Linking Graduate Nursing Interprofessional Education to Collaboration in Upstate New York

by

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Abstract

This observational descriptive correlational study explores how masters and doctorally prepared CRNA’s, one to five years’ post-graduation demonstrate interprofessional collaboration defined by non-technical skills measured by the TeamSTEPPS 2.0 observational worksheet within the perioperative period. The Nursing Essentials describe cumulative interprofessional education (IPE) that prepare nurses to lead interprofessional teams (American Association of Colleges of Nursing, 2006). The interprofessional learning continuum (IPLC) model describes the IPE to interprofessional collaboration (IPC) education-to-practice continuum that this study will help define for graduate nurses. Using TeamSTEPPS non-technical skills, validated by the Agency for Healthcare Research and Quality (AHRQ) as key to quality IPC, the Pearson’s r and two-sample t-test examined relationships between nurse anesthetists (N = 16) IPE and IPC. Results demonstrated a statistically significant difference in means between education level, employment culture and overall TeamSTEPPS scores (r = .71, p = 0.002). Although, further research is needed to differentiate education level and employment culture; results support the IPLC model’s description of IPE development and demonstrates its functionality within interprofessional teams utilizing CRNA’s in the operating room (OR). Furthermore, the TeamSTEPPS 2.0 observational worksheet demonstrated the ability to measure DNP IPE impact within the OR.

Keywords: Interprofessional Collaboration/Education, Graduate Nurses Impact, TeamSTEPPS,
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This project looked at teams and how to improve communication within them. Keeping with the spirit of teamwork, this project would not have been accomplished without the help of many individuals. First, my wife Michelle, who motivated me to continue on, loved me when I was crazy, and was the rock of our family for three long years. She supported me and our family without hesitation or resentment. My son Gabe, who sacrificed time with his dad so I could study. Dr. Faust, Dr. Spulecki, and Dr. Korogoda who lead my program and all of my coursework with kind hearts and open minds. Dean Lewis who help guide this project to completion. Finally, Dr. Gewandter, who bailed me out of the nightmare that is IRB. Thank you all! This wouldn’t have happened without you.
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**Background**

**Problem**

As healthcare grows and becomes more complex, reform and progress become an ongoing need. Finding ways to decrease cost, improving the health of a population and improving the care that patients receive provides direction for areas of reform (Berwick, Nolan, & Whittington, 2008). These guidelines have been labeled as the *Triple Aim* and describe what changes in the current reform should focus on (Berwick et al., 2008). An important aspect of the *Triple Aim* is that the three guidelines are not independent (Berwick et al., 2008). This means that reforms to healthcare should address all areas of the *Triple Aim*. Obviously, finding ways to change healthcare that incorporates all aspects of the *Triple Aim* can be difficult. The Institute of Medicine (IOM) has identified interprofessional collaboration as an area that has the potential for reform that achieves all goals of the *Triple Aim*. However, reforming interprofessional collaboration in healthcare has some knowledge gaps that need to be filled before initiating a systems-wide change. Specifically, understanding the link between interprofessional education (IPE) and its effects on interprofessional collaboration (IPC) requires further development and exploration (Cox et al., 2016)

The surgical workforce consists of medical providers, anesthetists, nurses, technicians, aides, and administrative support and is an ideal area of research due to its collaborative origins. Each of the above roles requires varying years of education and practice. To compound the complexity of the surgical suite, all of these roles must work together. Even though all of these fields have the patient’s best interest in mind, teamwork and cooperation are not always easily achieved. Even if teamwork can be difficult at times, improved teamwork leads to improved
patient outcomes and is worthy of investment and development (Reeves, Perrier, Goldman, Freeth, & Zwarenstein, 2013; Weaver et al., 2010).

Generating data on the effectiveness of the surgical team is hard due to the interprofessional relationships and different goals of each group. Also, different professions may do the same role in the operating room (OR). Thus, picking one profession and focusing on it; in this case, the Certified Registered Nurse Anesthetists (CRNA), a form of advanced practice registered nurse, allows for an evaluation of a well-established role in the operating suite and a starting point for data generation.

Nurses first started to administer anesthesia in the 1820’s, in the form of chloroform (Ray & Desai, 2016). In the past decade, nurse anesthetists and other forms of advanced practicing registered nurses (APRN) have begun to be educated at the doctoral level (Pritham & White, 2016). Nurse anesthetists specifically have announced that the entry-level education will be at the doctoral level as 2025 (Dunbar-Jacob, 2013). This change has influenced many aspects of healthcare and has had a profound impact on CRNAs in the surgical suite. In theory, higher education leads to improved practice, thereby improving patient outcomes. Yet, there is very little data on how doctors of nursing practice (DNP) have impacted the healthcare system (Pritham & White, 2016). One of the reasons behind this gap in knowledge is due to the lack of nursing impact data. It is challenging to measure how a profession’s education influences practice in healthcare; especially when multiple professions provide various aspects to patient care. Observing how doctorally prepared nurses are affecting IPC within the surgical suite will support defining DNP’s impact on healthcare and provide a possible path for DNP impact measurement. How do advanced nurse practitioners, specifically CRNA’s, one to five years’ post-graduation demonstrate interprofessional collaboration defined by non-technical skills
(NTS) measured by the TeamSTEPPS 2.0 observational worksheet within the perioperative period?

**Nature**

The nursing profession has been evolving to keep pace with the demanding needs of healthcare (Paplam & Austin-Ketch, 2015). An example of this evolution is the development of the DNP in 2004 (Pritham & White, 2016). Measurement of DNP programs’ impact on healthcare is paramount to assure program quality and optimization of educational outcomes (Paplam & Austin-Ketch, 2015). Generally speaking, there are three areas developed during the education of a DNP. Academic knowledge acquisition is the first area. Taking tests of didactic material during school is the standard of evaluation for this subject. Clinical techniques and skills are the second areas of education. Skills are developed and tested through clinical course simulation and hours spent providing patient care. The third area is non-technical skills, evident in *DNP essentials* six and eight (American Association of Colleges of Nursing, 2006). These skills include communication, leadership, critical thinking, and aspects of inter-professional collaboration. Interprofessional collaboration can be defined as; organized and efficient team structures, unhindered and organized communication, clear, balanced leadership, continuous and collaborative situation monitoring and mutual support among team members (King et al., 2008).

Non-technical skills observation and how it impacts the local healthcare system will test an avenue for collaborative interprofessional assessment. Linking non-technical skills developed in graduate education to skills observed in the workplace will further define the relationship between IPE and IPC. Further description of how IPC education and skills gained through this education is needed (Cox et al., 2016).
The Agency for Healthcare Research and Quality (AHRQ) has identified the TeamSTEPPS training as a program that can improve patient care (Shaw, 2015). TeamSTEPPS focuses on improving team structure, leadership, situation monitoring, mutual support, and communication. TeamSTEPPS supports development in the aforementioned non-technical skills due to the association with improved patient outcomes that have been seen with the improvement of these non-technical skills (Shaw, 2015). All of the above-listed qualities of TeamSTEPPS are also said to be improved upon when completing a DNP program under Essential VI of the DNP essentials (American Association of Colleges of Nursing, 2006). When comparing the Masters of Nursing Essentials to the DNP Essentials the wording describes an evolution from champion to expert in interprofessional collaboration (American Association of Colleges of Nursing, 2006; Nursing, 1996).

Using the TeamSTEPP 2.0 tool to observe the surgical suite, while focusing on new graduate CRNAs, provides a way to gauge NTS outcomes of nursing programs. Furthermore, this observation measures the IPC impact DNPs are having on the local surgical environment all while providing measurable data points for larger studies. Observations of this nature, provide direction for areas of educational improvement for new graduates and hospital employees.

**Project Objectives/Goals**

This project has two primary objectives. Objective one: Describe surgical teams’ interprofessional collaboration with newly graduated CRNAs and measure IPC using a non-technical skills assessment tool that uses TeamSTEPPS. Objective two: Use analytic software to determine if any of the observed non-technical skills defined by TeamSTEPPS, years of education and experience have a correlational relationship.
Theoretical Framework

Interprofessional Learning Continuum

The exploration of the benefits regarding the amalgamation of IPE into educational programs and its relationship to IPC has been discussed for over half a century (Cox et al., 2016). However, there has been an increased push to develop and explore relevant educational pathways that result in improved IPC (Reeves et al., 2013). Nursing has identified the DNP as the terminal degree for APRN’s and uses the *Masters Essentials* and *DNP Essentials* to guide the education of IPC non-technical skills in these graduate nursing students. It is now generally accepted that improved IPC leads to improved outcomes, reduced costs and overall improvements in population health (Cox et al., 2016; Weaver et al., 2010). The Institute of Medicine (IOM) gathered a group of experts in the field of IPC and IPE to define this continuum of IPC development (Cuff, 2013). The result of this meeting validated the need for further research and development of guiding theories. A committee was created to dive into the research and determine the best methods for measuring the impact of IPE on IPC and define the variables involved with IPC enhancement (Cox et al., 2016).

The results of the IOM committee identified some key areas concerning the IPE to IPC continuum that needs improvement (Cox et al., 2016). A closer alignment of IPE and health care IPC is necessary (Cox et al., 2016). There is a lack of conceptual frameworks for measuring the impact of IPE, the evidence base for IPE is weak, and linking IPE with IPC behavior in the field is needed (Cox et al., 2016). The need for improved conceptual frameworks led to the development of the interprofessional learning continuum (IPLC) model. This theoretical framework defines the education-to-practice continuum of IPE. The IPLC describes a process of growth that occurs, both in the education phases and in informal settings that define how
collaborative skills are developed and utilized. The IPLC identifies interfering factors and how learning and limiting factors fluctuate to influence health systems and outcomes. The IPLC helps guide this project in a way that allows guidance of outcome analysis and identifies some barriers that could inhibit the research. Nursing education *Essentials* align with the IPLC and describes educational outcomes that result with improved IPC through advanced IPE (American Association of Colleges of Nursing, 2006).

**Review of the Literature**

This literature review was conducted using; EBSCO, PubMed, Google Scholar, CINAHL, the Cochrane Collaboration and the University of Buffalo’s library databases. Search terms included: Doctor of Nursing Practice, Impact, Non-Technical Skills, TeamSTEPPS, Surgical Team, Outcomes, Education, Masters Prepared, Advance Nurse Practitioner, Patient Satisfaction. The combination of the above terms used Boolean phrases; AND, OR, and NOT when searching. No discrimination was performed for inclusion regarding age, gender, and language (if translated into English). The article title was the first layer of exclusion, and then further exclusion was enhanced by abstract.

Paplham & Austin-Ketchch (2015) describe the American Association of Colleges of Nursing (AACN) formalization of the Doctor of Nursing Practice (DNP) degree in 2004. The AACN has also directed that APRNs will start to be trained at the DNP level and will eventually require this degree level for entree into practice (Cronenwett et al., 2011). Paplham & Austin-Ketch (2015) continue to discuss the difficulty measuring the impact of this new education directive. The biggest problem in evaluating DNP programs is that there is little data on impact and no standardized mechanism of measurement (Pritham & White, 2016). Due to the complexity and variety of program evaluations, finding the correct tool for measuring outcomes

The IPLC theory of the education-to-practice continuum directs this research away from technical skills and redirects it towards the non-technical skill. This redirection is based on the understanding that successful IPC can be broken down into specific non-technical skills. Doctor of Nursing Practice programs teaches both technical and non-technical skills (Terhaar, Taylor, & Sylvia, 2016). Measurement of non-technical skills listed in program outcomes can be a challenge to measure at clinical sites (Lyk-Jensen et al., 2016). To correctly and accurately measure outcomes in a clinical setting provides useful information for programs and healthcare systems. Due to the Affordable Care Act (ACA), patient outcomes are now linked to reimbursement (Jadotte, Chase, Qureshi, Holly, & Salmond, 2017). Thus, measurement and assessment of how graduate level nurses contribute to patient outcomes have a direct correlation to financial impact and patient care outcomes.

Linking nursing program interprofessional education (IPE) to patient outcomes requires further elaboration. The DNP and Masters Essentials guide both nursing course topics and outcomes (American Association of Colleges of Nursing, 2006; Pritham & White, 2016). In Essentials VI, interprofessional collaboration is described (American Association of Colleges of Nursing, 2006). Interprofessional collaboration has been demonstrated to improve patient outcomes (Reeves et al., 2013). Patient outcomes in the operating rooms are significantly improved, at all levels, by improved teamwork skills (Weaver et al., 2010). However, a call for
more data on quantifying how interprofessional collaboration is affecting patient outcomes is needed (Reeves et al., 2013).

Even though interprofessional collaboration and education are in the Essentials of Nursing, interprofessional skill development does not appear to be a major educational topic (Killien et al., 2016; Madsen Gombkoto et al., 2014). Simulation training with multiple professions incorporated has been demonstrated successfully (Reeves et al., 2013). Focused education on non-technical skills in anesthesia crisis management improves simulation outcomes with resident providers (Yee et al., 2005). No baseline data has been found regarding interprofessional collaboration post-education focusing on APRNs.

The evaluation of interprofessional skills post-APRN education will provide valuable data in a number of ways. First, it will help fill a gap for impact data on how APRN’s are impacting interprofessional areas, in this project the operating room. Impact data can be derived by evaluation of how DNP Essentials manifest in the field (Pritham & White, 2016). The Doctor of Nursing Practice Essentials are being used due to the conversion of Masters prepared APRNs to DNPs that is currently going on in the US (Cronenwett et al., 2011). Second, this project will provide data for educational institutions on how Essential VI is being observed post-graduation. Nurse educators need educational impact data to determine if the current education path is the right direction (Dunbar-Jacob, Nativio, & Khalil, 2013). Third, these data are offering a baseline outcome measure that could be used as a reference point in other studies. Finally, observational teamwork assessments offer local institutions data on teamwork in their facility.

Finding a tool that is validated and has demonstrated a correlation between patient outcomes has been a challenge. Though self-reporting provides subjective data, the reliability and validity could be questioned (Ross et al., 2016). The use of the Nurse Anesthetists’ Non-
Technical Skills system (N-ANTS), a non-technical skills evaluative tool, provides a reliable and valid way for supervisors to assess CRNA non-technical skills at the clinical site (Lyk-Jensen et al., 2016). Even if the N-ANTS provides an accurate way for supervisors to assess IPC, it lacks a teamwork focus. Many non-technical skill assessment tools have reliability and validity issues (Wooding, Gale, & Maynard, 2016).

The Agency for Healthcare Research and Quality (AHRQ) and the Department of Defense (DoD) have developed the TeamSTEPPS system that improves teamwork by improving collaboration and communication. Even if there is not an agreed-upon measurement tool to assess DNP collaborative skills and education, TeamSTEPPS 2.0 has an observational tool that can provide insight on new DNP’s teamwork attributes and has been validated. This tool shows potential for this project.

The Agency for Healthcare Research and Quality (AHRQ) has demonstrated the TeamSTEPPS training is a program that can improve patient care (Shaw, 2015). Poor interprofessional collaboration has been shown to increase the cost of healthcare through preventable medical and medication errors, hindering patient outcomes though diminished quality and quantity of treatments, and diminishing the overall efficiency of the healthcare system (Cox et al., 2016; King et al., 2008; Weaver et al., 2010). TeamSTEPPS focuses on improving team structure, leadership, situation monitoring, mutual support, and communication as non-technical skills that lead to improved patient outcomes (Shaw, 2015). All of the above-listed qualities of TeamSTEPPS are also said to be improved upon when completing a DNP program under Essential VI of DNP outcomes (American Association of Colleges of Nursing, 2006). The difference between Masters and Doctoral nurses is defined in the Essentials of each educational track. The Masters Essentials describe a provider who is a champion of IPC,
whereas the doctorally-prepared nurse is described as an expert and leader of IPC. Using the TeamSTEPPS 2.0 tools to observe the surgical suite while observing teams with the masters prepared and doctorally prepared CRNAs provides a way to gauge non-technical outcomes of nursing programs and measure the impact DNPs are having on the local surgical environment.

This literature review has uncovered a gap in knowledge the can be addressed by this project. Specifically, there is a need for DNP impact data and interprofessional education effects on healthcare (Paplham & Austin-Ketch, 2015; Pritham & White, 2016; Reeves et al., 2013). The DNP Essentials, the new standard for APRN educational direction, state that new graduate DNP’s will have advanced interprofessional collaboration skills (American Association of Colleges of Nursing, 2006). Improved interprofessional collaboration skills improve patient outcomes (Cox et al., 2016; Reeves et al., 2013; Weaver et al., 2010; Yee et al., 2005). Certified Registered Nurse Anesthetists are a subset of APRN’s who work every day in the operating suite. The operating room is an area of healthcare that has constant interprofessional interaction. Thus, objectively observing CRNA interprofessional skills in the operating room should provide data that can be used by educational institutions for improvement while simultaneously generating data on how APRN’s in the operating room contribute to interprofessional collaboration and improving patient outcomes.

**Justification/Validity**

The Agency for Healthcare Research and Quality (AHRQ) has identified the TeamSTEPPS training as a program that can improve patient care (Shaw, 2015). TeamSTEPPS focuses on improving team structure, leadership, situation monitoring, mutual support, and communication as on-technical skills that lead to improved patient outcomes (Shaw, 2015). All of the above-listed qualities of TeamSTEPPS should also be said to be improved upon when
completing a DNP program under Essential VI of DNP outcomes (American Association of Colleges of Nursing, 2006). Using the TeamSTEPPS 2.0 tool to observe the surgical suite with masters and doctorally prepared CRNAs provides a way to gauge post graduate non-technical skills in action while adding to the impact DNPs are having on the local surgical environment.

The TeamSTEPPS 2.0 observation tool has been demonstrated to correctly assess the quality of healthcare teams in simulation and in real-time (Chiu, 2014). Experts and novices have been able to score teams with little variation of scores and minimal training (Chiu, 2014). Reliability and validity studies have shown that improved scores of the TeamSTEPPS 2.0 observational tool lead to enhanced patient outcomes (King et al., 2008; Maguire, 2016).

Methods

Design

The overall goal of this study is to observe the relationship between team members in the surgical suite and identify if increased education on the part of the CRNA provides an increase in non-technical skills. Thus, facilitating improved patient care through improved IPC. Due to the observational method of data collection, this study design is classified as quantitative research (Polit & Beck, 2008). Specifically, aiming to describe a relationship between multiple variables and using variables that can’t be manipulated, makes this an observational descriptive correlational study (Polit & Beck, 2008).

Occurring in two separate institutions, this study involved sixteen total participants. Eight masters prepared CRNA’s and eight doctorally prepared CRNA’s. Prior to approaching the institutions, an Institutional Review Board (IRB) approval was obtained from the University at Buffalo (UB), see appendices A. After UB IRB was approved, a reliance agreement (Appendices B) was organized for the study to be conducted at the University of Rochester’s Medical Center.
(URMC) Strong Memorial Hospital (SMH). The Kaleida anesthesia group had a standing agreement with UB and deferred to their IRB decision.

A Two-sample t-test and a Pearson’s r test were run on all variables to find a correlation between variables. The difference in the scores between the two educational groups provided data defining at what level surgical teams perform with varying levels of CRNAs education and experience. Team structure, leadership, situation monitoring, mutual support, and communication skills have been linked to improved patient outcomes (Shaw, 2015).

Due to the nature of this project and the focus on interprofessional collaboration, no patient information was required. No participant’s names were being utilized or recoded. The only information that was necessary was demographic information. This information was kept on a secure computer, and paper forms were maintained in a locked file cabinet in the researcher’s office located in Wende Hall at the University at Buffalo. Enrollment in this project occurred through one-on-one private conversations, sign-up fliers and emails. No coercion to enroll was attempted. Participant members remain anonymous, and team scores were de-identified to prevent any retribution to interprofessional collaboration measurement. There should be no ethical conflicts in this study. There was no anticipated risk to fetuses or pregnant participants.

Measures

The tool used to score each CRNA was the TeamSTEPPS 2.0 observational tool. This tool has scorings for team structure, communication, leadership, situation monitoring and mutual support. The DV has four to six defining sub-variables that describe the variable and add measuring power (Appendix C). Validation and bias have been accounted for by completing
TeamSTEPP 2.0 training. Alexander Rorie, the author, participated in online-training provided by the AHRQ for tool use. A letter allowing the use of this tool is located in Appendix D.

The TeamSTEPPS 2.0 observational tool was created using the TeamSTEPPS core values as variables and measures how a team’s works together. Some additional measurements have been added to the tool. Specifically, some demographic data was needed for correlational analysis. Measurements that were added included; experience as an RN, experience as an CRNA, level of education and where the participant graduated (Appendix E). Experience has been accounted for through the selection of staff with similar years of experience, in this case, less than five years. The addition of demographic data allows for a correlational analysis of education and experience to non-technical skills measured by the TeamSTEPPS 2.0 observational worksheet scores.

Enrollment utilized two techniques. At the Kaleida facility, informational sign-up sheets were posted in breakrooms and hallways for one week. After the first week, enrollment was assisted by one-on-one conversations. At URMC a sign-up sheet was posted in the breakroom, and an informative email was sent to all the CRNA’s on the anesthetist distribution list proved to me by the chief nurse anesthetist. After one week, one-on-one conversations boosted enrollment. Prior to the signing of each consent form, the observer reviewed all aspects of the consent form and reminded each participant that this was strictly voluntary and they could drop out for any reason with no repercussions by the observer or the employer. Also included in this conversation was highlighting of IRB and support numbers, de-identification and how the employers would not have access to individual scores or observations, where the information would be located and how it was protected, reinforcement of patient anonymity, and how the study had built in risk protection for emotional or unintended damage.
Data Collection

Data collection was obtained through observations made by the lead researcher, Alexander Rorie. Using the TeamSTEPPS tool created by the AHRQ, after participation in training using the tool provided by AHRQ, data was collected from URMC and Kalida institutions. Data collection started after consent was obtained and prior to when the CRNA first looked up patient information on the day of surgery. Data collection ended when care of the patient was passed to the post anesthesia care unit (PACU) nurse. After each observation day, data was entered into Microsoft’s Excel, coded and organized in preparation for SPSS input. All data was coded and de-identified prior to SPSS entry on a secured laptop. All paper copies of observations are kept in a locked cabinet in the researcher’s office.

Results

Description

Observations occurred on CRNA’s who have graduated from a graduate program within the past one to five years. A total of sixteen CRNA’s were observed (N=16). Seven masters prepared and one doctorally prepared CRNA were observed from the Kaleida group in Buffalo, NY. Also, seven doctorally prepared and one masters prepared CRNA from the University of Rochester Medical Center (URMC) in Rochester, NY were observed. Doctor of nursing practice education was completed by participants (n=8) in New York (87.5%) and Virginia (12.5%). Masters education was completed by participants (n=8) in Michigan (12.5%), Ohio (12.5%), New York (25%) and Florida (50%).

Mean experience as a registered nurse (RN) before working as a CRNA was 6.75 years in the Kaleida group with a mean CRNA work experience of 2.13 years. In the URMC group, mean
experience as an RN before working as a CRNA was 5.63 years with a mean CRNA experience of 1.73 years. No statistical difference was noted between years of experience across settings or educational level. The one-year difference in experience can be accounted for the additional year of education that is required of DNP’s

Variables were coded using a five-point scale for each of the measures used in the TeamSTEPPS 2.0 observational tool. A two-point scale was used for coding the different degrees of education and anesthesia group. Graduation location was grouped by state and coded. Years of experience was left as is. Data analyses were done with the help of SPSS a statistical analysis program and reviewed by a statistical consultant for interpretive and data entry validation.

**Data Analysis/Interpretation**

**Two-Sample t-Test**

A two-sample t-test was used to analyze the overall mean scores of the TeamSTEPPS observation tool between DNPs and Masters prepared CRNA’s. The t-test revealed a difference in mean scores between the two groups of 21.25 (Masters Mean = 72.13 and DNP Mean = 93.38). The t-test resulted in an F = 5.532 and a Sig. of 0.034 (<0.05); so equal variances were not assumed in this case. As variances were not equal, a Sig. (2-tail) resulted in 0.005.

After noting that seven out of eight DNP’s were at URMC and seven out of eight Masters worked at Kaleida, this author wanted to see if there was a difference in scores based on where you worked. A second two-sample t-test was used to analyze the overall mean scores of the TeamSTEPPS observation tool between URMC and Kaleida CRNA’s. This was run after the initial analyses were run. The t-test revealed a difference in mean scores between the two groups of 21.25 (Masters Mean = 72.13 and DNP Mean = 93.38). The t-test resulted in an F = 5.532 and
a Sig. of 0.034 (<0.05), so equal variances were not assumed in this case. As variances were not equal, a Sig. (2-tail) resulted in 0.005.

The t-tests revealed a statistically significant difference in means of overall TeamSTEPPS scores between education levels favoring the DNP group. The second t-test used to analyze the anesthesia group with overall TeamSTEPPS scores resulted in the same difference in means. This result will be discussed in the next section. The fact that seven of the eight DNPs worked at URMC resulted in URMC having higher overall scores.

[Insert table 1 here]

**Pearson’s r**

A correlative Pearson’s r was performed to analyze the linear relationship between all the variables that were used in the t-test’s (Master/Doctoral with overall TeamSTEPP scores) and on overall TeamSTEPPS 2.0 observational scores. Using an alpha equal to 0.05, Pearson’s correlation resulted with a 0.71, with a Sig. (2-tailed) of 0.002.

[Insert table 2 here]

A correlative Pearson’s r was run using years’ experience as an RN and CRNA with overall TeamSTEPPS scores. A Pearson’s correlation of -0.155 with a Sig. (2-tailed) of 0.566 (significant at the 0.01 level) was expressed for RN experience. A Pearson’s correlation of -0.45 with a Sig. (2-tailed) of 0.87 was expressed for CRNA experience.

[Insert table 3 here]

Further Pearson’s correlative analysis between educational level and specific TeamSTEPPS scores were completed to detail specific areas of linear relationships. Using an
alpha equal to 0.05, the following areas of specific TeamSTEPPS score demonstrated a linear relationship with education level: Assigns or identifies team members’ roles and responsibilities; \( r = .606, p = 0.013 \), holds team members accountable; \( r = .668, p = 0.005 \), provides brief, clear, specific and timely information to team members; \( r = .641, p = 0.008 \), uses check-backs to verify information that is communicated; \( r = .674, p = 0.00 \), uses SBAR, call-outs, and handoff techniques to communicate effectively with team members; \( r = .766, p = 0.001 \), identifies team goals and vision; \( r = .597, p = 0.015 \), delegates tasks or assignments, as appropriate; \( r = .799, p = < 0.00 \) conducts briefs, huddles, and debriefs; \( r = .853, p = < 0.001 \), monitors fellow team members to ensure safety and prevent errors; \( r = .589, p = 0.16 \), and fosters communication to ensure that team members have a shared mental model; \( r = .651, p = 0.006 \).

The Pearson’s correlations above show a statistically significant difference in means between education level and overall TeamSTEPPS score (\( r = .71, p = 0.002 \)). This correlation confirms that, in this subject group, the increased education level of DNP’s is associated with higher overall TeamSTEPPS scores and specific areas defined in Table 3.

The Pearson’s r that was run using years’ experience as an RN (\( r = -0.155, p = 0.566 \)) and CRNA (\( r = -0.45 p = 0.87 \)) with overall TeamSTEPPS scores did not show any significant impact on TeamSTEPPS scores. Experience as an RN or as a CRNA did not influence overall TeamSTEPPS scores in this study.

Overall, these data support the claim that there is a difference in TeamSTEPPS scores when comparing masters and doctorally prepared CRNA’s. In this study, doctorally prepared CRNA’s demonstrated interprofessional skills at a higher level than masters prepared CRNA’s when using
the TeamSTEPPS observational worksheet. Due to the demographic makeup of this study’s sample, where the participant worked (anesthesia group) mirrored the results of the education level.

**Discussion**

In this study, doctorally prepared CRNA’s scored higher on the TeamSTEPPS observational worksheet, independent of experience. However, separation of anesthesia group and level of education was not possible. We can conclude that, in this group, either higher educational training or place of employment leads to an increase in skills identified by the TeamSTEPPS 2.0 observational worksheet.

The reason for identical results between anesthesia group and education level may be attributed to the employment practices associated with each group. The URMC group employed seven of the eight DNP’s and the Kaleida group only employs a single DNP. There is an unknown factor that is influencing the increased employment of DNPs at URMC. These data signify that didactic education or the anesthesia group is the primary relationship for the development and utilization of collaborative techniques for this group.

These data also add to the Institute of Medicine’s (IOM) request to discover where interprofessional education is best learned; institutional or academic (Cox et al., 2016). This research suggests that IPC didactic training and institutional culture have a positive influence on interprofessional collaboration. The IPLC describes this development of skills, stating that as education increases so does IPC skills (Cox et al., 2016). The IPLC also describes the relationship that institutional culture has on IPC (Cox et al., 2016). In this study, increased education and institutional culture seemed to have a positive influence on IPC. This positive
influence adds credibility to the IPCL model’s description of the IPE to IPC continuum. However, with the inability to separate education level from institutional culture, conclusions from this research cannot be made. The IPCL model is still new and further development demonstrating its validity is still needed.

The *Nursing Essentials* provide criteria for DNP improvement. The *Essential* describe a progression in IPC skills when compared to masters prepared CRNAs. The outcomes of this project may bring additional validity to that claim. Using the TeamSTEPPS worksheet, this research demonstrates a way to assess the impact doctorally prepared CRNA’s are having on interprofessional collaboration in the OR. These data demonstrate that the more doctorally prepared CRNA’s employed at a hospital will result in increased interprofessional collaboration in the OR and thus improved patient outcomes. Unfortunately, there was no single anesthesia group in Buffalo or Rochester that employs an adequate number of masters and doctorally prepared CRNA’s to differentiate anesthesia group and education level as a correlation to improved TeamSTEPPs scores.

Measurement of interprofessional collaboration is possible through the use of the TeamSTEPPS observational worksheet (Cox et al., 2016). Measurement of such skills demonstrated the positive impact that doctorally prepared CRNA’s are having on the upstate NY healthcare system through the improvement of IPC. This research supports adding the TeamSTEPPS 2.0 observational worksheet as a tool to discover how DNP education is impacting interprofessional collaboration of healthcare systems as a whole. This research also provides an avenue to start the discussion on how to measure interprofessional collaboration in the operating suite and hopefully throughout healthcare. With the growing literature supporting the positive effects of interprofessional collaboration to patient outcomes, leaders in IPC will have an
increasing impact and value to healthcare systems. Ways to derive the impact advanced practicing nurses are making to the healthcare team concerning IPC has been explored with this research.

Limitations

The biggest limitation of this study was that the sample size was small. Although there was evidence to support that DNP education improves observed overall TeamSTEPPS scores, the results we unable to differentiate between anesthesia group and education level, in relation to increased overall TeamSTEPPS scores. The demographics in this study was a limiting factor. Due to the different educational experiences of the participants, possible TeamSTEPPS training could have bolstered some scores of the participants in this study. Finally, the author of this research is currently enrolled in a DNP graduate program, and this could contribute to potential observational bias.

Conclusion and Future Study

In order to further define the relationship between education and IPC in the nursing profession, additional studies involving factors that contribute to the development of IPC is recommended. Even though this study suffers from many limitations, the direction of research helps takes another step in defining the IPE to IPC continuum. Defining how institutional culture influences IPC is recommended as a future area of study. Studying how other professions train in IPC and how these skills are measured would further advance the IPLC model. Expanding the testing of IPE in other nursing professions utilizing the TeamSTEPPS 2.0 observational worksheet would be another area of recommended research. Finally, finding an institution that employs both MSN’s and DNPs as CRNA’s in adequate numbers to test the results of this
research would bring much needed discussion to the field of IPC and how education impacts its practice. As the stress continues to build within healthcare systems due to; workforce shortages, increasing populations of the sick and elderly, and financial stress continues, finding ways to improve patient outcomes through the direction of the *Triple Aim* becomes imperative. Development of non-technical skills within the healthcare workforce has the potential to assist in the maintenance of the degrading healthcare system.
References


Appendices A

University of Buffalo IRB Approval

February 16, 2018

Dear Alexander Rorie,

On 2/16/2018, the University at Buffalo IRB reviewed the following submission:

<table>
<thead>
<tr>
<th>Type of Review:</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title of Study:</td>
<td>Linking Graduate Nursing Interprofessional Education to Collaboration in Upstate New York</td>
</tr>
<tr>
<td>Investigator:</td>
<td>Alexander Rorie</td>
</tr>
<tr>
<td>IRB ID:</td>
<td>MOD000005774</td>
</tr>
<tr>
<td>Documents Reviewed:</td>
<td>Dept Letterhead Consent Form Final V2.pdf, Category: Consent Form;</td>
</tr>
</tbody>
</table>

The University at Buffalo Institutional Review Board has considered the submission for the project referenced above on 2/16/2018 and determined it to be Exempt.

In conducting this study, you are required to follow the requirements listed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the Click system.

UBIRB exemption is given with the understanding that the most recently approved procedures will be followed and the most recently approved consenting documents will be used. If modifications are needed that may change the exemption determination, please contact the UB IRB Office. Also, see the Worksheet: Exempt Determination (HRP-312) for information on exemption criteria and categories.

As principal investigator for this study involving human participants, you have responsibilities to the SUNY University at Buffalo IRB (UBIRB) as follows:

1. Ensuring that no subjects are enrolled prior to the IRB approval date.

2. Ensuring that the UBIRB is notified of:
   - All Reportable Information in accordance with the Reportable New Information Smart Form.
   - Project closure/completion by submitting a Continuing Review/Modification/Study Closure Smart Form in Click.
3. Ensuring that the protocol is followed as approved by UBIRB unless minor changes that do not impact the exempt determination are made.

4. Ensuring that the study is conducted in compliance with all UBIRB decisions, conditions, and requirements.

5. Bearing responsibility for all actions of the staff and sub-investigators with regard to the protocol.

6. Bearing responsibility for securing any other required approvals before research begins.

If you have any questions, please contact the UBIRB at 716-888-4888 or ub-irb@buffalo.edu.
Appendices B

URMC Reliance Agreement Letter

OFFICE FOR HUMAN SUBJECT PROTECTION
Research Subjects Review Board

2/19/18

Jennifer Gewandter/Alexander Rorie
Anesthesiology
University of Rochester

Regarding:
*Linking Graduate Nursing Inter-professional Education to Collaboration in Upstate New York*

UR Institutional Tracking #: RSRB70888

Dear Dr. Gewandter/Mr. Rorie:

The RSRB has completed an institutional review of the study noted above. This letter documents our agreement to rely on the University of Buffalo IRB and also confirms compliance with University of Rochester requirements.

- **Education** - All study personnel have completed the required Human Subject Protection training.
- **Potential Conflicts of Interest** - No study team members have a potential conflict of interest related to the research to be conducted.
- **Site-specific Consent Forms** – All consent forms have been revised to include the necessary language, as applicable.
- **Ancillary Committees** – All institutionally required ancillary committee approvals have been granted, as applicable.

Please feel free to contact me if you have any questions regarding this institutional review.

Thank you,

[Signature]

Kristin Daunenauer
Assistant Regulatory Specialist - Reliance
Research Subjects Review Board Office
University of Rochester
kristin_daunenauer@urmc.rochester.edu

Saunders Research Building - 265 Crittenden Blvd, Suite 1.250 - Box CU420628 - Rochester, NY 14642-0628
585.273.4127 - 585.273.1174 fax
Team Performance Observation Tool

<table>
<thead>
<tr>
<th>1. Team Structure</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Assembles a team</td>
<td></td>
</tr>
<tr>
<td>b. Assigns or identifies team members’ roles and responsibilities</td>
<td></td>
</tr>
<tr>
<td>c. Holds team members accountable</td>
<td></td>
</tr>
<tr>
<td>d. Includes patients and families as part of the team</td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td>Overall Rating – Team Structure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Communication</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Provides brief, clear, specific, and timely information to team members</td>
<td></td>
</tr>
<tr>
<td>b. Seeks information from all available sources</td>
<td></td>
</tr>
<tr>
<td>c. Uses check-backs to verify information that is communicated</td>
<td></td>
</tr>
<tr>
<td>d. Uses SBAR, call-outs, and handoff techniques to communicate effectively with team members</td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td>Overall Rating – Communication</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Leadership</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Identifies team goals and vision</td>
<td></td>
</tr>
<tr>
<td>b. Uses resources efficiently to maximize team performance</td>
<td></td>
</tr>
<tr>
<td>c. Balances workload within the team</td>
<td></td>
</tr>
<tr>
<td>d. Delegates tasks or assignments as appropriate</td>
<td></td>
</tr>
<tr>
<td>e. Conducts briefs, huddles, and debriefs</td>
<td></td>
</tr>
<tr>
<td>f. Role models teamwork behaviors</td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td>Overall Rating – Leadership</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4. Situation Monitoring</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Monitors the status of the patient</td>
<td></td>
</tr>
<tr>
<td>b. Monitors fellow team members to ensure safety and prevent errors</td>
<td></td>
</tr>
<tr>
<td>c. Monitors the environment for safety and availability of resources (e.g., equipment)</td>
<td></td>
</tr>
<tr>
<td>d. Monitors progress toward the goal and identifies changes that could alter the plan of care</td>
<td></td>
</tr>
<tr>
<td>e. Fosters communication to ensure that team members have a shared mental model</td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td>Overall Rating – Situation Monitoring</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Mutual Support</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Provides task-related support and assistance</td>
<td></td>
</tr>
<tr>
<td>b. Provides timely and constructive feedback to team members</td>
<td></td>
</tr>
<tr>
<td>c. Effectively advocates for patient safety using the Assertive Statement, Two-Challenge Rule, or CIIS</td>
<td></td>
</tr>
<tr>
<td>d. Uses the Two-Challenge Rule or DESC Script to resolve conflict</td>
<td></td>
</tr>
<tr>
<td>Comments:</td>
<td>Overall Rating – Mutual Support</td>
</tr>
</tbody>
</table>

**TEAM PERFORMANCE RATING**
Appendices D
Letter for use of TeamSTEPPS Observational Tool

September 5, 2017

Alexander Querin-rorie
DNP Candidate, School of Nursing
University at Buffalo
Buffalo, NY

Dear Allee:

This letter is to grant you permission on behalf of the Agency for Healthcare Research and Quality (AHRQ) to use the TeamSTEPPS® 2.0 Team Performance Observation Tool (https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/education/curriculum-tools/teamstepps/instructor/reference/mpot.pdf) in your doctoral research. You have permission to reprint the tool for your research, comparing interprofessional professional education skills in two cohorts of Certified Registered Nurse Anesthetists and include it as an appendix to your capstone paper. If you reprint the tool in an appendix, please note, “Reprinted with permission of the Agency for Healthcare Research and Quality.” The suggested reference citation for TeamSTEPPS® is:


If you have any additional questions, please contact me.

Sincerely,

David I. Lewin, M.Phil.
Health Communications Specialist/Manager of Copyrights & Permissions
Office of Communications and Knowledge Transfer
Agency for Healthcare Research and Quality
5600 Fishers Lane
Room # 07N58D / Mail Stop # 07N94A
Rockville, MD 20857 USA
Email: David.Lewin@ahrq.hhs.gov
Phone: +1 301-427-1895
# TeamSTEPPS® 2.0

## Team Performance Observation Tool

**Data:**  
**Unit/Department:**  
**Team:**  
**Shift:**  
**Rating Scale:**  
1 = Very Poor  
2 = Poor  
3 = Acceptable  
4 = Good  
5 = Excellent  
**Please comment if 1 or 0:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Team Structure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Assembles a team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Assigns or identifies team member roles and responsibilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Holds team members accountable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Includes patients and families as part of the team</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Comments:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Overall Rating – Team Structure</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 2. Communication              |        |                                                                        |
| a. Provides brief, clear, specific, and timely information to team members |        |                                                                        |
| b. Seeks information from all available sources |        |                                                                        |
| c. Uses check-backs to verify information that is communicated |        |                                                                        |
| d. Uses SIDAR, call-outs, and handoff techniques to communicate effectively with team members |        |                                                                        |
| **Comments:**                 |        |                                                                        |
| **Overall Rating – Communication** |       |                                                                        |

| 3. Leadership                 |        |                                                                        |
| a. Identifies team goals and vision |        |                                                                        |
| b. Uses resources efficiently to maximize team performance |        |                                                                        |
| c. Balances workload within the team |        |                                                                        |
| d. Delegates tasks or assignments, as appropriate |        |                                                                        |
| e. Conducts briefs, huddles, and debriefs |        |                                                                        |
| f. Role models teamwork behaviors |        |                                                                        |
| **Comments:**                 |        |                                                                        |
| **Overall Rating – Leadership** |       |                                                                        |

| 4. Situation Monitoring       |        |                                                                        |
| a. Monitors the status of the patient |        |                                                                        |
| b. Monitors fellow team members to ensure safety and prevent errors |        |                                                                        |
| c. Monitors the environment for safety and availability of resources (e.g., equipment) |        |                                                                        |
| d. Monitors progress toward the goal and identifies changes that could alter the plan of care |        |                                                                        |
| e. Foster communication to ensure that team members have a shared mental model |        |                                                                        |
| **Comments:**                 |        |                                                                        |
| **Overall Rating – Situation Monitoring** |       |                                                                        |

| 5. Mutual Support             |        |                                                                        |
| a. Provides task-related support and assistance |        |                                                                        |
| b. Provides timely and constructive feedback to team members |        |                                                                        |
| c. Effectively communicates for patient safety using the Assertive Statement, Two-Challenge Rule, or OUS |        |                                                                        |
| d. Uses the Two-Challenge Rule or BERS Script to resolve conflict |        |                                                                        |
| **Comments:**                 |        |                                                                        |
| **Overall Rating – Mutual Support** |       |                                                                        |

**TEAM PERFORMANCE RATING**
Tables

Table 1

Group Statistics: T Test Utilizing TeamSTEPPS Overall Scores and Education Level/Anesthesia Group.

<table>
<thead>
<tr>
<th>Education/Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masters</td>
<td>8</td>
<td>72.13</td>
<td>14.942</td>
<td>5.283</td>
</tr>
<tr>
<td>Doctoral</td>
<td>8</td>
<td>93.38</td>
<td>5.553</td>
<td>1.963</td>
</tr>
<tr>
<td>URMC</td>
<td>8</td>
<td>93.13</td>
<td>5.553</td>
<td>1.963</td>
</tr>
<tr>
<td>Kaleida</td>
<td>8</td>
<td>72.13</td>
<td>14.942</td>
<td>5.283</td>
</tr>
</tbody>
</table>

*Note:* There was a statistically significant difference in means of overall scores between education level and TeamSTEPPS score. Anesthesia group, represented by URMC and Kaleida, demonstrated exactly the same difference in means,
Table 2

Group Statistics: Pearson’s Correlations with TeamSTEPPS Worksheet Overall Score and Educational Level

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education Level</td>
<td>.710**</td>
<td>0.002</td>
<td>16</td>
</tr>
<tr>
<td>Anesthesia Group</td>
<td>.710**</td>
<td>0.002</td>
<td>16</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed)

Note: Results in this table demonstrate positive correlation between overall TeamSTEPPS scores and education level/anesthesia group.
Table 3

Group Statistics: Pearson’s Correlations with TeamSTEPPS Worksheets Overall Score

Experience as a RN and CRNA

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN Experience</td>
<td>-.155</td>
<td>.566</td>
<td>16</td>
</tr>
<tr>
<td>CRNA Experience</td>
<td>-.045</td>
<td>.870</td>
<td>16</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed)

Note: This table demonstrated that no correlation was noted between years of experience as a RN or CRNA and overall TeamSTEPPS score. Experience did not appear to influence overall TEAMSTEPPs scores.
Table 4

Significant Relationships Described by Pearson’s Correlations with TeamSTEPPS Worksheet

Education Level and Specific Areas of Measurement.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Score</td>
<td>.710**</td>
<td>0.002</td>
<td>16</td>
</tr>
<tr>
<td>Team Structure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assigns or identifies team member’s roles and responsibilities.</td>
<td>.606*</td>
<td>.013</td>
<td>16</td>
</tr>
<tr>
<td>Holds team members accountable</td>
<td>.668**</td>
<td>.005</td>
<td>16</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provides brief, clear, specific and timely information to team members</td>
<td>.641**</td>
<td>.008</td>
<td>16</td>
</tr>
<tr>
<td>Uses check-backs to verify information that is communicated</td>
<td>.674**</td>
<td>.004</td>
<td>16</td>
</tr>
<tr>
<td>Uses SBAR, call-outs, and handoff techniques to communicate effectively with team members</td>
<td>.766**</td>
<td>.001</td>
<td>16</td>
</tr>
<tr>
<td>Leadership</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifies team goals and visions</td>
<td>.594*</td>
<td>.015</td>
<td>16</td>
</tr>
<tr>
<td>Delegates tasks or assignments, as appropriate</td>
<td>.799**</td>
<td>.000</td>
<td>16</td>
</tr>
<tr>
<td>Conducts briefs, huddles, and debriefs</td>
<td>.853**</td>
<td>.000</td>
<td>16</td>
</tr>
<tr>
<td>Situation Monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitors fellow team members to ensure safety and prevent errors</td>
<td>.589*</td>
<td>.016</td>
<td>16</td>
</tr>
<tr>
<td>Fosters communication to ensure that team members have a shared mental model</td>
<td>.651**</td>
<td>.006</td>
<td>16</td>
</tr>
</tbody>
</table>

*. Correlation is significant at the 0.05 level (2-tailed)

**: Correlation is significant at the 0.01 level (2-tailed)

Note: Education level and anesthesia group had statistically significant correlations with the above specific areas of the TeamSTEPPs worksheet.
Table 5

Pearson’s Correlations with each of the Team Structure Measures of the TeamSTEPPS Worksheet.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Education Level</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembles a Team</td>
<td></td>
<td>a</td>
<td>a</td>
<td>16</td>
</tr>
<tr>
<td>Assigns or identifies team member’s roles and responsibilities</td>
<td></td>
<td>.606*</td>
<td>.013</td>
<td>16</td>
</tr>
<tr>
<td>Holds team members accountable</td>
<td></td>
<td>.668**</td>
<td>.005</td>
<td>16</td>
</tr>
<tr>
<td>Includes patients and families as part of the team</td>
<td></td>
<td>.252</td>
<td>.346</td>
<td>16</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

a. Cannot be computed because at least one of the variables is constant
Table 6

Pearson’s Correlations with each of the Communication Measures of the TeamSTEPPS Worksheet.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Education Level</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides brief, clear, specific and timely information to team members</td>
<td></td>
<td>.641**</td>
<td>.008</td>
<td>16</td>
</tr>
<tr>
<td>Seeks information from all available sources</td>
<td></td>
<td>.370</td>
<td>.159</td>
<td>16</td>
</tr>
<tr>
<td>Uses check-backs to verify information that is communicated</td>
<td></td>
<td>.674**</td>
<td>.04</td>
<td>16</td>
</tr>
<tr>
<td>Uses SBAR, call-outs, and handoff techniques to communicate effectively with team members</td>
<td></td>
<td>.766**</td>
<td>.001</td>
<td>16</td>
</tr>
</tbody>
</table>

*. Correlation is significant at the 0.05 level (2-tailed)

**. Correlation is significant at the 0.01 level (2-tailed)
Table 7

Pearson’s Correlations with each of the Leadership Measures of the TeamSTEPPS Worksheet.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifies team goals and vision</td>
<td>.594*</td>
<td>.015</td>
<td>16</td>
</tr>
<tr>
<td>Uses resources efficiently to maximize team performance</td>
<td>.160</td>
<td>.554</td>
<td>16</td>
</tr>
<tr>
<td>Balances workload within the team</td>
<td>.359</td>
<td>.172</td>
<td>16</td>
</tr>
<tr>
<td>Delegates tasks or assignments as appropriate</td>
<td>.799*</td>
<td>.000</td>
<td>16</td>
</tr>
<tr>
<td>Conducts briefs, huddles, and debriefs</td>
<td>.853**</td>
<td>.000</td>
<td>16</td>
</tr>
<tr>
<td>Role models teamwork behaviors</td>
<td>.354</td>
<td>.179</td>
<td>16</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)
Table 8

Pearson’s Correlations with each of the Situation Monitoring Measures of the TeamSTEPPS Worksheet.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Education Level</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitors the status of the patient</td>
<td></td>
<td>.320</td>
<td>.227</td>
<td>16</td>
</tr>
<tr>
<td>Monitors fellow team members to ensure safety and prevent errors</td>
<td></td>
<td>.589*</td>
<td>.016</td>
<td>16</td>
</tr>
<tr>
<td>Monitors the environment for safety and availability of resources</td>
<td></td>
<td>.450</td>
<td>.080</td>
<td>16</td>
</tr>
<tr>
<td>(equipment)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitors progress toward the goal and identifies changes that could</td>
<td></td>
<td>.356</td>
<td>.176</td>
<td>16</td>
</tr>
<tr>
<td>alter the plan of care</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fosters communication to ensure that team members have a shared</td>
<td></td>
<td>.651**</td>
<td>.006</td>
<td>16</td>
</tr>
<tr>
<td>mental model</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

Note:
Table 9
Pearson’s Correlations with each of the Mutual Support Measures of the TeamSTEPPS Worksheet.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Education Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides task-related support and assistance</td>
<td>Pearson Correlation</td>
</tr>
<tr>
<td>Provides timely and constructive feedback to team members</td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td>Effectively advocates for patient safety using the assertive statement, two-challenge rule, or CUS</td>
<td></td>
</tr>
<tr>
<td>Uses the two-challenge rule or DESC Script to resolve conflict</td>
<td>n</td>
</tr>
<tr>
<td></td>
<td>.475</td>
</tr>
<tr>
<td></td>
<td>.313</td>
</tr>
<tr>
<td></td>
<td>.480</td>
</tr>
<tr>
<td></td>
<td>.378</td>
</tr>
<tr>
<td></td>
<td>.063</td>
</tr>
<tr>
<td></td>
<td>.238</td>
</tr>
<tr>
<td></td>
<td>.060</td>
</tr>
<tr>
<td></td>
<td>.149</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

Note:
LINKING GRADUATE NURSING INTERPROFESSIONAL EDUCATION TO COLLABORATION IN UPSTATE NEW YORK

By: Alexander Rorie

Purpose:
• Exploring interprofessional collaboration (IPC) within surgical teams involving varying education levels of the Certified Registered Nurse Anesthetist (CRNA).
• Observing the effects interprofessional education (IPE) had on post-graduate CRNAs.
• Generating assessment data of IPC.

Purpose: (cont.)
• Contribute to the assessment of IPE and it’s effect on healthcare.
• Assessment of DNP IPC contribution.
• Add to the evolving discussion of impact and evaluations of DNPs.

Objective one: Describe surgical teams’ interprofessional collaboration with newly graduated CRNAs and measure IPC using a non-technical skills assessment tool that uses TeamSTEPPS.

Objective two: Use analytic software to determine if any of the observed non-technical skills defined by TeamSTEPPS, years of education, and experience have a correlational relationship.
PICO/Study Question:
How will advanced nurse practitioners, specifically, certified registered nurse anesthetists (CRNAs), 1-5 years post-graduation impact inter-professional collaboration based on non-technical skills measured by the TeamSTEPPS 2.0 observational worksheet within the perioperative period?

Background – Situation
- Radical changes are occurring within national and international healthcare systems (Cuff, 2013).
- Dynamic interaction between different professions are increasing as healthcare advances.
- Increasing age of population and costs of healthcare demand healthcare innovation.
- Triple Aim – Improve experience, improve population health and decrease cost (Berwick, Nolan, & Whittington, 2008).

Background – Nursing
- Nursing is the largest healthcare workforce in the US (American Association of Colleges of Nursing, 2011).
- The profession of nursing is evolving to meet the needs of the demanding healthcare system (Cronenwett et al., 2011).
- To meet the demand, nursing education pathways are undergoing improvement and advancement.
- Interprofessional education is an essential aspect of the advanced nurse practitioner (American Association of Colleges of Nursing, 2006).
Background – Essential

<table>
<thead>
<tr>
<th>Master-E Degree Program</th>
<th>DNP Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Advocate for the value and role of the professional nurse as member and leader of interprofessional healthcare teams.</strong></td>
<td></td>
</tr>
<tr>
<td>2. Understand other health professionals’ scopes of practice to maximize contributions within the healthcare system.</td>
<td></td>
</tr>
<tr>
<td>3. Use effective communication strategies in the design, coordination, and evaluation of patient-centered care.</td>
<td></td>
</tr>
<tr>
<td>4. Use effective communication strategies to develop, participate, and lead interprofessional teams and partnerships.</td>
<td></td>
</tr>
<tr>
<td>5. Mentor and coach new and experienced nurses and other members of the healthcare team.</td>
<td></td>
</tr>
<tr>
<td>6. Functions as an effective group leader or member based on an in-depth understanding of team dynamics and group processes.</td>
<td></td>
</tr>
</tbody>
</table>

1. **Employ effective communication and collaborative skills in the development and implementation of practice models, peer review, practice guidelines, health policy, standards of care, and/or other scholarly products.**
2. **Lead interprofessional teams in the analysis of practice organizational issues.**
3. **Employ consultative and leadership skills with interprofessional and interprofessional teams to create change in healthcare and complex healthcare delivery systems.**

**Background – IPE**

- There is a gap of knowledge on how IPE affects professional collaboration and patient outcomes (Reeves, Perrier, Goldman, Freeth, & Zwarenstein, 2013).
- The evaluation of IPE and IPC is underdeveloped (Cox, Cuff, Brandt, Reeves, & Zierler, 2016).
- Most conceptual frameworks lack the comprehensive ability to guide the measurement of IPE and IPC (Cox, Cuff, Brandt, Reeves, & Zierler, 2016).

**Background - IPC**

- The Institute of Medicine (IOM) identified IPC as a variable that effects patient outcomes (Cox, Cuff, Brandt, Reeves, & Zierler, 2016).
- Improved IPC leads to improved patient outcomes (Cox, Cuff, Brandt, Reeves, & Zierler, 2016).
- Improved non-technical skills (NTS) improve IPC (Cox, Cuff, Brandt, Reeves, & Zierler, 2016).
- DNP students are expected to have advanced IPE and skills that will contribute to IPC (American Association of Colleges of Nursing, 2006).

**Theoretical Framework - IPE**

- The interprofessional learning continuum (IPELC) model.
- Description of the education-practice continuum.
- This project helps quantify IPE development within the learning continuum.
Contribution: Clinical Scholarship

• Generating data relating to IPE and IPC is needed (Reeves, Perrier, Goldman, Freeth, & Zwarenstein, 2013).
• Impact of DNP programs on advanced nursing practice is a continuing process and requires more further research (Paplam & Austin-Ketch, 2015).
• Tests if tools that test aspects of DNP essentials can be used as program evaluation tools (Pritham & White, 2016).

Contribution: Clinical Innovation

• Pioneering the importance of the IPE and IPC continuum and its effects on patient outcomes demonstrates this project's innovation.
• Developing IPE and demonstrating its effect on IPC will allow for further alignment of education and practice.

Contribution: Practice

• Evaluation of the IPE and IPC continuum provides institutions and APRN groups validation of theory regarding non-technical skills development.
• The nursing profession could use this data or practice of evaluation to improve IPE or IPC and thus demonstrate the link between IPE and IPC.
• Further research or standardization of IPC assessment could contribute significantly to the improvement of patient outcomes and the goals of the Triple Aim.

Methodology: Procedures/Protocols

• Observer completed TeamSTEPPs observation training prior to observations.
• IRB approval was acquired prior to observation.
• No intervention, observation only.
• CRNA employee consent was gathered prior to observation and 24 hrs after information was dispersed.
• Hardcopies of observations were secured in a locked cabinet at the researchers' house.
• Electronic data was coded and secured on a dedicated laptop.
Methodology: Procedures/Protocols

- Observation worksheet de-identified prior to information transfer to SPSS.
- The preop evaluation was the start of the evaluation and handoff to PACU RN was the end of the observation.
- The TeamSTEPPs 2.0 worksheet was the only observation tool.
- Careful consideration to patient privacy was practiced.
- Consent was obtained with all participants.
- Employer retaliation and unintended harm (emotional) protections were considered and included resources included in consent.

Data Collection

- Study information was dispersed via email and one-on-one conversations.
- Only CRNA’s one to five years’ post-graduation were included.
- Participants were observed throughout the perioperative period.
- Data was de-identified and analyzed.

Data Analysis

- Analytical software will used to do statistical analysis.
- SPSS and consultation from Dr. Hillman.
- Parametric Tests – normally deviated results
  - T tests for group mean comparisons
  - Pearson’s r for correlational testing

Sample Description

- CRNA’s
- Post-graduation 1-5 years
- Two Groups:
  - Masters’ (n = 8)
  - DNP (n = 8)
- N = 16
- Kaleida and Strong healthcare systems
Sample Description (cont.)

- Doctor of nursing practice education was completed by participants (n=8):
  - New York (87.5%)
  - Virginia (12.5%)

- Masters education was completed by participants (n=8):
  - Michigan (12.5%),
  - Ohio (12.5%),
  - New York (25%),
  - Florida (50%)

---

### T Test Utilizing TeamSTEPPS Overall Scores and Education Level/Anesthesia Group.

<table>
<thead>
<tr>
<th>Education/Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masters</td>
<td>8</td>
<td>72.13</td>
<td>14.942</td>
<td>5.283</td>
</tr>
<tr>
<td>Doctoral</td>
<td>8</td>
<td>93.38</td>
<td>5.553</td>
<td>1.963</td>
</tr>
<tr>
<td>URMC</td>
<td>8</td>
<td>93.38</td>
<td>5.553</td>
<td>1.963</td>
</tr>
<tr>
<td>Kaleida</td>
<td>8</td>
<td>72.13</td>
<td>14.942</td>
<td>5.283</td>
</tr>
</tbody>
</table>
Results (cont.)

Pearson’s Correlations with TeamSTEPPS Worksheet
Overall Score and Educational Level

<table>
<thead>
<tr>
<th>Overall Score</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education Level</td>
<td>.710**</td>
<td>.002</td>
<td>16</td>
</tr>
<tr>
<td>Anesthesia Group</td>
<td>.710**</td>
<td>.002</td>
<td>16</td>
</tr>
</tbody>
</table>

Results in this table demonstrate positive correlation between overall TeamSTEPPS scores and education level/anesthesia group.

Data Analysis (cont.)

Pearson’s Correlations with TeamSTEPPS Worksheets
Overall Score Experience as a RN and CRNA

<table>
<thead>
<tr>
<th>Overall Score</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RN Experience</td>
<td>-.155</td>
<td>.566</td>
<td>16</td>
</tr>
<tr>
<td>CRNA Experience</td>
<td>-.045</td>
<td>.870</td>
<td>16</td>
</tr>
</tbody>
</table>

This table demonstrated that no correlation was noted between years of experience as a RN or CRNA and overall TeamSTEPPS score. Experience did not appear to influence overall TEAMSTEPPs scores.

Discussion

- We can conclude that, in this group, either higher educational training or place of employment lead to an increase in skills identified by the TeamSTEPPS 2.0 observational worksheet.
- The URMC group employed seven of the eight DNP’s and the Kaleida group only employs a single DNP.
- There is an unknown factor that is influencing the increased employment of DNPs at URMC.
- These data signify that didactic education or the anesthesia group has a relationship in the development and utilization of collaborative techniques in this group.
Discussion (cont.)

• This research suggests that IPC didactic training and institutional culture have a positive influence on interprofessional collaboration.
• In this study, increased education and institutional culture seemed to have a positive influence on IPC. This positive influence adds credibility to the IPCL model’s description of the IPE to IPC continuum.
• The Essentials describe a progression in IPC skills when compared to masters prepared CRNAs. The outcomes of this project may bring additional validity to that claim.

• Measurement of interprofessional collaboration is possible through the use of the TeamSTEPPS observational worksheet.
• Measurement of such skills demonstrated the positive impact that doctorally prepared CRNAs are having on the upstate NY healthcare system through the improvement of IPC.
• This research also provides an avenue to start the discussion on how to measure interprofessional collaboration in the operating suite and hopefully throughout healthcare.

Limitations

• New theoretical framework
• One observer
• Small sample size
• Limited demographic
• Limited healthcare systems
• Observational bias
• Varying pre grad school education

Conclusion

• Further research and standardization of IPC assessment. This could contribute to the improvement of patient outcomes and the goals of the Triple Aim – Cox, Cuff, Brandt, Reeves, & Zierler, 2016.
• Impact of DNP programs on advanced nursing practice is a continuous process and requires further research - Paplham & Austin-Ketch, 2015.
• The tool demonstrated measurement of DNP Essential VI and has the potential of a program evaluation tool- Pritham & White, 2016.
Conclusion (cont.)

- In order to further define the relationship between education and IPC in the nursing profession, additional studies involving factors that contribute to the development of IPC are recommended.

References


References

Thank you for your time!!