressing online learning as means of continuing education for health care workers
Fortune, J. (2007) The virtual learning environment: An alternative, flexible and	Google Scholar Key Words : Online learning,	Level of evidence VII  Expert nurse educator opinion and description of practice	How can a virtual learning environment (VLE) be used for neonatal nursing continuing	Description of single program implementation in Scotland/UK  Power analysis not cited	Description of hospital program, no specific instruments mentioned	Describes anecdotal positive responses from use of VLE for teaching newborn assessment	Strengths: nice summary of a single successful program and addresses neonatal	Applicable to Capstone as it includes expert opinion of



accessible method of neonatal nurse education. <i>Journal of Neonatal Nursing</i> . 13, 231-235.	neonatal nursing  No funding source was cited	within her hospital setting	education in Scotland? Highlights benefits of VLE when financial resources are limited				nursing and neonatal care  Weakness: single descriptive experience described	online learning effectiveness in the neonatal nursing population consistent with my Capstone population
Zukowsky, K, Swan, BA, Powell, M, Frisby, T, Lauver, L, West MM, Marsella, A. (2011) Implementing an MSN nursing program at a distance through an urban-rural partnership. <i>Advances in Neonatal Care</i> . 11, 114-118.	Google scholar Key Words :  Online learning, nursing  Funding: Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions grant money for "Promoting Health Access: Online Graduate	Level of Evidence: VI  Description of program development	Can implementing and an on-line MSN program for rural students provide high quality and rigorous distance education for NNP students?  Also, can an online program be a cost effective solution to providing qualified NNPs in rural underserved areas?	Description of program development, implementation and evaluation in rural Pennsylvania  Power analysis not cited	No specific instruments were described	Describes positive response from on-line distance program, yet addresses the challenges in recruiting rural nurses interested in pursuing the NNP education and role	Strengths: Nice description of on-line program success and application of grant and working with DHHS  Weakness: single descriptive experience	Applicable to Capstone project since this program was specifically designed toward NNP education utilizing an online format. Yet transferable information is limited since this is mainly focused on rural NNP students, however the geography and effectiveness of online teaching with NNPs

	Programs for Rural Underserved Communities D09HP08336-01							at various geographic locations is applicable to my project, and I may have some NNPs that practice primarily in a rural setting in my project population
Forseflund et al. (2009) Continuing education meetings and workshops: effects of professional practice health care outcomes. <i>Cochrane Effective Practice and Organization of Care Group</i> . DOI: 10.1002/14651858.CD003030.pub2 (Hardcopy)	Google Scholar Key Words : Continuing education Funding: Cochrane Collaboration	Level of Evidence: I  Systematic review	To assess the effects of educational meetings on professional practice and healthcare outcomes	Cochrane Review updating previous Cochrane searches by searching the "Cochrane Effective Practice and Organization of Care Group Trials"  Power analysis not cited	"Randomized controlled trials of education meetings that reported objective measure of professional practice on healthcare outcomes"	Continuing education impact: findings: can be beneficial yet have limited impact on patient care  There was not statistical significance found in effects of educational meetings on professional practice, yet there was a trend suggesting more intensive interventions may have more positive effects	Strengths: Systematic Cochrane review, showing some positive impact on continuing education  Weakness: not neonatal or APRN focused	Applicable as it addresses the potential benefit of continuing education on patient care. My Capstone project includes provision of continued education to practicing NNPs
Bloomfield, J., Roberts, J., While, A. (2010) The effect of computer – assisted learning versus conventional teaching methods on	Google Scholar Key Words : Online learning, nursing	Level of Evidence: IV  Research design: randomized controlled experimental design	Could nursing students learn and retain theory and skill of hand washing more effectively when taught using computer	First year nursing students in a 3 year nursing program in London (n=420) Inclusion criteria: ability to use a computer. Total N 245 students	Two groups randomized controlled design. Intervention group used interactive, multimedia, self-directed computer assisted learning module.	Knowledge scores increased significantly p < .05 from baseline in both groups, immediate, week and with 8 week follow-up demonstrating significant	Strength: Randomized controlled trial sample size control 113, intervention 118 Showing effectiveness	Applicable to Capstone since it shows effectiveness of teaching nursing

the acquisition and retention of hand washing theory and skills in pre-qualification nursing students: A randomized controlled trial. <i>International Journal of Nursing Studies</i> . 47, 287-294.	g procedures  No funding source was cited		assisted learning compared with convention face-to-face methods?	enrolled,  Power analysis not cited – yet commented on decreased final population size decreased due to attrition	Control group with traditional lecture face to face, assessment of skill performance used OSCE	increase in intervention group	ss of online teaching a nursing procedure evaluated by use of OSCE  Weakness: attrition: final population size dwindled due to attrition and at 42, 43.	procedure in an online fashion, with procedure evaluation using an OSCE, consistent with my Capstone project of teaching an essential NNP procedure and evaluation using an OSCE.
Bloomfield, JG, While, AE, Roberts, JD. (2008). Using computer-assisted learning for clinical skills education in nursing: integrative review. <i>Journal of Advanced Nursing</i> . 63, 222-235.	Google Scholar Key Words : Online learning, nursing procedures  Funding source not cited	Level of evidence: V  Integrative literature review	Integrated review of research investigating computer assisted learning for clinical skills education in nursing	Integrative review  CINAHL, Medline, BNI, PsychInfo, and ERIC electronic databases 1997-2006, key words computer assisted instruction, education, clinical education, nursing skills education  Power analysis not cited	Utilized electronic citation tracking and hand searching of reference lists and relevant journals as well as literature search in traditional methods	Limited empirical evidence, many study limitations including small sample size, and design weaknesses. Call for more research needed especially addressing sample size, range of skills, longitudinal follow-up and control of confounding variables. Call for more RCT addresses effectiveness of CAL- overall positive reports however of satisfaction and effectiveness	Strength: Integrative review, specifically addresses acquisition of clinical skills –  Weakness: Data already 6 yrs. old.	Pertinent to Capstone project as it addresses limited studies available to describe the use of online learning techniques for teaching clinical skills in education
Twigg, C.A. (2003). Improving learning and	Google Scholar Key Words :	Level of evidence: V  Research Design: Systematic	Provides ways to look at online learning without increasing	Review of outcomes of 8.8million grant from Pew Charitable Trusts for 30	General review	20 of 30 students showed improved learning and remaining 10	Strengths: Multi-site study, Large sample size,	Applicable to Capstone since address

reducing costs: New models for online learning. <i>Educause review</i> . 28-38.	Online learning Funding: PEW Charitable Trust	Review of descriptive and qualitative studies	costs-looked at entire course redesign, not just a single class. Looks at a variety of models, supplemental, replacement, Emporium and fully online	institutions in course redesign, required institutions to complete comprehensive evaluations of findings  Citation of power N/A		showed no change in online versus traditional learning. Each institution showed 40% cost savings on average with range from 20 to 80% savings, overall include increased course-completion rates, improved retention, better student attitudes toward subject matter, and increased student satisfaction with the mode of instruction. The thirty redesigned courses represent 50,000 students nationwide and produce a savings of 3.6million q year	significant findings for learning, student satisfaction, retention attitudes and large cost savings.  Weakness: not randomized or controlled study and older (2003)	ses the effectiveness of online learning in nursing in a variety of settings as well as cost savings
Garrison, D.R. Kanuka, H., (2004). Blended learning: uncovering its transformative potential in higher education. <i>The Internet and Higher Education</i> . (7) 95-105. (Hardcopy)	Google Scholar Key Words : Online learning No funding source cited	Level of Evidence: VII  Design: Expert opinion based on experience and supporting literature	To look at the transformative potential of blended learning in higher education	Discussion about the concept of blended learning combining traditional learning with online learning.  Citation of power N/A	N/A	Provides a framework of issues to be addressed to transition to blended learning approach	Strengths: Nice conceptual model p 97 on e-learning and enhanced, blended and online variables  Weakness: Older article and low level of evidence	Applicable to Capstone as it addresses online and blended learning strategies and provides a nice reference for a conceptual framework addressing online and blended learning

Rovai, A.P. (2003). A practical framework for evaluating online distance education programs. <i>Internet and Higher Education</i> (6) 109-124. (Hardcopy)	Google Scholar Key Words : Online learning Funding source not cited	Level of Evidence: V Review of descriptive and qualitative studies	Provides support for the need for specific evaluations to be conducted regarding the experience of online learning, also to include technology and support services, course design, and instruction  Power analysis not cited	Review of program evaluation guidelines along with author experience  Power analysis not provided	Review of literature	Review and synthesis of literature used to produce effective framework for determining type of evaluation to be completed	Strength: Provides effective framework for evaluation of online learning activities  Weakness: low level of evidence and older article (2003)	Applicable to Capstone as it addresses a variety of online learning activities and provides a framework that could be utilized to evaluate effectiveness on learning activity
DeBourgh, G.A. (2003) Predictors of student satisfaction in distance-delivered graduate nursing courses: What matters most? <i>Journal of Professional Nursing</i> . (19) 149-163.	Google Scholar Key Words : Online learning and nursing No funding source cited	Level of Evidence: V  Research Design: Correlational research design examining relationships among learner attributes and instructional variables and student satisfaction	Question: What are the separate and collective effects of selected learner attributes and instructional predictors on the criterion of student satisfaction in a first-semester course of a graduate nursing program taught via multipoint, real-time full IVT  Used systems theory and transactional distance concept  Power analysis not cited	Convenience sample of registered nurses enrolled in first semester masters program in mandatory theory course  Power analysis not provided	Student subjects surveyed using Student Satisfaction Survey measuring satisfaction at the end of first semester course, included Tele-course Evaluation Questionnaire (Biner, 1993)	Four main predictors to student satisfaction with online learning 1. Clarity of communication and course expectations 2. Selection, quality and instructional use of visuals 3. Timeliness of feedback on course work 4. Use of instructional strategies that aid students in understanding course content  Instructor/instruction was highest predictor of satisfaction	Strengths: research, conducted on graduate nursing courses Provides solid information to faculty responsible for design and delivery of effective instruction Used original questionnaire applicable to student satisfaction with distance education Weakness: older article (2003)	Applicable to Capstone project since provides original research basis to student satisfaction with online learning experiences, Emphasizes the need for clarity in instructions for online learning to be valued and successful

								<p>successful as well as timely responses from instructors. Applicable guidance for creation of my Capstone project online module and instructor availability during application processes</p>
<p>Gruendemann, B., J. (2007). Distance learning and perioperative nursing. <i>Association of Operating Room Nursing Journal</i>. (85) 574-586.</p>	<p>CINA HL Key word: online learning, Nursing  No funding source cited</p>	<p>Level of Evidence: VII  Descriptive article using supportive literature for expert author opinion</p>	<p>Question: What are the strengths of online distance learning based on literature review</p>	<p>Expert author opinion supported by literature  Power analysis N/A</p>	<p>N/A</p>	<p>Outcomes of literature summarized the strengths/weaknesses Strengths of online learning included: Flexibility of study time Interaction of students Enhanced faculty role Enhanced job skills and professional practice Improved recruitment and retention Weaknesses: lack of face to face contact, Difficulties understanding assignments Technical problems</p>	<p>Strengths of article:  Identified: flexibility of timing, Enhanced job skills and professional practice, improved recruitment and retention Weakness: Based on student/faculty role so limited transferability to continuing education situation with practicing NNPs</p>	<p>Applicable to Capstone as this article highlights potential strengths of online learning consistent with goals described in my Capstone including, enhanced job skills, flexibility and availability of education</p>
<p>Dorrian, J., &amp; Wache, D. (2009).</p>	<p>CINA HL, Keyw</p>	<p>Level of Evidence: VI</p>	<p>What lessons were learned</p>	<p>Descriptive study of evaluations of</p>	<p>Analysis of participant evaluation,</p>	<p>Results: Lessons learned:</p>	<p>Strengths for Provides</p>	<p>Support Capsto</p>

Introduction of an online approach to flexible learning for on-campus and distance education students: Lessons learned and ways forward. <i>Nurse Education Today</i> . (29) 157-167.	ords: Online learning, nursing  Funding source not cited	Single descriptive study	from a large-scale implementation of an online nursing program?	online learning from students and faculty in large nursing program in Australia  Power analysis not provided	both student and faculty	Clear and detailed instructions necessary Provide support for individuals not comfortable with online format Work in team approach for developing programs	support for the need to provide Clear instructions & Provide support &  Develop Team Weakness: Low level of evidence in descriptive study	ne as it provides clear guidance for the need for clear and concise instructions when embarking in online learning activities and need for ongoing support of students
Smith, A. (2010). Learning styles of registered nurses enrolled in an online nursing program. <i>Journal of Professional Nursing</i> (26) 49-53.	CINA HL Keyword: Online learning- Advanced practice nursing  No funding source cited	Level of Evidence: VI  Research design: descriptive cross-section study	What are the learning styles of graduate nurses enrolled in an online nursing program?	Master's nursing students, Sample size 217 students enrolled in online courses at study site's university, students were enrolled in either RN-BSN or master's program  No power analysis cited: yet authors did state that follow-up studies with larger sample size suggested	Kolb's Learning Style Inventory version 3.1 given to nursing students	Results: Predominant style was 'accommodator', the "feeling, hands on person who likes new experiences and can adapt to changing circumstances, yet all four learning styles were represented	Strengths / weaknesses Addresses learning of advanced practice nurses, yet looks at students and not experienced APRNs, the APRN aspect is most closely related to PICO Weakness: Low level of evidence and study with students, not practicing APRNs so limited transferability	Applicable to Capstone project since this discusses the learning styles of online learners in nursing education programs. Information gained can be assimilated into online module development
Litmanovitz, I., & Carlo, W.A. (2008)	CINA HL Needle thorac	Level of Evidence: IV  Research	What is the incidence and outcome of managing a	136 NICU ventilated infants with pneumothorax while on the	Retrospective chart review and analysis of expectant management	Of 136 ventilated infants with pneumothorax 74% were	Strengths: Good evidence for indicating	Excellent source for clinical

Expectant management of pneumothorax in ventilated neonates. <i>Pediatrics</i> . (122) e975-e980.	ostomy and neonate  No funding source cited	design: Retrospective analysis	pneumothorax without tube thoracostomy and to determine the clinical and laboratory characteristics that distinguish infants with a pneumothorax who can be treated without chest-tube insertion?	ventilator  Power analysis not provided	of pneumothorax	treated with CT, 26% without chest, Of those without CT 14 had needle aspiration and 21 expectant management Authors concluded that expectant management of pneumothorax in neonates on the ventilator can be expectantly managed	need for minimal intervention for neonatal pneumothorax, supports use of needle thoracostomy for pneumothorax aspiration Weakness, does not address procedural technique or teaching methods relatively small sample size	1 component of module development on neonatal needle aspiration for pneumothorax  Provides clinical insight into indications for intervention
---	---	--------------------------------	---	---	-----------------	---	---	---



## Appendix C

### Capstone Project Educational Presentation

#### Comparison of Neonatal Nurse Practitioner Needle Thoracentesis Procedural Competency After Completion of an Online Module or Textbook review

Carol Wallman RN, MS, NNP-BC

#### Presentation

- \* Presentation to:
  - \* Children's Hospital Colorado (CHCO) Neonatal Nurse Practitioners:
  - \* Obtain departmental support for proposal

#### Problem Statement

- \* Is the completion of an online module on neonatal needle thoracostomy effective review for Neonatal Nurse Practitioners (NNPs)
- \* Format:
  - Utilize online format or textbook review for didactic content
- \* Utilize standardized clinical assessment tool

#### PICO Statement

- \* Population: NNPs practicing within CHCO
- \* Intervention: Development, implementation and evaluation of online module for review of neonatal needle thoracostomy
- \* Comparison: Standard teaching method (textbook)
- \* Outcome: Results of standardized observation tool compared between experimental and control group

#### Background

- \* Competency evaluation is a national focus
- \* APRN Consensus Work Group (APRN Consensus Work Group, 2008)
- \* National Association of Neonatal Nurse Practitioners (NANNP, 2010)
- \* Institute of Medicine (IOM, 2011), (IOM, 2009)
- \* The Joint Commission (2011)

#### Current Practice

- \* CHCO NNP Competency Committee
- \* Track NNP Portfolios and Procedures
- \* Annual Skills Day- Mandatory
- \* Power point presentations or textbook review
- \* Open-book written exam
- \* Simulated procedure practice
- \* No formal evaluation of procedure performance

## NANNP Recommendations

- ✳ Develop standardized institutional specific procedure guidelines
- ✳ Assessment of initial and ongoing competencies
- ✳ Recommended content of assessments:
  - ✳ Universal precautions and time-outs
  - ✳ Review and discussion of informed consent
  - ✳ Review of procedure's indications, contraindications, complications
  - ✳ Assessment and management of pain (NANNP, 2010)

## Benefits of Online Format

- ✳ Demonstrated effectiveness for nurses (Cobb, 2004)
- ✳ Ability to reach vast geographic distance
- ✳ CHCO NNPs reside and practice > 200 miles apart
- ✳ Cost effectiveness (Altimier, 2009)

## Choice of Thoracentesis

- ✳ NANNP defined 3 essential NNP procedures
  - ✳ Endotracheal intubation
  - ✳ Emergent umbilical line placement
  - ✳ Needle thoracostomy (thoracentesis)
- ✳ Recommend 3 procedures per year-
  - ✳ For ETT and emergent Umbilical line
  - ✳ Review for needle thoracostomy

## Choice of Thoracentesis

- ✳ Procedure tracking : 90% CHCO NNP participation
- ✳ NNPs NOT having 3 yearly procedures
  - ✳ ETT placement 9%
  - ✳ UVC placement 20%
  - ✳ UAC placement 34%
  - ✳ Thoracentesis 86%
- ✳ (CHCO, unpublished data, 2011)

## Choice of Thoracentesis

- ✳ Essential NNP procedure per NANNP
- ✳ Lowest frequency of NNP performance
- ✳ Emergency procedure for pneumothorax
- ✳ Neonatal period most common for pneumothorax (Limanovitz & Carlo, 2008)

## Use of Structured Assessment Tool

- ✳ Variations of structured assessment tools exist:
- ✳ Well supported APRN use in literature (Ward & Willis, 2006)
- ✳ Objective standardized clinical exam (OSCE)
- ✳ Objective structured assessment of technical skills (OSATS)
- ✳ Objective structures clinical assessments (OSCA)

## Choice of Tool

- ⊗ Leicester Clinical Procedure Assessment Tool (LCAT)
- ⊗ Holistic approach to procedure assessment
- ⊗ Generic, multi-professional assessment tool
- ⊗ High content validity
- ⊗ Acceptable reliability
- ⊗ Eliminates need for multiple checklists (McKinley et al., 2010).

## Methodology

- ⊗ Research question:
  - ⊗ Is the completion of an online module effective in teaching NNPs thoracentesis as evaluated by the LCAT?
- ⊗ Research benchmarks:
  - ⊗ Competent NNP performance after review module completion
  - ⊗ Effective use of LCAT for performance assessment

## Methodology

- ⊗ Independent variable: online module
- ⊗ Dependent variable: LCAT performance measurements
- ⊗ Extraneous variables:
  - ⊗ Years of clinical practice as RN and NNP
  - ⊗ Recent experience with thoracentesis
  - ⊗ Any self learning completed by NNP

## Methodology

- ⊗ Descriptive, quantitative, pre-experimental design
- ⊗ IRB approval
- ⊗ Voluntary CHCO NNP participation
- ⊗ Convenience sample of CHCO NNPs
- ⊗ Informed consent (Cullen, 2012)

## Methodology

- ⊗ Randomization of participants
- ⊗ Experimental group completes online module review
- ⊗ Control group completes textbook review
- ⊗ Individual blinded assessments by NNP expert
- ⊗ Assessment per LCAT
- ⊗ Outcomes evaluated as aggregate data (Cullen, 2012)

## Impact

- ⊗ Present program at national professional conference
- ⊗ Publish findings in professional journal
- ⊗ Serves as model for competency assessment

## Impact

- ⌘ Present program at national professional conference
- ⌘ Publish findings in professional journal
- ⌘ Serves as model for competency assessment

## References

- ⌘ Institute of Medicine (2011). *The future of nursing: Leading change, advancing health*. Retrieved from National Academies Press
- ⌘ Litmanowits, I., & Carlo, W. (2008, November). Expectant management of pneumothoraces in ventilated neonates. *Pediatrics*, 122, e975-e979. doi: 10.1542/peds.2008-1269
- ⌘ McKinley, R. K., Staud, J., Gray, T., Schwertb, L., Allen Jones, T., & Miller, H. (2007). Development of a tool to support holistic genetic assessment of clinical procedure skills. *African Education*, 42, 619-627. doi: 10.1111/j.1365-2923.2008.01023.x
- ⌘ National Association of Neonatal Nurse Practitioners (2010). *Competency and certification tool*. Cleveland, Ohio: National Association of Neonatal Nurses
- ⌘ Ward, H., & Willis, A. (2006, April). Assessing advanced clinical practice skills. *Primary Health Care*, 16(3), 22-24

## References

- ⌘ APRN Consensus Work Group & the National Council of State Boards of Nursing APRN Advisory Committee. (2008). *Consensus model for APRN systems: Licensing, accreditation, certification & education*. Retrieved from <https://www.ncsbn.org/2276.htm>
- ⌘ Altman, L. (2009). Benefits of a flexible neonatal online nursing orientation program. *Newborn and Infant Nursing Reviews*, 9, 83-87. doi: 10.1053/j.nimr.2009.03.014
- ⌘ Cobb, S. (2004). Internet continuing education for health care professionals: an integrative review. *Journal of Continuing Education in the Health Professions*, 24, 171-180.
- ⌘ Collier, P. (2012). *NRN01 Human subjects implications for research, slide handout.pdf* [Microsoft Word File]
- ⌘ Collier, P. (2012). *NRN02 Human subjects implications for research, slide handout.pdf* [Microsoft Word File]
- ⌘ Institute of Medicine (2009). *Redesigning continuing education in the health care professions*. Retrieved from IOM.edu. [www.iom.edu/continueduc](http://www.iom.edu/continueduc)

*Appendix D*

## E-Mail Consent Script

Date: 12-4-12

This e-mail is being sent to you to request your participation in a research study.  
If you have already consented for this research study, please disregard this e-mail.

Study Title: **Comparison of Neonatal Nurse Practitioner needle thoracostomy procedural competency after completion of an online module or standard textbook review**

This e-mail provides you with information about the study. A member of the research team will discuss this study with you and answer all of your questions. Please read the information below and ask questions about anything you do not understand before deciding whether or not to take part.

Principal Investigator: Carol Wallman RN, MS, NNP-BC

Why is this study being done?

This study plans to learn more about Neonatal Nurse Practitioner (NNP) neonatal needle thoracostomy procedural performance after completing an online module or textbook review. This study is part of the course work for Carol Wallman's doctorate of nursing program course requirements.

If you agree to join the study you will be blindly randomized to either complete standard textbook review or an online module review within one week of your scheduled skills day. You will be able to complete either the module or the textbook review on your own time. During your regularly scheduled skills day an NNP expert will evaluate your neonatal needle thoracostomy procedure performance. The review will take approximately 15 minutes and the evaluation will take approximately 15 minutes.

Your decision to participate or not participate will in no way impact your employment at Children's Hospital Colorado. All data collected will be kept confidential and shared only with team members.

You may have questions about your rights as someone in this study. You can call Carol Wallman at (970) 581- 7462 with questions or Dr. Cris Finn, (Capstone Chair, at Regis University at 719-661-6750). You can also call the Multiple Institutional Review Board (IRB). You can call them at 303-724-1055.

Please review the attached consent form and contact Carol Wallman at (970) 581-7462 at your convenience with any questions and to provide phone consent should you decide to participate.

If you do not contact Carol Wallman (Principal Investigator) within three days you will receive a phone call from Carol Wallman to answer any questions you may have and to invite you to participate in this study.

Thank you for your consideration,

Carol Wallman

Attachment: Consent Form

## Appendix E

### Collaborative Institutional Training Initiative Completion Certificate

Completion Report

8/2/12 10:44 AM

#### CITI Collaborative Institutional Training Initiative

##### Human Research Curriculum Completion Report Printed on 8/2/2012

**Learner:** Carol Wallman (username: cwallman@regis.edu)

**Institution:** Regis University

**Contact Information** Department: Nursing

Email: cwallman@regis.edu

**Social Behavioral Research Investigators and Key Personnel:**

**Stage 1. Basic Course Passed on 08/02/12** (Ref # 8379361)

Required Modules	Date Completed	
Introduction	07/31/12	no quiz
History and Ethical Principles - SBR	07/31/12	4/5 (80%)
The Regulations and The Social and Behavioral Sciences - SBR	08/01/12	5/5 (100%)
Assessing Risk in Social and Behavioral Sciences - SBR	08/01/12	4/5 (80%)
Informed Consent - SBR	08/02/12	5/5 (100%)
Privacy and Confidentiality - SBR	08/02/12	5/5 (100%)
Regis University	08/02/12	no quiz

**For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.**

Paul Braunschweiger Ph.D.  
Professor, University of Miami  
Director Office of Research Education  
CITI Course Coordinator

[Return](#)

## Appendix F

### Regis Institutional Review Board Approval



Academic Affairs  
Academic Grants

3333 Regis Boulevard, H-4  
Denver, Colorado 80221-1099

303-458-4206  
303-964-3647 FAX  
www.regis.edu

#### IRB – REGIS UNIVERSITY

February 4, 2013

Carol Wallman  
8059 Timberwolf Circle  
Wellington, CO 80549

**RE: IRB #: 13-029**

Dear Ms. Wallman:

Your application to the Regis IRB for your project "Comparison of NNP Needle Thoracostomy Procedural Competency after Completion of an Online Module or Standard Textbook Review" was approved as an expedited study on February 4, 2013. It is approved under research category #7.

If changes are made in the research plan that significantly alter the involvement of human subjects from that which was approved in the named application, the new research plan must be resubmitted to the Regis IRB for approval. Projects which continue beyond one year from their starting date require IRB continuation review. The continuation should be requested 30 days prior to the one year anniversary date of the approved project's start date. A completion report of the findings of this study should be sent to the IRB.

In addition, it is the responsibility of the principal investigator to promptly report to the IRB any injuries to human subjects and/or any unanticipated problems within the scope of the approved research which may pose risks to human subjects. Lastly, a final report should be submitted at completion of the project and it is the responsibility of the investigator to maintain signed consent documents for a period of three years after the conclusion of the research.

Sincerely,

*Patsy McGuire Cullen*  
Patsy McGuire Cullen, PhD, CPNP  
Chair, Institutional Review Board  
Associate Professor and Director  
Department of Accelerated Nursing  
Loretto Heights School of Nursing  
Rueckert-Hartman College for Health Professions  
Regis University

cc: Dr. Cris Finn

A JESUIT UNIVERSITY



## Appendix G

### Colorado Multiple Institutional Review Board Approval



Colorado Multiple Institutional Review Board, CB  
F-490  
University of Colorado, Anschutz Medical  
Campus  
13001 E. 17th Place, Building 500, Room N3214  
Aurora, Colorado 80045

303.724.1055 [Phone]  
303.724.0890 [Fax]  
[COMIRB Home Page \[Web\]](http://comirb.hmc.edu)  
[comirb@ucdenver.edu](mailto:comirb@ucdenver.edu) [E-Mail]  
FWA00005070 [FWA]

University of Colorado Hospital  
Denver Health Medical Center  
Veteran's Administration Medical Center  
The Children's Hospital  
University of Colorado Denver  
Colorado Prevention Center

#### Certificate of Approval

10-Jan-2013

**Investigator:** Carol Wallman  
**Sponsor(s):**  
**Subject:** COMIRB Protocol 12-1592 Initial Application  
**Effective Date:** 08-Jan-2013  
**Expiration Date:** 07-Jan-2014  
**Expedited Category:** 7  
**Title:** Comparison of Neonatal Nurse Practitioner needle thoracentesis procedural competency after completion of an online module or standard textbook review

All COMIRB Approved Investigators must comply with the following:

- For the duration of your protocol, any change in the experimental design/consent and/or assent form must be approved by the COMIRB before implementation of the changes.
- Use only a copy of the COMIRB signed and dated Consent and/or Assent Form. The investigator bears the responsibility for obtaining from all subjects "Informed Consent" as approved by the COMIRB. The COMIRB REQUIRES that the subject be given a copy of the consent and/or assent form. Consent and/or assent forms must include the name and telephone number of the investigator.
- Provide non-English speaking subjects with a certified translation of the approved Consent and/or Assent Form in the subject's first language.
- The investigator also bears the responsibility for informing the COMIRB immediately of any Unanticipated Problems that are unexpected and related to the study in accordance with COMIRB Policy and Procedures.
- Obtain COMIRB approval for all advertisements, questionnaires and surveys before use.
- Federal regulations require a Continuing Review to renew approval of this project within a 12-month period from the last approval date unless otherwise indicated in the review cycle listed below. If you have a restricted/high risk protocol, specific details will be outlined in this letter. Non-compliance with Continuing Review will result in the termination of this study.

You will be sent a Continuing Review reminder 75 days prior to the expiration date. Any questions regarding this COMIRB action can be referred to the Coordinator at 303-724-1055 or UCHSC Box F-490.

#### Review Comments:


This expedited approval includes:  
Application, v12/1/12 and attachment F  
Protocol  
Consent/authorization form  
LCAT evaluation  
Demographic questionnaire  
Needle Thoracostomy  
Email script

## Appendix H

### Neonatal Needle Thoracostomy On-line Module

# Neonatal Needle Thoracostomy

An On-line Module for Procedure Review



## Objectives

- Upon completion of this module the participant will be able to competently demonstrate neonatal needle thoracostomy upon evaluation by an expert neonatal nurse practitioner (NNP) utilizing the Leicester Clinical Assessment Tool which includes the following components:
  - Effective communication
  - Safety
  - Infection prevention
  - Procedural competency and
  - Team work (McKinley, 2008)

## Needle Thoracostomy

- Needle thoracostomy is defined as the use of a needle to create an opening in the chest wall to remove fluid or air.
- Needle thoracostomy is also referred to as "simple aspiration" or needle thoracentesis (Repanshek, Ulfberg, Vilke, Chan & Harrigan, and NANNP 2010)

## Objectives

- Upon completion of this module the participant will be able to competently demonstrate neonatal needle thoracostomy upon evaluation by an expert neonatal nurse practitioner (NNP) utilizing the Leicester Clinical Assessment Tool which includes the following components:
  - Effective communication
  - Safety
  - Infection prevention
  - Procedural competency and
  - Team work (McKinley, 2008)

## Pulmonary Air Leak

A pulmonary leak is defined as:

Extravasation of air into the lung parenchyma and pleural spaces (AHA/AAP, 2011)



## Pulmonary Air Leak

- A pulmonary air leak in the neonatal population may be a life threatening situation.
- The neonatal period is the most common period for presentation of a pulmonary air leak.
- The presence of a pulmonary air leak requires rapid diagnosis and management. (Limanovitz & Carlo, 2008)

## Neonatal Risk Factors for Pulmonary Air Leak

- Neonates have many risk factors increasing their incidence of a pulmonary air leak.
- Some of these risk factors include:
  - Respiratory distress syndrome
  - Meconium aspiration syndrome
  - Aspiration of blood or amniotic fluid
  - Pneumonia and sepsis
  - Need for mechanical ventilation (Limanovitz & Carlo, 2008)

## Clinical Presentation of Pneumothorax

- Clinical signs and symptoms of a pneumothorax include:
  - Respiratory distress
  - Diminished breath sounds on the affected side
  - Diminished heart sounds (AHA/AAP, 2011)

## Clinical Presentation of a Tension Pneumothorax

- When the pneumothorax is under tension, or placing increased pressure within the pleura space and preventing lung expansion, signs and symptoms may include:
  - Bradycardia and / or tachycardia
  - Hypotension
  - Cyanosis
  - Poor perfusion (AHA/AAP, 2011)

## Clinical Confirmation of a Pneumothorax

- When an infant's clinical presentation is concerning for a possible pneumothorax the next step is to confirm the diagnosis
- Transillumination with a flashlight of the suspected side of the pneumothorax will illuminate nicely on the affected side if a pneumothorax is present (AHA/AAP, 2011)

## Clinical Confirmation of a Pneumothorax

- Definitive diagnosis of a pneumothorax is obtained by evaluation of a chest x-ray (CXR)



Right tension pneumothorax on CXR

## Indications for Needle Thoracostomy

- Indications for needle thoracostomy include the presence of a pneumothorax that is:
  - Under tension
  - Causing significant respiratory distress
  - Causing lung collapse with ventilation and / or perfusion abnormalities
  - In the presence of a bronchopleural fistula
- The needle thoracostomy may be a temporary measure while preparing for thoracostomy tube placement (MacDonald, Ramasethu, & Rais-Bahrani, 2012)

## Indications for Needle Thoracostomy

- Large pleural fluid collections can also be an indication for needle thoracostomy
  - Examples of pleural fluid include:
    - Pleural effusions
    - Empyema (pus in the pleural space)
    - Chylothorax (Lymphatic fluid [Chyle] in pleural space)
- (MacDonald, Ramasethu, & Rais-Bahrani, 2012)

## Indications for Needle Thoracostomy

- A pneumothorax causing significant clinical compromise usually requires evacuation of the air
- However, a small and asymptomatic pneumothorax may not require intervention and may resolve spontaneously (AHA / AAP, 2011 and MacDonald, Ramasethu, & Rais-Bahrani, 2012)

## Contraindications for Needle Thoracostomy

- Small pulmonary air or pleural fluid collections without significant hemodynamic symptoms
- Spontaneous pneumothorax that is likely to resolve without intervention (AHA / AAP, 2011 and MacDonald, Ramasethu, & Rais-Bahrani, 2012)

## Potential Complications of Needle Thoracostomy

- Pain
  - Lung perforation
  - Vessel perforation
  - Accidental reinjection of air or fluid into chest cavity
- (AHA / AAP, 2011 and MacDonald, Ramasethu, & Rais-Bahrani, 2012)

## Preparation for Procedure

- Review indications for needle thoracostomy
- Discuss plans with family if patient condition allows
- Discuss plans with team members
- Complete time out according to institution guidelines
- Anticipate and prepare for pain management
- Prepare needed equipment

## Pain Management

- Acute clinical presentation may not allow time for additional pain management prior to performance of procedure
- Recognize potential need for pain management beyond procedure completion
- IV opioid treatment may be indicated (Barton & Wallman and AAP Committee on Fetus and Newborn 2007)

## Equipment

- Drapes
- Antiseptic prep
- Large syringe
- T-connector
- Stop-cock
- Butterfly needle or angio-catheter set-up



## Procedural Technique for Needle Thoracostomy

- Use antiseptic to cleanse the appropriate hemithorax (MacDonald, Ramasethu, & Rais-Bahrani, 2012)
- Use of universal precautions, including gloves



### Procedural Technique for Needle Thoracostomy

For air removal locate the 2<sup>nd</sup> mid-clavicular intercostal space for needle insertion

For fluid removal locate the 4<sup>th</sup>-5<sup>th</sup> mid-axillary intercostal space for needle insertion (AHA/ AAP, 2011 and MacDonald, Ramasethu, & Rais-Bahrani, 2012)



Insertion of butterfly needle at 2<sup>nd</sup> intercostal space for air removal.

Initial needle insertion at 45 degree angle and then decreasing to 15 degrees

### Procedure Technique

Initial needle insertion at 45 degrees then gently decrease angle to 15 degrees

If using angio-catheter slide cannula in and remover stylet. Attach t-connector with syringe

Aspirate air or fluid until vital signs and pulse oximetry improve (AHA/ AAP, 2011 and MacDonald, Ramasethu, & Rais-Bahrani, 2012)



Use one hand to secure needle at insertion site, while aspirating with syringe with other hand.

## Needle Thoracostomy

- **Additional Tips for success**
  - Avoid excessive aspiration since it increases the risk for lung perforation
  - Use of an angio-catheter rather than needle has been shown to decrease the risk for lung perforation (MacDonald, Ramasethu, & Rais-Bahrani, 2012)

## Post-procedure Care

- Remove any remaining disinfectant with normal saline wipe
- Insertion site may be covered with an op-site or petroleum jelly and gauze dressing
- Address infant's pain and intervene appropriately
- Discuss follow-up care plans with team members
- Update family members

## References

- American Heart Association, American Academy of Pediatrics (2011). *Neonatal resuscitation textbook*, 9<sup>th</sup> edition. Glenview IL: American Academy of Pediatrics
- Barton, D. & Wallman, C. and American Academy of Pediatrics Committee on Fetus and Newborn (2007, June). Prevention and management of pain in the neonate. *Advances in Neonatal Care*, 7, 151-160.
- Children's Hospital of Colorado (2011). Neonatal nurse practitioner competency program. Raw unpublished data Microsoft Word
- Litmanowicz, I., & Carlo, W. (2008, November). Expectant management of pneumothorax in ventilated neonates. *Pediatrics*, 122, e975-e979. doi: 10.1542/peds.2008.1269

## References

- MacDonald, M., Ramasethu, J., & Rais-Bahrani, (2012). *Atlas of procedures in neonatology*, 3<sup>rd</sup> edition. Philadelphia, PA: Lippincott Williams & Wilkins
- McKinley, R. K., Strand, J., Gray, T., Schowirth, L., Alon-Amos, T., & Miller, H. (2008). Development of a tool to support holistic genetic assessment of clinical procedure skills. *Medical Education*, 42, 619-623. doi: 10.1111/j.1365-2923.2008.03023.x
- National Association of Neonatal Nurse Practitioners. (2010). *Competencies and orientation tool kit*. Glenville, Illinois: National Association of Neonatal Nurses
- Repanshek, Z., Uberg, J., Viller, G., Chan, T., & Harggan, R., (2012). Alternative treatments of pneumothorax. *Journal of Emergency Medicine*, 44, 457-466. doi: 10.1016/j.jemermed.2012.02.049

*Appendix I*

## Demographic Questionnaire

**Neonatal Nurse Practitioner Needle Thoracostomy Competency Evaluation**

Please respond to the following questions based on your experience as an NNP.

1. How long have you been practicing as an RN? \_\_\_\_\_
2. How long have you been practicing as an NNP? \_\_\_\_\_
3. How long have you worked for the Children's Hospital Colorado (CHCO) system as an NNP? \_\_\_\_\_
4. What is your age?
  - a. < 30 years old
  - b.  $\geq 30$  years old but <40
  - c.  $\geq 40$  years old but <50
  - d.  $\geq 50$  years
5. On average, how many clinical hours do you work per week?
  - a. 12 hours or less
  - b.  $\geq 12$  hours but <24 hours
  - c.  $\geq 24$  hours but < 36 hours
  - d.  $\geq 36$  hours
6. What is the Level of nursery for your primary clinical site as defined by AAP Levels of Care 2012?
  - a. Level I
  - b. Level II

- c. Level III
  - d. Level IV
7. What is the Level of nursery for your secondary clinical site as defined by AAP levels of Care 2012?
- a. Level I
  - b. Level II
  - c. Level III
  - d. Level IV
  - e. N/A (do not have a secondary site)
8. How many needle thoracostomies (thoracentesis) have you performed in the past year on a live neonatal patient?
- a. 0
  - b. 1 or 2
  - c. 3 or greater
9. How many needle thoracostomies (thoracentesis) have you observed in the past year on a live neonatal patient?
- a. 0
  - b. 1 or 2
  - c. 3 or greater
10. What do you perceive as barriers to obtaining 3 or more needle thoracostomy (thoracentesis) procedures on a live neonatal patient in the past year? Please choose ALL that apply.
- a. Lack of patients in my setting needing needle thoracostomy (thoracentesis)
  - b. Competition for procedure, i.e. other NNPs, NNP students, residents, fellows, attending physicians
  - c. Discomfort with the procedure so allow others to complete
  - d. No barriers; I perform 3 or more procedures/year
  - e. Other (please be specific): \_\_\_\_\_
11. What is your preferred method of procedure review?
- a. Live didactic presentation
  - b. Online review module
  - c. Text book review
  - d. Other (please specify): \_\_\_\_\_
12. Were you able to complete the online module or textbook review within 1 week prior to participating in the procedure evaluation?
- a. Yes



- b. No

IF you completed the **online module** please complete questions 13,14, and 15. If you completed the **textbook review** please do NOT answer questions 13,14,15.

13. What do you think was the most helpful part of this online module?

- a. Written content
- b. Pictures
- c. Case studies
- d. Other (please specify): \_\_\_\_\_

14. Have you completed other online educational modules in the past?

- a. Yes
- b. No

15. How would you rate the length of this module?

- a. Too short
- b. Too long
- c. Just right

*Appendix J*

## Participant Consent

**Date: 12/4/12****Valid for Use Through: 9/30/13****Study Title: Comparison of Neonatal Nurse Practitioner neonatal needle thoracostomy procedural competency after completion of an online module or standard textbook review****Principal Investigator:** Carol Wallman RN, MS, NNP-BC**COMIRB No:** 12-1592**Version Date:****Version No:**

---

You are being asked to be in a research study. This form provides you with information about the study. A member of the research team will describe this study to you and answer all of your questions. Please read the information below and ask questions about anything you do not understand before deciding whether or not to take part.

**Why is this study being done?**

This study will investigate Neonatal Nurse Practitioner (NNP) neonatal needle thoracostomy procedural performance after completing an online module versus a textbook review.

You are being asked to be in this research study because you are an NNP employed by Children's Hospital Colorado and performing neonatal needle thoracostomy is within your job description. Up to 75 people will participate in the study.

**What happens if I join this study?**

If you join the study, you will be randomized to either complete standard textbook review or an online module review within one week of your scheduled skills day. During skills day an expert NNP will evaluate your neonatal needle thoracostomy procedure performance for competence per standard procedure. The review will take approximately 15 minutes and the evaluation will last approximately 15 minutes.

**What are the possible discomforts or risks?**

Discomforts you may experience while in this study include mild anxiety related to being evaluated on skill performance.

\_\_\_\_\_Initials

**What are the possible benefits of the study?**

This study is designed to learn more about best practice strategies related to content review for essential NNP procedures and evaluation for NNP procedure competence.

**You will not be paid to be in the study.**

**It will not cost you anything to be in the study.**

**Is my participation voluntary?**

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you choose to take part, you have the right to stop at any time. If you refuse or decide to withdraw later, you will not lose any benefits or rights to which you are entitled. This will in no way affect your employment at CHCO.

**Who do I call if I have questions?**

The researcher carrying out this study is [Carol Wallman](#). You may ask any questions you have now. If you have questions later, you may call [Carol Wallman](#) at (970) 581-7462

You may also have questions about your rights as someone in this study. You can call [Carol Wallman at \(970\) 581-7462](#) with questions or Dr. Cris Finn, (Capstone Chair, at Regis University at 719-661-6750). You can also call the Multiple Institutional Review Board (IRB) at 303-724-1055.

**Who will see my research information?**

All data from this study will be de-identified and cannot be linked with any individual participant. We will do everything we can to keep your records confidential. All data will be kept on a password-protected computer, and any papers will be kept in a locked file cabinet in the investigators personal office. Confidentiality cannot be guaranteed.

Both the records that identify you and the consent form signed by you may be looked at by others such as:

- Federal agencies that monitor human subject research
- Human Subject Research Committee
- The group doing the study
- Regulatory officials from the institution where the research is being conducted who want to make sure the research is safe

The results from the research may be shared at a meeting in aggregate only and no individual names or locations will be used. The results from the research may be in published articles. Your name will be kept private when information is presented.

\_\_\_\_\_  
**Initials**

**Agreement to be in this study**

I have read this paper about the study or it was read to me. I understand the possible risks and benefits of this study. I know that being in this study is voluntary. I choose to be in this study: I will get a copy of this consent form.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Print Name: \_\_\_\_\_

Consent form explained by: \_\_\_\_\_

Date: \_\_\_\_\_

Print Name: \_\_\_\_\_

Investigator: \_\_\_\_\_

Date: \_\_\_\_\_