

**Identifying Factors Influencing Pediatric Professionals’
Self-reported Collaborative Practice Behaviors**

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THESIS

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This thesis is dedicated to my Philly / Chicago family and friends (especially the Wangos). Thank you for your patience, love and support.

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LIST OF ABBREVIATIONS

ACLS	Advanced Cardiac Life Support
AHA	American Heart Association
ANOVA	Analysis of Variance
CFA	Confirmatory Factor Analysis
CIHC	Canadian Interprofessional Health Collaborative
CPBs	Collaborative Practice Behaviors
CPR	Cardiopulmonary Resuscitation
HFP	High Fidelity PALS
ICCAS	Interprofessional Collaborative Competency Attainment Survey
IPE	Interprofessional Education
IRB	Internal Review Board
LFP	Low Fidelity PALS
LURIE	Ann and Robert H. Lurie Children's Hospital
MD	Physician
NP	Nurse Practitioner
PALS	Pediatric Advanced Life Support
RN	Registered Nurse
RT	Respiratory Therapist
UIC	University of Illinois at Chicago
WHO	World Health Organization

SUMMARY

A study of pediatric health care professionals' self-reported collaborative practice behaviors (CPBs) was carried out using a mixed methods explanatory design. Quantitative and qualitative responses were collected from 218 pediatric health care professionals who attended an interprofessional American Heart Association (AHA) resuscitation course. Information on demographics and CPBs was collected from the professions of nursing, (registered nurses and nurse practitioners), medicine, and respiratory therapy. In self-reported CPB scores, a statistically significant change in mean was demonstrated by all professions ($t(208) = -12.76$; $\rho < .001$) immediately after the AHA courses; this change increased for the total sample over a 6-week period ($t(130) = -1.68$; $\rho = .046$). Participants responses to open-ended questions also indicated professional differences as to which CPB's were most important. Considering each individual group physicians identified *roles and responsibilities* (94%, $n = 17$) as most important CPB, whereas *communication* was identified by registered nurses (78%, $n = 76$), nurse practitioners (100%, $n = 11$) and respiratory therapists (71%, $n = 5$) as the most important CPB.

There was an increase in mean self-reported CPB scores over time for health care professionals after participation in the AHA course. In contrast perceptions about the lasting effects of the CPBs learned in AHA courses on interprofessional teams and patient care in clinical practice varied between professions.

I. IDENTIFYING FACTORS INFLUENCING PEDIATRIC PROFESSIONALS' SELF-REPORTED COLLABORATIVE PRACTICE BEHAVIORS

A. Background

The World Health Organization (WHO) defines *interprofessional education* (IPE) as the gathering of learners from two or more professions with the intent to learn about, from, and with each other, in order to develop an effective collaborative practice and improve patient outcomes (World Health Organization [WHO], 2010). Collaborative practice that includes a patient-centered focus and integrates health care professionals' values and skills can simultaneously achieve cost-effective care, improved patient care, and satisfactory patient experiences (Ateah et al., 2018). Collaborative practice among pediatric health care professionals is imperative for ensuring the most effective care for children with complex medical conditions. Effective collaborative practice behaviors (CPBs) can positively influence patient care by improving patient outcomes such as hospital length of stay, infection rates, and readmission rates (Manville, Klein, Bainbridge, 2014). The purpose of this literature review is to identify research studies that focus on IPE for pediatric health care professionals, with CPBs as the targeted outcomes. This literature review adopted the CPB framework from the Interprofessional Collaborative Competency Attainment Survey (ICCAS) (Schmitz et al., 2017). The ICCAS is a psychometrically sound self-report instrument that measures CPBs of health care professionals (Schmitz et al., 2017). Derived from the Canadian Interprofessional Health Collaborative, the ICCAS survey instrument is posited to have five domains (sub-concepts) of behavior, including: *communication; collaboration; conflict management and team functioning; patient-centered care; and roles and responsibilities*. Within each CPB domain, three to five component behaviors within that domain are described (Schmitz et al., 2017). See Table I. *Collaborative Practice Behaviors (CPBs) and Behavioral Descriptors in the ICCAS*.

TABLE I
COLLABORATIVE PRACTICE BEHAVIORS (CPBS) AND BEHAVIORAL DESCRIPTORS

CPB Domains	Behavioral Descriptors
Communication	• Promote effective communication among IP members • Actively listen to IP members' ideas, concerns • Express my ideas and concerns without being judgmental • Provide constructive feedback to the IP team members • Express my ideas clearly and precisely
Collaboration	• Seek out IP members to address issues • Work closely with IP team members to enhance care • Learn from IP team members to enhance care
Conflict Management and Team Functioning	• Actively listen to the perspective of the IP team member • Take into account the ideas of the IP team members • Address team conflict in a respectful manner • Develop an effective care plan with IP team members • Negotiate responsibilities within overlapping scopes of practice
Patient-Centered Care	• Use an IP team approach with patient to assess • Use an IP team approach with the patient to provide whole person care • Include the patient and family in decision-making
Roles and Responsibilities	• Identify and describe my abilities and contributions to the IP team • Be accountable for my contributions to the IP team • Understand the abilities and contributions of IP team members • Recognize how others' skills and knowledge complement my own

Note: Collaborative Practice Behaviors (CPBs) and Behavioral Descriptors in this chart are adopted from Schmitz, C. C., Radosevich, D. M., Jardine, P., MacDonald, C. J., Trumpower, D., & Archibald, D. (2017). The Interprofessional Collaborative Competency Attainment Survey (ICCAS): A replication validation study. Journal of Interprofessional Care, 31(1), 28-34. doi:10.1080/13561820.2016.1233096

Communication, which is the first CPB domain in the ICCAS, is comprised of five component behaviors: effective communication; active listening; free expression of ideas; provision of constructive feedback to the interprofessional (IP) team; and clear, concise expression of ideas. *Collaboration*, the second domain within the ICCAS instrument, is made of three behaviors that center on patient care: seeking out IP members; working closely with IP members, and/or learning from the IP team when caring for patients. In the third domain,

conflict management and team functioning, five behaviors emphasize being respectful, negotiating responsibilities, and including all team members' input to develop a patient care plan. Specifically, the five descriptors within the *conflict management and team functioning* behavioral competency includes: active listening; consideration of team members' ideas; respectfully addressing conflict; effective care planning; and negotiation of care responsibilities without overlap. The fourth domain of CPB within the ICCAS, *patient-centered care*, is described by three behaviors: IP assessment of the patient's health; assessment of the patient as a whole person; and patient and family inclusion in the treatment decision-making process. The final ICCAS domain of *roles and responsibilities* includes four behaviors that focus on self-understanding as well as understanding the abilities and contributions of other professionals. Specifically, the behavioral descriptors include: identification of my abilities and contributions; accountability for my contributions; understanding the abilities and contributions of team members; and recognition of how others' skills and knowledge complement my own (Schmitz et al., 2017). One distinction of collaborative practice is the inclusion of patient and family as active members of the IP team (Baird, Ashland, & Rosenbluth, 2019). In the pediatric setting, involving family members as part of the IP team is necessary, because this patient population includes a wide range of ages and comprehension levels. Another distinction of collaborative practice is that the perspectives of professionals from different health care professions are valued and synthesized into patients' treatment plans (Baird et al., 2019). Integrating IP team members' perspectives into patients' plan of care improves the delivery and efficiency of treatment interventions, promotes IP team cohesiveness and decision-making, and prevents patient care from being limited to the narrow vision of one specialty (Ateah et al., 2018). In the past, traditional health care practice emphasized: (1) health care professionals working in parallel; (2)

families as the recipient of care; (3) physicians as leaders; and (4) hierarchal decision-making. In contrast, collaborative practice shifts the focus to: (1) health care professionals working collaboratively; (2) family involvement in decision-making; (3) expert leadership; and 4) the incorporation of diverse viewpoints (Baird et al., 2019).

B. Methods

This paper follows an integrative review method that incorporates both quantitative and qualitative data. An integrative review is an approach that allows for the inclusion of diverse methodologies (Whittemore & Knafl, 2005). To identify literature that focused on reporting CPB outcomes for research with pediatric health care professionals, a literature search was conducted in the following databases: CINAHL (Cumulative Index of Nursing and Allied Health Literature), PubMed (National Library of Medicine through Medline) and Embase (Excerpta Medical Database). Search terms included: *interprofessional education, multiprofessional education, health professional, healthcare worker, interprofessional practice, health facilities, collaborative team, collaborative practice behavior, collaborative practice competence, interprofessional relations, corporative behavior, infant, child, and adolescent*. The initial search yielded 671 articles (CINAHL = 57; PubMed = 360; and Embase = 254). Filters were applied to include only literature that was: (1) published in an academic journal within the last five years; (2) written in the English language; and (3) were full-text articles. Of the remaining 279 abstracts and reviews, exclusion criteria was expanded to articles that were focused on non-licensed health care professionals, students, or were quality improvement projects. The remaining 51 full-text articles were reviewed, with the following inclusion criteria: focus on pediatrics; held in pediatric health care settings or health care facility settings; described more than one health care profession; and identified at least one CPB of the ICCAS as a study

outcome: *communication; collaboration; conflict management and team functioning; patient-centered care; and roles and responsibilities*. The inclusion and exclusion process for this integrative review is depicted in Figure 1. *PRISMA 2009 Flow Diagram for Integrated Review: Interprofessional Education and Collaborative Practice Behaviors for Pediatric Professionals*. The final 11 studies included in this integrative review were conducted in pediatric health care settings and identified at least one CPB domain from the ICCAS as a study outcome.

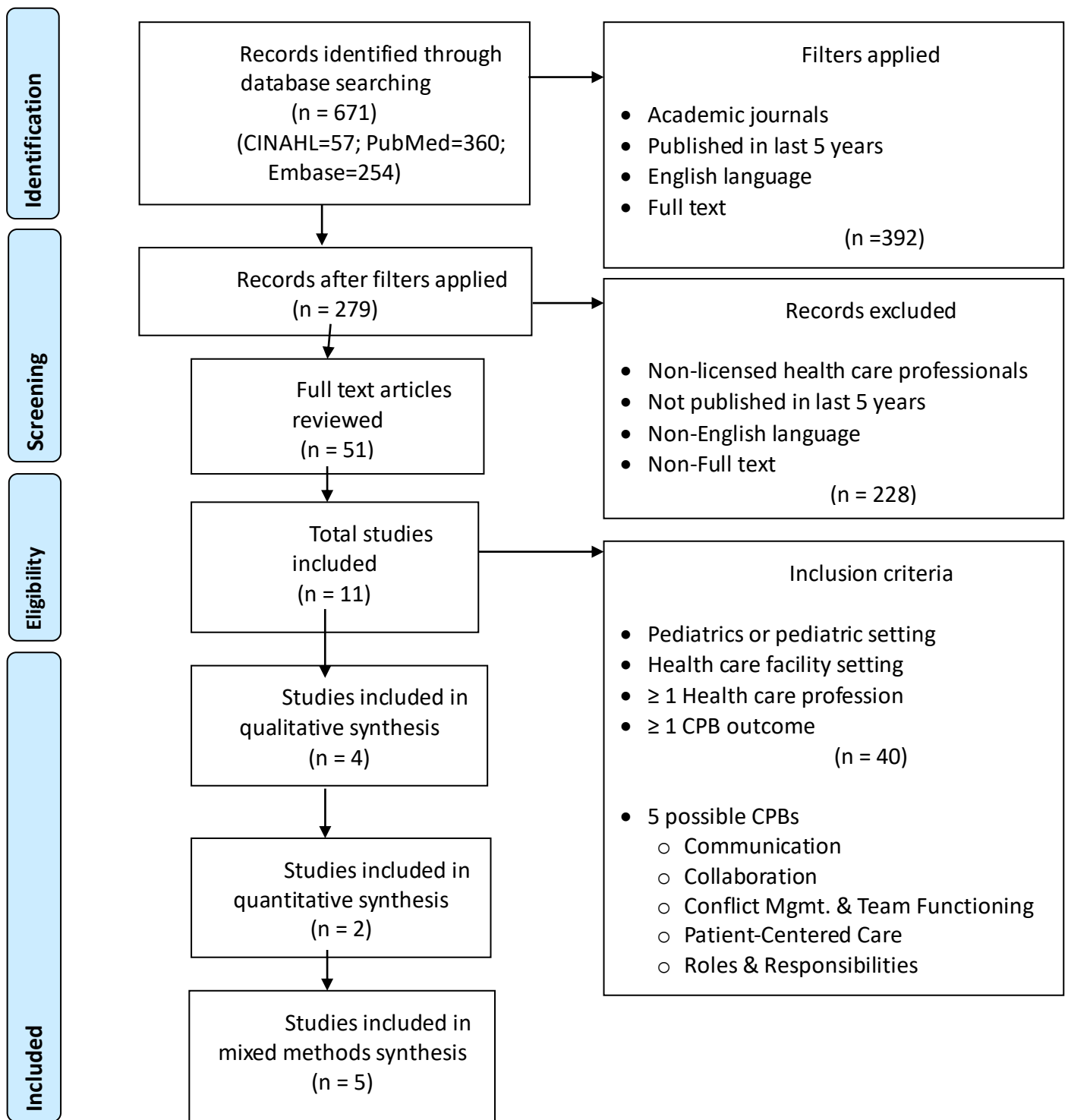


Figure 1. PRISMA 2009 Flow Diagram for Integrated Review: Interprofessional Education and Collaborative Practice Behaviors for Pediatric Professionals. Note: This PRISMA 2009 Flow Diagram is adapted from Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G., The PRISMA Group. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7):e1000097.

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1. Data Extraction

From the 11 studies in this integrative review, the following categories were extracted: study aims; study setting; participants; data sources; education method; theoretical framework; study approach and design; instruments; and data analysis.

2. Assessment of Study Quality

In order to maintain alignment with other integrative reviews in the IPE research field, a quality assessment was performed on the 11 articles analyzed. The Olsen and Baisch (2014) appraisal method was used, which looks at four main categories of research (Olsen & Baisch, 2014). Categories included: study type; sampling method; data collection; and method detail and analysis. Possible scores range from a value of four for qualitative research articles in which the sampling and data collection were not explained, to a value of 13 for articles that employed quantitative experimental design, random sampling, and data collection that was explained with differential statistics (Olsen & Baisch, 2014). The articles between the values of 4 -13 represent a mixture of the four categories, with higher scores denoting higher quality research. See Table II. *Methodological Quality Ratings of Included Studies*.

TABLE II.
METHODOLOGICAL QUALITY RATINGS OF INCLUDED STUDIES

Study	Study Type [†]	Sampling Method	Data Collection Method Provided in Detail	Analysis [‡]	Quality Rating Score
Bennett et al. (2016)	3: Qualitative	1: Convenience	1: Methods & tools	1: Narrative	6
Borott et al. (2017)	3: Qualitative	1: Convenience	1: Methods & tools	1: Narrative	6
Caldwell et al. (2018)	5: Mixed	1: Convenience	1: Methods & tools	2: Descriptive	9
Fagan et al. (2018)	4: Quantitative	1: Convenience	1: Methods & tools	3: Inferential	9
Felix et al. (2016)	5: Mixed	1: Convenience	1: Methods & tools	3: Inferential	10
Gawel et al. (2018)	3: Qualitative	2: Purposive	1: Methods & tools	1: Narrative	7
Goldman et al. (2018)	5: Mixed	1: Convenience	1: Methods & tools	3: Inferential	10
Lehmann et al. (2019)	5: Mixed	1: Convenience	1: Methods & tools	3: Inferential	10
Nti et al. (2019)	4: Quantitative	1: Convenience	1: Methods & tools	3: Inferential	9
Rachwal et al. (2018)	5: Mixed	1: Convenience	1: Methods & tools	1: Narrative	8
Wieczorek et al. (2016)	3: Qualitative	2: Purposive	1: Methods & tools	1: Narrative	7

C. Results

All 11 studies in this literature review were completed within the last five years. Two of the studies were completed in Germany (Lehmann, et al. 2019; Felix et al. 2016). Four studies were completed in Australia (Bennett et al. 2016; Borott et al. 2016; Wieczorek et al. 2016; Caldwell et al. 2018). The remaining five studies were completed in the United States (Lehmann et al., 2019; Bennett, Hauck, Radford, & Bindahneem, 2016; Borott, 2016; Caldwell, Scott, Kerr, & O'Mara, 2018; Wieczorek, Marent, Dorner, & Dür, 2016; Gawel et al. 2018). Qualitative approaches were utilized in four of the studies (Bennett et al., 2016; Borott, 2016; Gawel et al., 2018; Wieczorek et al., 2016). Two researchers utilized a quantitative approach. (Fagan, Connelly, Williams, & Fisher, 2018; and Nti, 2019). The remaining five studies utilized a mixed

methods approach (Caldwell et al. 2018, Felix et al. 2016, Goldman et al. 2018, Lehmann et al. 2019, Rachwal et al. 2018).

1. Study Aims

In many of the interprofessional education (IPE) studies reviewed researchers measured more than one CPB concept. Aims of these studies included examining changes in: *communication, collaboration, teamwork, patient-centered care; and roles and responsibilities*, in the form of health care professional (HCP) skills.

a. Communication. *Communication* during different situations was addressed in three IPE studies. Borott (2016) examined communication between physicians and nurses while they ordered and administered medications. Communication between HCPs during pediatric transfers at community hospitals and at level one trauma centers was evaluated by Gawel et al. (2018). Communication during monthly interprofessional rounds on a pediatric floor was investigated by Rachwal et al. (2018).

b. Collaboration. *Collaboration* was the study aim in eight IPE studies. Five studies examined collaboration within an interprofessional team (Bennett et al., 2016; Fagan et al., 2018; Felix et al., 2016; Gawel et al., 2018; Wieczorek et al., 2016). Three studies explored the impact of an interprofessional class or workshop on participants' perceptions of collaboration in the health care setting. (Brown et al., 2014; Caldwell et al., 2018; Fagan et al., 2018)

c. Interprofessional teamwork. Four IPE studies assessed interprofessional *teamwork*. Associations between teamwork training and collaborative practice behaviors was the focus of two of the studies (Fagan et al., 2018; Lehmann et al., 2019). The remaining two

researchers investigated how teamwork was displayed while interprofessional teams were working (Rachwal et al., 2018; Wieczorek et al., 2016).

d. Patient-centered care. *Patient-centered care* was the focus of two IPE studies (Nti, 2019; Goldman et al., 2018). One study examined the impact of IPE on patient outcomes for specific pediatric diagnoses of blunt head trauma (Nti, 2019). The second patient-centered care study explored interprofessional HCP's perceptions about caring for pediatric patients (Goldman et al., 2018).

e. Roles and responsibilities. Only one IPE study explored *roles and responsibilities*, in the form of HCP skills in pediatric emergency situations (Lehmann et al., 2019).

2. Study Setting

Studies were conducted in various health care settings. One IPE study was completed in the mother-baby unit of an adult care hospital, while another study was held in a community-based clinic (Wieczorek et al., 2016; Bennett et al., 2016). Two IPE studies were held in community-based hospitals (Gawel et al., 2018; Goldman et al., 2018). The remaining seven studies were conducted in pediatric tertiary care hospitals (Borott et al. 2016, Fagan et al. 2018, Nti et al. 2019, Caldwell et al. 2018, Felix et al. 2016, Lehmann et al. 2019, Rachwal et al. (2018).

3. Participants

In this literature review of IPE studies, participants were HCPs in both inpatient and outpatient settings. Six IPE studies sampled HCPs who worked only at inpatient settings (Borott et al. 2016, Wiecezorek et al. 2016, Nti et al. 2019, Goldman et al. 2018, Lehmann et al. 2019, Rachwal et al. 2018). HCPs working solely in outpatient settings were queried in two IPE studies (Bennett et al., 2016; Caldwell et al., 2018). Three IPE studies sampled HCPs working in

a combination of inpatient and outpatient and settings (Fagan et al., 2018; Felix et al., 2016; Gawel et al., 2018).

4. Data Sources

Data were collected from diverse sources in the studies found in this literature review.

a. Healthcare professionals. Ten IPE studies utilized a variety of HCPs as data sources. Eight of these ten studies interviewed nurses, physicians and a combination of other professionals, such as chaplains, child life specialists, ethicists, certified nursing assistants, midwives, occupational therapists, psychologists, leadership (management), respiratory therapists, speech therapists, and paramedics (Bennett et al. 2016; Gawel et al. 2018; Wieczorek et al. 2016; Fagan et al. 2018; Caldwell et al. 2018; Felix et al. 2016; Goldman et al. 2018; Rachwal et al. 2018). Two of the ten studies only sampled nurses and physicians as data sources (Borott, 2016; Lehmann et al. 2019).

b. Chart reviews. Patient charts were the data source used by researchers in one study (Nti, 2019). Data were obtained on patients with a diagnosis with pre/post chart reviews. Data were collected over multiple points in time, including before and after implementation of IPE.

5. Educational Method

Various types of IPE were utilized in research studies in this literature review. Interprofessional simulations were used by both Goldman et al. (2018) and Nti (2019). A one-day workshop was the IPE intervention employed by both Caldwell, Scott, Kerr, & O'Mara (2018) and Fagan, Connelly, Williams, & Fisher (2018). One researcher chose interprofessional meetings as the form of education intervention, with meetings monthly (Rachwal et al., 2018).

The implementation of a new service or patient care program as the education treatment was used in two studies (Bennett et al., 2016; Rachwal et al., 2018). Four studies did not use any form of IPE as part of their research.

6. Theoretical Framework

Only two studies used research designs based on theoretical frameworks. Barr's Assessment of Education Outcomes for Interprofessional Learning was used by Caldwell et al. (2018) to assess team members' perception and attitudes toward IPE (Barr, Freeth, Hammick, Koppel, & Reeves, 2000). Borott (2016) chose the Medication Communication Model as a theoretical framework to design his study, focusing on the three IPE domains of: (1) environmental and sociocultural antecedents to communication; (2) analysis of communication act; and (3) outcomes of communication act (Manias, Kinney, Cranswick, & Williams, 2014). Although neither Bennett, Hauck, Radford, and Bindahneem (2016), Felix et al. (2016), nor Wieczorek, Marent, Dorner, and Dür (2016) chose to underpin their study designs with a theoretical framework, all three researchers used theory-based hypothesis testing during data analysis. Bennett et al. (2016) applied Creswell's eight-step systematic process of analyzing data (Creswell, 2009). Felix et al. (2016) employed Mayring's process of analyzing data, and Wieczorek et al. (2016) utilized Ritchie & Lewis' method to interpret qualitative data (Creswell, 2009; Mayring, 2015; Ritchie, Lewis, Nicholls, & Ormston, 2009). One study by Gawel et al. (2018) followed a methodology based on participants' perspectives and observations, using the Consolidated Criteria for Reporting, rather than using an existing theoretical framework to design this study (Tong, Sainsbury, & Craig, 2007). The resulting process map generated by Gawel et al. (2018) described patients' physical movements, from initial traumatic event through each step of treatment, concluding at the pediatric tertiary care hospital. No theoretical

framework for research design nor data analysis was referenced in the remaining six IPE studies in this literature review.

7. Study Approach and Design

Four IPE studies in this literature review used a qualitative approach in their research design (Bennett et al., 2016; Borott et al., 2017; Gawel et al., 2018; Wieczorek et al., 2016). Two studies utilized a quantitative approach (Fagan et al., 2018; Nti, 2019). Five studies employed a mixed methods approach (Caldwell et al., 2018; Felix et al., 2016; Goldman et al., 2018; Lehmann et al., 2019; Rachwal et al., 2018).

a. Qualitative studies. Types of qualitative study designs found in this literature review included an ethnography design by Borott et al. (2017), an exploratory case study design by Bennett et al. (2016), and phenomenological designs by Gawel et al. (2018) and Wieczorek et al. (2016).

Semi-structured interviews were used to collect participant responses in all four of the qualitative studies (Bennett et al., 2016; Borott et al., 2017; Gawel et al. 2018; Wieczorek et al. 2016). Two of the four qualitative studies used focus groups to perform participant interviews (Bennett et al., 2016; Borott et al., 2017). All four studies added their own unique qualitative strategy in addition to participant interviews. Bennett et al. (2016) engaged participants in reflective journaling, and Borott et al. (2017) tasked researchers with observing participants. Gawel et al. (2018) performed both phone and in-person interviews while Wieczorek et al. (2016) had two researchers present at each one hour in-person interview.

b. Quantitative studies. In one of the two quantitative studies, data was collected through pre/post chart reviews, at multiple points in time, utilizing a retrospective chart

review with a time series design (Nti et al., 2019). Fagan et al. (2018) utilized a prospective quasi-experimental design.

c. Mixed methods studies. In all five mixed methods studies, qualitative surveys included questions with Likert-type scales that could be quantified, as well as two or more open-ended, subjective questions (Caldwell et al., 2018; Felix et al., 2016; Goldman et al., 2018; Lehmann et al., 2019; Rachwal et al., 2018).

8. INSTRUMENTS

a. Researchers. In four qualitative studies in this literature review, researchers acted as instruments to collect data during interviews with study participants (Bennett et al., 2016; Borott et al., 2017; Gawel et al., 2018; Wieczorek et al., 2016).

b. Surveys. Only one of the quantitative studies used a survey instrument with demonstrated reliability. Fagan et al. (2018) utilized the Collaboration and Satisfaction about Care Decisions (CASCD) instrument (Cronbach's $\alpha = .89 \leq \alpha < .90$) (Baggs, 1994).

In four of the five mixed methods studies, researchers created surveys for data collection, although none of the survey instruments demonstrated validity or reliability (Caldwell et al., 2018; Felix et al., 2016; Goldman et al., 2018; Lehmann et al., 2019). Only one of the four researchers submitted their survey to content experts for review (Caldwell et al., 2018). Similarly, only one researcher's survey was peer-reviewed and approved by a competency center (Felix et al., 2016). Lehmann's (2019) survey was the only one pilot-tested before being administered. Goldman's (2018) survey was administered to study participants without review or pilot testing. Rachwal et al. (2018) reported using an instrument to collect data but did not describe that instrument.

c. **Chart Reviews.** One study relied on chart reviews taken at various time intervals to collect pediatric patient data (Nti et al., 2019).

9. Data Analysis

a. **Qualitative studies.** Three of four qualitative studies in this literature review employed thematic analyses to report results (Bennett et al., 2016; Borott et al., 2017; Wieczorek et al., 2016). Bennett et al. (2016) used Creswell's eight-step systematic process for analyzing qualitative responses to discover three themes: (1) journey of professional growth; (2) journey of the team; and (3) journey of the practice partnership (Creswell, 2009). These three themes aligned with CPBs of *communication*, *collaboration* and *roles & responsibilities*, respectively (Schmitz et al., 2017). Borrott (2016) performed a thematic analysis utilizing the Medication Communication Model (Ritchie & Spencer, 1994). Three themes of communication emerged: (1) antecedents to communication; (2) analysis of communication acts; and (3) outcomes of communication acts. Multiple CPBs were seen within these themes. *Collaboration* became apparent when providers communicated effectively about providing medications for patients, *conflict management* skills was seen during communication across professions, the influence of identities within *interprofessional teams* appeared during communication about medications, and *roles and responsibilities* emerged during active communication between interprofessional providers. Wieczorek et al. (2016) utilized a thematic analysis based on Ritchie and Lewis' method, describing HCPs' perceptions about the initiation of a baby-friendly initiative across three maternity units (Ritchie et al., 2009). Although three main themes emerged, the theme that closely relates to the CPBs is the theme labeled *collaboration in the face of professional and structural boundaries*. This theme relates to the individual descriptive items in the ICCAS under the domains of *collaboration*, *communication*, and *roles and*

responsibilities. In the fourth qualitative study of this literature review, Gawel et al. (2018) utilized a constant comparative method to analyze the results between community hospitals and pediatric tertiary care hospitals (Glaser & Strauss, 1967). Using the constant comparative method of analysis, Gawel et al. (2018) generated a patient transfer process map and identified mutual responses from participants to explain development of the map. One of the five primary themes that emerged in this study was *enhancing shared sense-making*. This theme relates to the individual descriptive items in the ICCAS under the domains of *patient-centered care*, *communication*, and *collaboration*.

b. Quantitative studies. One researcher reported the CPB of *patient-centered care* as an outcome (Nti et al., 2019). Pediatric patient metrics and HCP metrics were measured at multiple time intervals. Descriptive and inferential statistics were used to analyze changes in patient data before and after implementation of IPE interventions for pediatric providers.

Nti et al. (2019) researched the care of pediatric trauma patients. The timing of care for trauma patients was one outcome measured after an IPE intervention for pediatric providers. Comparison of pre-IPE median (mp) time in minutes to post-IPE median time (ml) in minutes revealed a statistically significant improvement in timing of care. Both the median time for trauma patients to receive CT (mp = 37, ml = 28, $\rho < 0.05$) and median time to receive focus assessment with sonography for trauma (FAST) (mp = 18, ml = 8, $\rho < 0.05$), significantly improved.

Another outcome measured following IPE intervention in Nti et al.'s (2019) study on pediatric trauma patients was time to patient disposition. *Time to patient disposition* is the time between patient's arrival in the emergency department and patient's admission to an inpatient

unit or operating room. (Nti et al. (2019). Three metrics on patient disposition that were measured, in minutes, included: time to general ward (mp 03:04, m1= 03:12, $\rho < 0.528$), time to PICU (mp= 02:06, m1= 01:59, $\rho < 0.498$), and time to operating room (mp = 01:59, m1= 01:29, $\rho < 0.350$). None of the patient disposition outcomes showed statistically significant improvements after pediatric professionals participated in IPE interventions.

Fagan et al. (2018) the second quantitative researcher, investigated the effect of an additional IPE, the Team STEPPS 2.0 course, on the CPB of *collaboration* in randomized groups of health care professionals. The Department of Defense (DoD) and the Agency for Healthcare and Research Quality (AHRQ) developed Team STEPPS 2.0 course as a customizable training aimed at improving institutional collaboration and patient safety (AHRQ, 2016). In this study, a 2-hour, in-person version of Team STEPPS was taught to the intervention group, before they attended their scheduled IPE course. The intervention group reported higher levels of collaboration than the control group ($U = 156$, $z = -3.32$, $\rho = .001$). The intervention group also demonstrated statistically significant improvements in scores on situational awareness ($t_{19} = -2.854$, $\rho = 0.010$) and perception of ability to make team decisions ($t_{19} = -2.179$, $\rho = .042$) compared to the control group.

c. Mixed methods studies. Three of the five researchers who utilized a mixed methods design applied content analysis to report results in their mixed methods studies (Caldwell et al., 2018; Lehmann et al., 2019; Rachwal et al., 2018). *Content analysis* is a flexible method of analyzing participant responses in which the coding categories are pulled directly from the text data (Hsieh & Shannon, 2005). Caldwell et al. (2018) used the four conditions of bedwetting, daytime bedwetting, fecal incontinence, and neurogenic bladder as themes to organize qualitative results. Quantitative data was cross-analyzed with the reported

baseline knowledge and confidence of providers caring for these four conditions. In order to identify changes in participants' perceptions and attitudes toward the four conditions of bedwetting, three self-reported surveys containing both closed-end and open-ended questions were utilized. Baseline knowledge was measured immediately before the workshop, and self-reported surveys were distributed immediately after the workshop, and 6 months later. Comparison of pre-workshop, post-workshop, and 6-month workshop surveys revealed observable patterns of improvement for each condition. Qualitative responses supported the improved quantitative scores. For example, descriptive statistics demonstrated an improvement in the percentage of participants who had increased knowledge and confidence in each bed wetting condition at 6 months (bed wetting = 94%, daytime wetting = 88%, fecal incontinence = 72%, neurogenic bladder = 84%), and was supported by emergent qualitative themes such as *importance of a multidisciplinary approach* and *collegial contact*. The CPBs of *collaboration*, *conflict management and team functioning*, and *roles and responsibilities* emerged as themes in this study (Caldwell et al., 2018).

Content analysis was also employed by Lehmann et al. (2019) to research healthcare professionals' knowledge of pediatric emergencies. Learning assessments were used to organize the qualitative results and included: previous experience, previous training courses, and individual needs assessment (for skills). When cross-analyzed with quantitative data, comparisons of nurses and physicians revealed statistically significant differences in the effect of previous types of training courses on knowledge (self-directed learning: RN = 10%, $p < 0.05$, MD = 70%; and the percentage of health care professionals who attended previous pediatric emergency courses: (RN = 76%, MD = 20%, $p < 0.05$). Nurses and physicians also demonstrated statistically significant differences in percent attendance at practical courses for

acquiring skills (RN = 68%, MD = 30%, $\rho < 0.05$). Similarly, significant differences were found between nurses and physicians in the levels of knowledge and skills needed for pediatric emergencies (knowledge $F(3,123) = 6.647$, $\rho < 0.001$; skills $F(3,123) = 5.832$, $\rho = 0.001$). The CPBs of *collaboration* and *communication* emerged as themes in this study (Lehmann et al., 2019).

To organize content analysis in a study on *interprofessional team meetings*, Rachwal et al. (2018) used three categories: (1) challenging conversations with families; (2) challenging interprofessional conversations; and (3) challenging conversations environmentally. Challenging conversations environmentally include conversations with leadership regarding environmental themes such as low staffing, high census, or quality of care. Over a 6-year period, 1156 professionals participated in monthly interprofessional team meetings that were held on inpatient floors during lunch hour. Meeting participants included health care professionals such as nurses, physicians, social workers, and chaplains. The major theme that emerged was the CPB of *communication*. Participants most commonly described learning new communication techniques, increased self-awareness, and a new ability to engage in open discussions with other professions. Rachwal et al. (2018) collected quantitative data in this study, but did not report the data and did not cross-analyze the quantitative data with qualitative responses.

The fourth mixed methods analysis was conducted by Goldman et al. (2018), whose research focused on transfer of pediatric patients from community hospitals to pediatric tertiary care hospitals. Transcripts of pediatric simulation debriefing discussions were coded into categories. An inductive method derived from grounded theory was used to identify common themes about pediatric transfers. Grounded theory is a research method that permits a scientist to establish a theory that offers an interpretation about the main concern of a sample being studied.

Three major themes were established: (1) knowledge and skill limitations due to infrequent pediatric emergencies (2) caring for a sick child exacts an emotional toll; and (3) acknowledgement of pediatric-specific deficits in patient safety and pediatric-specific care. Participant responses categorized within all three themes reinforce the CPB of *collaboration*. For the statement “comfort level of taking care of critically ill children,” quantitative results demonstrated statistically significant differences between providers at the community hospital and the pediatric tertiary care hospital (4 [IQR = 3 - 4]; $\rho < 0.001$). A statistically significant difference in agreement was found between nurses and other providers for “receiving adequate training in the care of the acutely ill child” (3.5 [IQR = 2.8 - 4] vs 3 [IQR = 3 - 4]; $\rho = 0.002$). When quantitative data was cross-analyzed with qualitative data, contrasting responses were found, suggesting a gap between participants’ self-perceived, individual level of comfort and their true, systems-level readiness for pediatric emergency care (Goldman et al., 2018).

Felix et al. (2016) used Mayring’s deductive and inductive process for context analysis to research participants’ attitudes toward interprofessional collaborative practice (Mayring, 2015). Of the four themes that emerged, three aligned with CPBs of: (1) *collaboration* (“personal competence”); (2) *conflict management* (“methodical expertise”); and (3) *roles and responsibilities* (“social expertise”). Each of these three themes supported the importance of CPBs. Upon cross-analysis with quantitative data, comments in the emergent themes supported the quantitative data. For example, comparison of physicians at two locations showed statistically significant results for “including nurses in interprofessional decision making” ($M = 1.37$, $SD \pm .54$; $M = 1.82$, $SD \pm 1.35$, $\rho = .032$). Results were statistically significant for the number of options for on-the-job training IPE in the clinical setting compared to the number of options for undergraduate IPE training in the classroom ($M = 3.77$, $SD \pm 1.15$, $M = 4.72$, $SD \pm$

0.99, $\rho < .0001$). Statistically significant results were also reported among physicians on perceived importance of *collaboration* ($M = 1.8$, $SD \pm 0.86$, $\rho = .044$), and *roles and responsibilities/conflict management* ($M = 3.21$, $SD \pm 0.76$, $\rho = .032$). In this study, Felix et al. (2016) combined the two CPBs of *conflict management* and *roles and responsibilities* into one behavioral descriptor. All results are presented in Table III. Table of Evidence: *Interprofessional Education and Collaborative Practice Behaviors for Pediatric Providers*

TABLE III.

TABLE OF EVIDENCE; INTERPROFESSIONAL EDUCATION AND COLLABORATIVE PRACTICE BEHAVIORS FOR PEDIATRIC PROVIDERS

Author Title Journal Location	IPE Topic Study Aim	Setting Sample	IPE Instrument	Design Framework Method	Analysis Results	ICCAS Collaborative Practice Behaviors Reported as Outcomes
Qualitative Studies						
Bennett et al. (2016) An interprofessional exploration of nursing and social work roles when working jointly with families. <i>Journal of Interprofessional Care</i> Australia	IPE Topic <i>Collaboration</i> Study Aim To explore perceptions of how nurses and social workers work together	Setting: <u>Outpatient</u> Early parenting clinic in Nagala Sample Nursing, Social Work N=8 Professionals RN: <i>n</i> =4 SW: <i>n</i> =4	IPE A new service providing psychosocial services for families and children Instrument Researcher	Design Qualitative Framework Creswell's process of analyzing data Method Exploratory Case Study	Analysis Interviews, reflective journaling, & focus groups Results Themes: 1. Journey of professional growth 2. Journey of the team 3. Journey of the practice partnership	<i>Collaboration</i> <i>Conflict Management</i> <i>Roles and Responsibilities</i> No results reported on the other two collaborative practice behaviors
Borott et al. (2016) Medication communication between nurses and doctors for paediatric acute care: An ethnographic study. <i>Journal of Clinical Nursing</i> Australia	IPE Topic <i>Communication</i> Study Aim To examine how communication between nurses & physicians occur when managing medications	Setting <u>Inpatient</u> Pediatric teaching hospital Sample Nursing, Medicine N=147 Professionals RN: <i>n</i> = 110 MD: <i>n</i> =37	IPE None Instrument Researcher	Design Qualitative Frameworks Medication Communication Model Ritchie & Spencer qualitative data analysis Method Ethnography	Analysis Interviews, observations, & focus groups Results Three Communication Themes: 1. Antecedents to communication 2. Analysis of communication act 3. Outcomes of communication act	<i>Communication</i> <i>Roles and Responsibilities</i> No results reported on the other three collaborative practice behaviors
Gawel et al. (2018) A qualitative study of multidisciplinary providers' experiences with transfer process	IPE Topic <i>Collaboration</i> <i>Communication</i> Study Aim	Setting <u>Inpatient & Outpatient</u> 6 community hospital emergency rooms	IPE None Instrument Researcher	Design Qualitative Framework Consolidated Criteria for Reporting	Analysis Semi-structured interviews: • Via telephone • Via in-person	<i>Communication</i> <i>Collaboration</i> <i>Roles and Responsibilities</i>

for injured children and ideas for improvement. <i>Pediatric Emergency Care</i> United States	To explore multidisciplinary professionals' experiences with the process of transferring injured patients from community hospitals to pediatric tertiary care hospitals & possible improvements after IPE intervention	Level 1 pediatric trauma transport teams Sample Nursing, Medicine, Paramedics N=34 Professionals RN: <i>n</i> = 11 MD: <i>n</i> =7 HC Leaders; <i>n</i> =11 Paramedics; <i>n</i> = 5		Method Constant comparative	Results Constant comparative method generated a theory/process map model Five themes related to collaborative practice behaviors: 1. Creation of standard operating procedure 2. Enhancing shared sense making 3. Improve provider confidence 4. Addressing/organizing physical environment 5. Fostering institutional relationships	No results reported on the other two collaborative practice behaviors
Wieczorek et al. (2016) The struggle for interprofessional teamwork and collaboration in maternity care: Austrian health professionals' perspectives on the implementation of the Baby-Friendly Hospital Initiative. <i>BMC Health Services Research</i> Australia	IPE Topic <i>Collaboration and Teamwork</i> Study Aim To investigate the ways in which interprofessional teams struggle to implement Baby-Friendly Initiatives (BFHI)	Setting <u>Inpatient</u> Mother-baby unit Sample Nursing, Medicine, Leadership, Midwifery N=36 HCPs RN: <i>n</i> =11 MD: <i>n</i> =13 Manager: <i>n</i> =1 Midwives: <i>n</i> =11	IPE None Instrument Researcher	Design Qualitative Framework Ritchie & Lewis qualitative data analysis Method Thematic Analysis	Analysis Semi-structured interviews Results Themes related to collaborative practice behaviors: • Health professionals' approaches to childbirth and breastfeeding • Collaboration in the face of professional and structural boundaries • Strategies to harmonize professional approaches with BFHI	<i>Collaboration</i> <i>Roles and Responsibilities</i> No results reported on the other three collaborative practice behaviors
Author Title Journal Location	IPE Topic Study Aim	Setting Sample	IPE Instrument	Design Framework Method	Analysis Results	ICCAS Collaborative Practice Behaviors Reported as Outcomes
Quantitative Studies						

Fagan et al. (2018) Integrating team training in the Pediatric Life Support program: An effective and efficient approach? <i>Journal of Nursing Administration</i> United States	IPE Topic <i>Collaboration and Teamwork</i> Study Aim To examine the effect of teamwork training (Team STEPPS) on collaboration among interprofessional healthcare workers attending a PALS class	Setting <u>Inpatient& outpatient</u> Pediatric tertiary care hospital (Rady Children's Hospital of San Diego) Sample Nursing, Medicine, Respiratory Therapy N=26 RN: n= 9 MD: n=14 RT: n= 3	IPE Control group: PALS Intervention group: PALS & 2-hr team STEPPS training Instrument Collaboration and Satisfaction about Care Decisions (CASCD) Value of training questionnaire	Design Quantitative Framework None Method Pre-/ post-intervention survey Compared 2 groups	Analysis Descriptive statistics Inferential statistics Results Intervention compared to control group: • Higher levels of collaboration • (U=156, z=-3.32, $p<.001$) • Statistically significant scores in situational awareness • (t19 = -2.854, $p=0.010$) • Perception of ability to make team decisions • (t19 = -2.179, $p=.042$)	<i>Communication</i> <i>Collaboration</i> <i>Patient-centered Care</i> No results reported on the other two collaborative practice behaviors
Nti et al. (2019) A novel streamlined trauma response team training improves imaging efficiency for pediatric blunt abdominal trauma patients. <i>Journal of Pediatric Surgery</i> United States	IPE Topic <i>Patient-Centered Care</i> Study Aim To determine the impact of trauma education on patient outcomes of patient with blunt head trauma	Sample <u>Inpatient</u> Pediatric tertiary care hospital (Norton Children's Hospital) Sample Patient charts N=1065 Patient Charts CT: n= 413 FAST: n=652	IPE Trauma simulations Instrument Patient chart	Design Quantitative Framework None Method Pre-/post-intervention chart review	Analysis Descriptive statistics Inferential statistics Results Statistically significant results: • Median time (mins) for trauma patient to CT (mp=37, m1=28, $p<0.05$) • Time for trauma patient to focus assessment with sonography for trauma (FAST)) (mp=18, m1=8, $p<0.05$) • Not statistically significant metrics on patient disposition (mins): • Time to general ward (mp=03:04, m1=03:12, $p<0.528$) • Time to PICU (mp=02:06, m1=01:59, $p<0.498$) • Time to operating room (mp= 01:59, m1= 01:29, $p<0.350$)	<i>Patient-Centered Care</i> Patient outcomes were reported No results reported on the other four collaborative practice behaviors

Author Title Journal Location	IPE Topic Study Aim	Setting Sample	IPE Instrument	Design Framework Method	Analysis Results	ICCAS Collaborative Practice Behaviors Reported as Outcomes
Mixed Method Studies						
Caldwell et al. (2018) A workshop to promote interprofessional care. <i>The Clinical Teacher</i> Australia	IPE Topic <i>Collaboration</i> Study Aim To determine a workshop's impact on HCP knowledge, confidence, and educational differences	Setting <u>Outpatient</u> Pediatric tertiary care hospital (Children's Hospital at Westmead) Sample Nursing, Medicine, Allied Health N=77 Professionals RN: <i>n</i> =17 MD: <i>n</i> =14 Allied Health: <i>n</i> =19	IPE 1-day workshop on pediatric incontinence & neurogenic bladder Instrument Researcher-created survey	Design Mixed Methods Framework Barr's assessment of education outcomes Method Pre-/post-intervention survey	Analysis Descriptive statistics Results Content analysis themes by four conditions: 1. Bedwetting (BW) 2. Daytime bedwetting (DUI) 3. Fecal incontinence (FI) 4. Neurogenic bladder (NB) • Increased understanding of 4 conditions ○ BW (93%) ○ DUI (95%) ○ FI (92%) ○ NB (100%) • Increased understanding of other professional roles & responsibilities ○ Medical specialist (91%) ○ Continence nurse (84%) ○ Physiotherapist (86%) ○ Psychologist (77%) • Patterns of improvement were observed for each condition after cross-analysis of quantitative data with reported baseline knowledge & confidence • 57% of participants completed post-intervention survey	<i>Collaboration</i> <i>Patient-Centered Care</i> <i>Roles and Responsibilities</i> No results reported on the other two collaborative practice behaviors
Felix et al. (2016) Self-perceived attitudes towards interprofessional collaboration and interprofessional education among	IPE Topic <i>Collaboration</i> Study Aim To determine the attitudes of health care professionals toward IPE and	Setting <u>Inpatient and outpatient</u> Pediatric tertiary care hospital Sample	IPE None Instrument Researcher-created questionnaire	Design Mixed Method Framework Mayring's process of analyzing data Method	Analysis Descriptive statistics Inferential statistics Results Intervention compared to control group: • 94.6% (<i>n</i> =159) rated IPE as relevant or very relevant ($p<.001$)	<i>Collaboration</i> <i>Conflict Management</i> <i>Roles and Responsibilities</i>

different health care professionals in pediatrics. <i>GMS Journal for Medical Education</i> Germany	interprofessional collaboration, and look at differences between the professions	Nursing, Medicine, Psychology, Social Work N=168 Professionals RN: <i>n</i>= 15 MD: <i>n</i>=121 Psychology: <i>n</i>=14 SW: <i>n</i>= 9		Post Survey Compared 2 groups	- Young participants indicated a higher importance of IPC than more experienced participants ($M=1.43$, $SD\pm 0.64$, $\rho=.013$) Statistically significant results: - Decision making ($M=1.37$, $SD\pm .54$, $M=1.82$, $SD\pm 1.35$, $\rho=.032$) - IPE education ($M=3.77$, $SD\pm 1.15$, $M=4.72$, $SD\pm 0.99$, $\rho<.0001$) - Importance of collaboration ($M=1.8$, $SD\pm 0.86$, $\rho=.044$) - Roles & responsibilities/conflict management ($M=3.21$, $SD\pm 0.76$, $\rho=.032$). Deductive and inductive context analysis themes related to collaborative practice behaviors: - Methodical expertise - Social expertise - Personal competence	No results reported on the other two collaborative practice behaviors
Goldman et al. (2018) Providers' perceptions of caring for pediatric patients in community hospital emergency departments: A mixed-methods analysis. <i>Society for Academic Emergency Medicine</i> United States	IPE Topic Patient-Centered Care Study Aim To explore interprofessional professionals' perceptions of caring for pediatric patients	Setting <u>Inpatient</u> Community hospitals' Emergency Departments Sample Nursing, Nursing Assistants, Medicine, Other HCPs N=159 Professionals RNs: <i>n</i>= 84 CNAs: <i>n</i>=13 MD/DOs: <i>n</i>=38 Other HCPs: <i>n</i>=24	IPE Interprofessional simulations Instrument Researcher-created questionnaire	Design Mixed Method Framework None Method Post-survey group comparison	Analysis Descriptive statistics Inferential statistics Results Completed survey: nurses (49%), nursing assistants (23%), MD/DOs (22%) Other HCPs (% not reported) Statistically significant differences between the community hospital and the pediatric tertiary care hospital: - For "comfort level of taking care of critically ill children" ($\rho<0.001$) (4 [IQR = 3-4]) - For "adequate training in the care of the acutely ill child" ($\rho=0.002$) - Providers: (3.5 [IQR = 2.8-4]) - Nurses: 3 [IQR = 3-4] Three themes emerged:	<i>Patient-centered Care</i> No results reported on the other four collaborative practice behaviors

					1. Knowledge & skills limitations due to infrequent events 2. Caring for a sick child takes an emotional toll 3. Acknowledgement of pediatric-specific safety & quality of care deficits	
Lehmann, at al. (2019) Pediatric in-hospital emergencies: Real life experiences, previous training and the need for training among physicians and nurses. <i>BMC Research Notes</i> Germany	IPE Topic <i>Teamwork and Clinical Skills</i> Study Aim To discuss the influences & differences of previous experiences with pediatric emergencies & pediatric training among RNs & MDs	Setting <u>Inpatient</u> Emergency department Pediatric tertiary care hospital Sample Nursing, Medicine N=128 Professionals RN: $n=75$ MD: $n=53$	IPE None Instrument Researcher-created survey with Likert scale questions & open-ended questions	Design Mixed Method Framework None Method Post-intervention survey	Analysis Descriptive statistics Inferential statistics Results Statistically significant differences between previous types of training courses on knowledge: - Self-directed learning ($p<0.05$) - RN=10% - MD=70% - Courses ($p<0.05$) - RN=76%, - MD=20% - Courses attended ($p<0.05$) - RN=68% - MD=30% Statistically significant differences between agreements of knowledge and skills in pediatric emergencies - Knowledge ($p<0.00$) - F (3,123) =6.647 - Skills ($p=0.001$) - F (3,123) = 5.832 Content analysis topics used to organize themes: - Previous experience - Previous training courses - Individual needs assessment (for skills)	<i>Communication</i> <i>Collaboration</i> No results reported on the other three collaborative practice behaviors

Rachwal et al. (2018) Navigating communication challenges in clinical practice: A new approach to team education. <i>Critical Care Nurse</i> United States	IPE Topic <i>Communication and Teamwork</i> Study Aim To assess the feasibility of monthly IPE rounds	Setting <u>Inpatient</u> Pediatric tertiary care hospital Sample Multiple HCPs N=1156 HCPs RN: <i>n</i> =653 MD: <i>n</i> =18 SW: <i>n</i> =103 Child Life: <i>n</i> =102 Psych: <i>n</i> =32 Chaplin: <i>n</i> =40 Ethics: <i>n</i> =18 Other: <i>n</i> =190	IPE Monthly IPE rounds based on Program to Enhance Relational and Communication Skills (PERCS) Instrument Research-created survey Post-intervention surveys, with both closed- & open-ended questions	Design Mixed Methods Framework None Method Post-intervention surveys	Analysis Descriptive statistics 92% of participants rated their participation as “quite valuable” or “very valuable” Results: Content analysis topics used to organize themes: - Interprofessional meetings - Challenging conversations with families - Challenging conversations between professions - Challenging conversations environmentally (conversations regarding low staffing, high acuity or high census)	<i>Communication</i> <i>Collaboration</i> No results reported on the other three collaborative practice behaviors
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D. Discussion

1. Collaborative Practice Behaviors

The purpose of this integrative review was to identify IPE research in the clinical pediatric health care setting that had collaborative practice behaviors as outcomes. This review was novel in that it deconstructed the concept of *collaborative practice behavior* into five sub-concepts (behaviors) of *communication, collaboration, conflict management and team functioning, roles and responsibilities and patient centered care* (Schmitz et al., 2017). Utilizing the ICASS, which is based on the competencies from the Canadian Healthcare Interprofessional Collaborative (CHIC) as a framework, we focused on researchers who reported at least one of these five sub-concepts as an outcome of their research. While the ICCAS is a psychometrically sound survey with all 20 items loading on a single domain *Collaborative Practice* it is posited to have five domains (sub-concepts) with 3-5 items describing each domain or sub-concept (Schmitz et al., 2017). Identifying which domain (sub-concepts) are reported in the clinical pediatric health care setting is valuable to IPE researchers and educators as it could lead to more concise reporting of IPE outcomes and improved development and delivery of future IPE.

Utilizing the ICCAS as a framework one can see the overlap in the sub- concept item descriptors (Table 1). For example, the sub-concept *conflict management and team functioning* has an item descriptor “*Negotiate responsibilities within overlapping scopes of practice*” which is similarly described in the sub-concept *roles and responsibilities* as “*Identify and describe my abilities and contributions to the IP team.*” Another example is an item descriptor in the sub-concept *communication* “*Actively listen to IP members’ ideas, concerns*” is almost identical to “*Actively listen to the perspective of the IP team member*” an item descriptor in sub-concept *conflict management and team functioning* (Schmitz et al., 2017). This ambiguity in item

descriptors and hence sub-concepts could support misleading results in the literature and further complicate the process of educating collaborative practice ready health care professionals.

Adding to the complexity, collaborative practice in health care settings has demonstrated varying levels based on key factors such as professional authority, education, and knowledge, system resources and patient needs (Hawryluk et al., 2002). The challenge lies in reconstructing IPE to develop collaborative practice ready health care professionals (Earnest et al., 2017). This newly reconstructed IPE should demonstrate an impact regardless of the health care setting.

Four researchers in this integrative review reported on sub-concepts of *communication* and *collaboration* as study outcomes (Fagan et al., 2018; Gawel et al., 2018; Lehmann et al., 2019; Rachwal et al., 2018). From a situational lens, Gawel et al. (2018) and Lehmann et al. (2019) explored these sub-concepts during pediatric emergencies. From the lens of environment, one researcher focused on these sub-concepts in the clinical setting, especially during daily processes such as medication administration and interprofessional meetings (Rachwal et al., 2018). Fagan et al. (2018) studied these sub-concepts in a pediatric advanced life support class (PALS). This feasibility study explored learners' ability to communicate and collaborate across professions. *Collaboration* is defined as a process of interprofessional interaction and decision making (Bridges, 2011). By nature of its definition, collaboration includes components such as accountability, coordination, communication, cooperation, assertiveness, autonomy, and trust (Bridges, 2011). The act of collaborating incorporates several other individual CPBs (sub-concepts) as defined by the item descriptors in the ICCAS, which could lead to confusion and ambiguous research outcomes. For example, in the sub-concept of *collaboration* one item descriptor "*Learn from IP team members to enhance care*" is similar to "*actively listen to IP team members ideas and concerns*", an item descriptor for *communication*. Furthermore, in one

study Gawel et al. (2018) *roles and responsibilities* was reported along with *communication* and *collaboration* as a CPB outcome. Looking closely at the item descriptors for the sub-concept *roles and responsibilities*, “*Understand the abilities and contributions of IP team members*” is closely related to the *communication* item descriptor of “*Actively listen to IP members’ idea and concerns*”. Another example of ambiguity is seen as “*Be accountable for my contributions to the IP team*” under *roles and responsibilities* which is similar to “*Work closely with IP team members to enhance care*” an item descriptor under *collaboration*. This overlap in defining sub-concepts could have led to confusion for researchers, thus leaving the results of the studies to varying interpretations.

These findings are consistent with the ambiguity seen in the current IPE literature. While researchers support IPE as an educational method there is a realization that weak study design and a low level of assessment reports have contributed to a shortage of robust evidence when reporting IPE results. (Bradley et al. 2009). Researchers also acknowledged that measuring the impact of IPE on interprofessional behaviors is challenging (Reeves et al., 2013). While a range of evaluation tools have been developed which try to capture different outcomes there continues to be inconclusiveness and confusion when defining important interprofessional behavioral concepts (Oates & Davidson, 2015; Thistlethwaite et al., 2014). Even though these researchers expressed some of the same challenges as this integrative review when reporting IPE research outcomes, none of these researchers focused on IPE in the clinical pediatric health care setting or all five collaborative practice behavior sub-concepts.

These findings imply the future of IPE and IPE research lies in focusing on the five sub-concepts of collaborative practice behaviors rather than collaborative practice behavior as a single concept. Providing evidence -based interventions that focus on the explicit teaching of

team skills related to *communication, collaboration, conflict management and team functioning, roles and responsibilities and patient centered care* could demonstrate to be more effective for preparing collaborative practice ready health care professionals (Earnest et al, 2017). As evidence of this integrative review IPE efforts have demonstrated some success in the individual sub-concepts but there is no evidence demonstrating positive outcomes from comprehensive IPE with effective skills training that includes all five sub-concepts. This integrative review contributes to the literature by bringing awareness of the collaborative practice sub-concepts reported as outcomes in the clinical pediatric health care setting. This review also suggests a need to shift future IPE development to a comprehensive skill- based training which focuses on all five sub-concepts seen in the ICCAS.

E. Conclusions

Even though IPE has been present since the 1950's it has become a formidable field of health care professional inquiry over the last 20 years (Paradis & Whitehead, 2018). Current IPE literature is weak regarding evidence of IPE's capability as a reliable educational method (Bradley, 2009). With a growing interest in collaborative practice behaviors, now is the time for researchers and educators to take a deeper dive into the sub-concepts of collaborative practice behaviors and develop comprehensive skill-based IPE that could produce collaborative practice-ready health care professionals. Deconstructing the concept of collaborative practice behaviors (CPBs) and reporting on the state of the current pediatric health care literature is one step supporting this deeper dive. Understanding the outcomes reported for each individual concept *communication, collaboration, conflict management and team functioning, roles and responsibilities and patient centered care* encourages IPE educators and researchers to transform

IPE and IPE research which could lead to reporting valid collaborative practice behavior outcomes.

F. Future Recommendations

A future recommendation includes anchoring IPE research in more robust theories related to collaborative practice behaviors which could improve the empirical success of IPE and enhance the validity of research results reported in the IPE field. Framing IPE research around specific theories with well-defined collaborative practice behavior concepts could alleviate vagueness when reporting on collaborative practice behaviors and validate future IPE research. In the current IPE literature a few studies have incorporated theory into their analyses and even then, these study designs were mostly quasi-experimental, utilizing pre- and post-intervention surveys while sparingly using qualitative methods to compliment the research results. (Cusack & O'Donoghue, 2012; Baker et al., 2011; Mohaupt, 2012). Future research should focus on the conceptualization and accurate measurement of collaborative practice behaviors as well as rigorous mixed method IPE studies (Reeves et al., 2017).

A further recommendation for interprofessional educators is to develop a comprehensive IPE course that is skills based and covers all five sub-competencies of collaborative practice behaviors in the ICCAS. Demonstrating and validating collaborative practice behaviors as a competency could produce competent health care professionals who understand the value of working in a collaborative practice and are able to demonstrate skills that support a collaborative practice.

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II. PEDIATRIC PROFESSIONALS' SELF-REPORTED COLLABORATIVE PRACTICE BEHAVIORS

A. Background

A primary benefit of interprofessional education (IPE) is improvement in the way health care professionals work together as a team, deliver care to their patients, and develop their professional skills (World Health Organization [WHO], 2010). Using IPE, health care professionals' skills can be maximized, encouraging them to function at their highest levels within a collaborative practice (WHO, 2010; Goucke, Jackson, Morriss, & Royle, 2015). Collaborative practice can achieve three goals simultaneously: cost-effective care, enhanced quality of care, and satisfactory patient experiences (Bodenheimer & Sinsky, 2014). Another goal for using IPE is to prepare collaboration-ready health care professionals, since collaborative practice behaviors supporting interprofessional teamwork can lead to improved patient outcomes (Paradis & Whitehead, 2018). Collaboration-ready health care professionals can redefine health care delivery, improve quality of patient care, and patient outcomes (Smith et al., 2018).

Evidence connecting IPE to improved patient care is emerging in health care settings. IPE research that focuses on correlating IPE outcomes with patient outcomes is most frequently seen in diabetes care. For example, after attending IPE on diabetes, health care professionals demonstrated increased knowledge and confidence ($\rho < 0.05$), which correlated with improvements in diabetic measures such as HBA1c ($\rho < 0.05$), blood glucose ($\rho < 0.05$), foot reviews ($\rho < 0.05$), and blood pressure ($\rho < 0.05$) (Herring et al., 2013; & Ching, Forte, Aitchison, & Earle, 2016). Researchers studying healthcare professionals who attended a didactic IPE with open discussions also found statistically significant improvements in specific patient outcomes. Egenberg et al. (2017) reported a decrease in blood transfusion rates ($\rho < 0.01$). Tremblay, Roberge, Touati, Maunsell, and Berbiche (2017) found improved access to care

for patients ($\rho = 0.0002$) after health care professionals attended IPE and Manville et al. (2014) discovered a decrease in patient length of stay ($p < .01$) and improved disposition at discharge ($p < .01$). Although they measured the correlation of IPE with patient outcomes, none of the studies focused on pediatric health care, and none utilized a mixed method research design.

Pediatric health care professionals often participate in standardized American Heart Association (AHA) courses such as Adult Cardiac Life Support (ACLS) and Pediatric Advanced Life Support (PALS) as a requirement of their employment. Selecting standardized evidence-based courses such as ACLS/PALS, which focus on teaching team skills, could be an effective mechanism for delivering IPE to large groups of health care professionals and for promoting CPBs (Herring et al., 2013).

Only limited research exists on self-reported CBPs in resuscitation and AHA courses. Current educational research on attendees of resuscitation courses focuses on changes in their retention of knowledge, psychomotor skills, and perceptions of leadership skills and confidence (Mistry et al., 2018; Stellflug, & Lowe, 2018; Anantasit, Vaewpanich, Kuptanon, Kamalaporn, and Khositseth, 2016; & Alsohime et al., 2018). For example, Anantasit et al. (2016) studied the resuscitation skills of medical residents. A statistically significant improvement in all resuscitation skills was demonstrated when comparing pre-course scores to scores measured at six weeks post-course: airway ($\rho < 0.001$), breathing ($\rho < 0.001$), pulse check ($\rho = 0.001$), chest compressions ($\rho = 0.083$), high quality CPR ($\rho = 0.09$), defibrillation ($\rho < 0.001$), intraosseous access ($\rho < 0.001$), and intubation ($\rho = 0.057$). However, this study only included medical residents, and was not taught interprofessionally.

One research study that considered multiple professions reported *participant performance scores* in a simulated scenario. Anesthesiology residents, pediatric residents, and

midwives were observed while they simulated care for a neonate who failed to respond to basic resuscitation interventions at birth (Mistry et al., 2018). Among groups *participant performance* was statistically different ($\rho = .006$), as measured by median (quartiles) *checklist* scores for anesthesiologist residents ($m = 14.0$; 13.0–14.75), pediatric residents ($m = 11.0$; 8.5–12.3), and midwives ($m = 10.8$; 8.3–13.9). Similarly, median (quartiles) of *apnea time* after delivery was significantly different among groups ($\rho = .01$), with both groups of residents performing similarly. Anesthesiology residents ($m = 61$ s; 37–97 s) and pediatric residents ($m = 63$ s; 42.5–97.5 s) showed similar *participant performance* times, but a significantly longer *apnea time* was shown by midwives ($m = 93.5$ s; 66.3–129 s) (Mistry et al., 2018). Although researchers compared interprofessional groups' scores, each professional participated individually in the simulations and did not have the opportunity to perform in an interprofessional team during the simulations. Additionally, no education on resuscitation was implemented as part of this study, so participants were required to draw on previous knowledge and skills while participating in the resuscitation simulations (Mistry et al., 2018).

Nursing research in the field of cardiac resuscitation focuses on measuring nurses' *self-efficacy*, *knowledge retention*, and *student satisfaction* after attending a cardiac resuscitation course (Roh, Lee, Chung, & Park, 2013; & Bukiran, Erdur, Ozen, & Bozkurt, 2014). When participants were randomly assigned into a computerized simulation class versus a manikin simulation class, no statistically significant changes in mean totals were reported between groups' *self-efficacy scores* (computerized 6.94 ± 1.55 vs. manikin 6.10 ± 1.68 , $t = 1.602$, $\rho = .118$) or mean total *student satisfaction* scores (computerized 7.64 ± 1.04 vs. manikin 7.43 ± 1.34 , $t = .882$, $\rho = .942$) (Roh et al., 2013). However, comparison of nurses' total mean *knowledge scores* after attending an ACLS course revealed statistically significant differences

when measured at various time intervals, including pre-course (pre $M = 13.1 \pm 4.52$), immediately post-course (post $M = 21.9 \pm 2.19$), six months post (6 mo. $M = 16.7 \pm 2.38$), and 12 months after (12 mo. $M = 16.7 \pm 2.38$, $\rho < 0.001$) the ACLS course (Bukiran et al., 2016). An increase in *knowledge* was shown immediately after the ACLS course, but the total mean scores in *knowledge* decreased longitudinally (Bukiran et al., 2016). The AHA courses that researchers utilized in this study were not IPE courses, and did not measure self-reported CPBs (Roh et al., 2013; & Bukiran et al., 2016).

In one randomized controlled trial that measured IPE, statistically significant differences were demonstrated in one team's mean *time-to-task* scores for three designated tasks, including *recognition*, *implementation*, and *reassessment*. Participants completed IPE in a high-fidelity PALS course (HFP) versus a low fidelity PALS course (LFP). Participants' response times were faster for each task in the HFP group: *recognition* (HFP $M = 99.9$ s vs. LFP $M = 112.2$ s; $\rho = 0.005$); *implementation* (HFP $M = 140.7$ s vs. LFP $M = 158.6$ s; $\rho = 0.005$), and *reassessment* (HFP $M = 154$ s vs. LFP $M = 186.5$ s; $\rho = 0.005$) (Stellflug & Lowe, 2018). In this study, the HFP group showed consistently better time scores compared to the LFP group in all three *time-to-task* measures of *recognition*, *implementation*, *reassessment*. At six months the HFP group continued to have scores significantly higher than the LFP group as evidence by pre-test and post-test *knowledge* scores (HFP pre $M = 27.1$ vs. post $M = 29.74$; LFP pre $M = 26.23$ vs. post $M = 29.63$; $\rho = 0.042$) (Stellflug & Lowe, 2018).

Whereas Stellflug and Lowe (2018) compared two different groups of IPE teams attending PALS courses, the majority of current research on resuscitation course participants focuses on results from a single profession, so little is known about outcomes from interprofessional teams who attend ACLS/PALS courses. Research is also limited on health care

professionals' self-reported CPBs immediately following completion of interprofessional AHA courses, and after participants have returned to work on their respective units.

The purpose of this mixed methods explanatory study was to: (1) determine the impact of an interprofessional AHA resuscitation course on health care professionals' self-reported CPBs; (2) identify any differences between the three professions of nursing, medicine, and respiratory therapy regarding self-reported CPBs; and (3) describe which aspects of self-reported CPBs were most strongly correlated with health care professionals' perceptions of interprofessional teams and enhanced patient care in clinical practice.

B. Methods

1. Study Design

A mixed methods explanatory design was utilized to integrate quantitative data from the Interprofessional Collaborative Competency Attainment Survey (ICCAS) tool, with qualitative responses from two open-ended survey questions. See Table 5. *Collaborative Practice Behaviors (CPBs) and Behavioral Descriptors*. The main advantage of a mixed methods explanatory design is the ability to use the qualitative strand to further explain quantitative results (Creswell & Plano Clark, 2018). The rationale for mixing both types of data in this study is that performed alone, neither the quantitative nor qualitative methods were adequate to explain the complex nature of collaborative practice behaviors

2. Theoretical Framework

Kirkpatrick's model, the Four Levels of Evaluation, was used to frame this research study (Kirkpatrick & Kirkpatrick, 2016; Shrader, Farland, Danielson, Sicat, & Umland, 2017). Kirkpatrick's model was first utilized to evaluate education in the service industry but subsequently the model was modified to evaluate education in the health care setting (Barr,

Koppel, Reeves, Hammick, Freeth, 2005). The modified Kirkpatrick's model changes the levels of evaluation to: 1-Reaction, 2a - Perceptions and attitudes, 2b - Knowledge and skills, 3 - Behavior, 4a - Practice, 4b – Patient, was used. The expansion of level 2 and level 4 lies in differentiating between outcomes related to people, versus outcomes related to service industry (Barr, Koppel, Reeves, Hammick, Freeth, 2005). Three of the six levels (*behavior, practice, and patient*) were measured in this study. The level of *behavior* was evaluated by obtaining health care professionals' self-reported CPBs before, immediately after, and 6-weeks after attending the interprofessional AHA course. The levels of *practice and patient* were evaluated by comparing all three of the health care professionals' self-reported CPBs scores and their qualitative responses reported 6-weeks after attending the interprofessional AHA course. The qualitative responses focused on evaluating health care professionals' *practice and patient* by asking them to focus on their experiences of utilizing CPBs on *interprofessional teams* and regarding *enhanced patient care* in clinical practice after attending the interprofessional AHA courses. See Figure 2.

Modified Kirkpatrick Model of Evaluation.

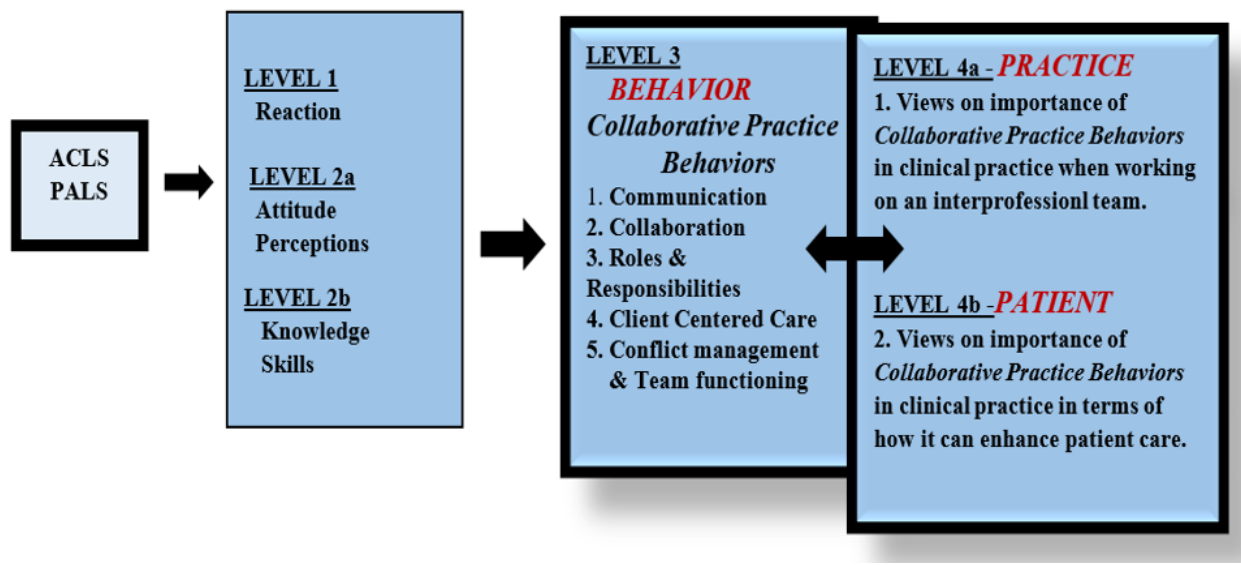


Figure 2. Modified Kirkpatrick Model of Evaluation

Note: This figure depicting *The Four Levels of Evaluation*, a modified version of Kirkpatrick's Evaluation Model, is adopted from Kirkpatrick, J., & Kirkpatrick, W. (2016). *Kirkpatrick's four levels of training and evaluation*. Alexandria, VA: Versa Press.

3. Setting

This study took place at a large tertiary care pediatric hospital, located in center city Chicago, IL. The hospital is a 288-bed hospital that supports up to 10,997 admissions, 512,625 outpatient visits, 61,767 emergency department visits, and 4,926 inpatient surgeries in a single year (ASC Communications, 2015). The hospital provides care for pediatric patients with complex medical conditions, such as: asthma, diabetes, seizures, heart and kidney disorders, cancer, trauma, and sickle cell anemia. The hospital's health care professionals, who work in inpatient and outpatient settings, provide medical, nursing, and respiratory therapy services (ASC Communications 2015).

4. Participants

a. Recruitment. Study participants were recruited by convenience sampling. Inclusion criteria consisted of health care professionals who were employed by the hospital, interacted with pediatric patients, and were attending interprofessional AHA resuscitation courses. The ACLS/PALS courses each consisted of a five hour in-person event that included one hour of didactic and basic life support review followed by four hours of interprofessional simulations and debriefings. Participants were recruited in person, at the beginning of selected interprofessional ACLS/PALS courses. Researchers explained the purpose of the research study by reading a script at the start of class and answering participants' questions throughout the recruitment process. During the first-class break, willing participants were given an information card which listed a study identification number and barcode (QR code) to electronically access the informed consent form and ICAAS Survey. After each ACLS/PALS class, the researcher stayed to assist participants who needed help with electronic access. Other mechanisms of recruitment included offering snacks and gift cards with a value of \$30 to health care professionals who participated in the research study. There were no direct risks or benefits for health care professionals as a result of participating in this study.

b. Sample Size. To determine the number of participants required for this study, power analysis was performed using inferential statistics repeated analysis of variance (ANOVA). A sample size of $N = 144$ was determined by using a moderate effect size ($d = .7$) with a significance level set at $p < .05$ and power of 0.8, based on the work of Schmitz and MacDonald (2017). Approximately 480 health care professionals were eligible to sign up for ACLS and PALS courses over the 12-week recruitment period. A total of 218 participants were recruited for this study, a number chosen for adequate power and the potential for missing data,

considering the calculated sample size ($N = 164$). Sample size determination for qualitative responses was determined by evidence of data saturation in the participant's responses. A total of 133 qualitative responses were reviewed from health care professionals; registered nurses ($n = 97$), nurse practitioners ($n = 11$), physicians ($n = 18$), and respiratory therapists ($n = 7$).

5. Data Collection

a. **Electronic Access.** Survey data collection occurred over an 18-week period using electronic methods. For initial data collection, participants used their mobile devices on site at the hospital. For follow-up six weeks after the AHA course, participants were contacted by email, which included an embedded link for digital access to the survey.

b. **Self-report Survey.** Immediately after completion of the ACLS/PALS course at the hospital, each study participant completed an ICCAS questionnaire electronically. The ICCAS is a 20-item, self-report tool with a 5-point Likert-type scale (1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent) that was used to assess each individual's ability to identify self-reported CPBs and was administered in a retrospective pre-post design (Schmitz et al., 2017).

6. Instrument

In the ICCAS tool, behavioral competencies are grouped under a single domain known as *collaborative practice behaviors* to reflect the five competencies from the Canadian Interprofessional Health Collaborative (CIHC) framework. Competencies in the framework include: *communication* (items 1–5), *collaboration* (items 6–8), *roles and responsibilities* (items 9–12), *client-centered care* (items 13–15), and *conflict management and team functioning* (items 16–20) (Schmitz et al., 2017).

In IPE studies, overall reliability has been measured at 0.96, and validity has been determined through exploratory factor analysis, where a single factor explained 85% of the variance. Moderate to large effect sizes ($d = .51-.98$) were demonstrated when comparing total pre-course to post-course scores for *collaborative practice behaviors* (Schmitz et al., 2017). The effect size ranges for each of the five CIHC competencies were: *communication* ($d = .39-.72$), *collaboration* ($d = .78-.94$), *roles and responsibilities* ($d = .43-.98$), *client-centered care* ($d = .35-.74$), and *conflict management and team functioning* ($d = .43-.79$) (Schmitz et al., 2017). ICAAS content was uploaded onto the Qualtrics^{XM} online survey website, which was developed for academic research (Qualtrics, n.d.). Researchers use Qualtrics to create and distribute surveys, to collect survey responses, and to analyze survey data that has been collected. Qualtrics was chosen because study participants find their survey design easy to use, and it is accessible on multiple mobile platforms.

Six weeks after attendance at ACLS/PALS courses, participants were emailed a link to access a post-course ICCAS survey and two open-ended questions. Their qualitative responses were collected with the following instructions:

Now that it has been 6 weeks since the completion of your ACLS/PALS course and you have had the opportunity to work on your respective hospital unit:

1. Please describe how you use the collaborative practice competencies when you are working in an interprofessional team on your hospital unit.
2. Please explain how attending an interprofessional ACLS/PALS course and recognizing the 5 collaborative practice competencies, enhances your patient care when returning to clinical practice on your hospital unit.

7. Data Analysis

a. **Quantitative Data.** Bartlett's test of sphericity and Kaiser – Meyer –

Olkin Measure of Sampling Adequacy was performed to determine the need to analyze the ICCAS survey answers through exploratory factor analysis. An exploratory factor analysis (EFA) of ICCAS Survey answers was performed and analyzed for psychometric validity of 1) all collaborative practice behavior (CPB) scores, 2) CPB scores within each profession, and 3) CPB scores over time. Validity is a property of the inferences made not the instrument therefore evidence of validity is needed from several different sources to support multiple interpretations (Cook & Beckman 2006). Psychometric validity across all health care professions in this study is important since strong evidence of validity from one health care profession does not counteract the need to seek evidence from other health care professions (Cook & Beckman 2006).

Eigenvalues, proportion of variance explained, and factor loadings, were analyzed to determine if a five - factor model, which aligned with the five CIHC competencies, was appropriate for the ICCAS Survey answers in this study. Descriptive statistics were used to describe participants.

Quantitative data were analyzed by the total CPB score for the total sample of health care professionals and by scores for each profession, including *nursing* (registered nurses (RNs) and nurse practitioners (NPs)), *medicine* (attendings and fellows), and *respiratory therapy* (RTs). To determine the impact of AHA courses on the change in health care professionals' self-reported CPBs, paired *t* tests were used to assess total sample scores and scores for each individual profession. Paired *t* tests were also used to determine the impact of AHA courses over time (immediately post-course vs. 6-weeks post-course).

Mixed effects modeling was used to examine the interaction of time and healthcare profession on the dependent variable of self-reported CPBs as well as the relationship between

the fixed effects of time and healthcare profession. The mixed effects model was used to determine the differences in CPB scores at specified time intervals: pre-course, immediately post-course, and 6-week post-course. The mixed effects model was also used to examine differences among and within three health care professions: nursing (RNs and NPs), medicine (attendings and fellows), and respiratory therapy.

b. Qualitative Data. Participant responses to two open ended questions were analyzed qualitatively using directed content analysis (Hseih & Shannon 2005). Directed content analysis uses an existing theory and the theory's key concepts to provide a structured approach when analyzing qualitative response (Hseih & Shannon, 2005). Utilizing the modified Kirkpatrick model, the two concepts of *interprofessional teams*, *enhanced patient care* and the five CPBs; *communication*, *collaboration*, *roles and responsibilities*, *client-centered care*, *conflict management and team functioning* were selected as key concepts. The 7 key concepts were identified in the qualitative responses, and then transformed into quantitative data so integration of the qualitative and quantitative data could occur. A new dichotomous variable was created (concept present) and a value of 1 was assigned when qualitative responses included a key concept and a value of 0 was assigned when qualitative responses did not include a key concept (Daly & Onwuegbuzie, 2010). Kirkpatrick (2016), emphasized level four evaluation occurs when on the job observations suggest behaviors are impacting desired outcomes, therefore responses were assigned a value of 1 for the *interprofessional teams* and *enhanced patient care* key concepts when health care professionals' qualitative responses related the five CPBs to a patient / interprofessional team interaction in the clinical setting. Kirkpatrick (2016), emphasized level three evaluation occurs when participants apply learned behaviors, therefore responses were assigned a value of 1 for the five CPB key concepts when health care

professionals discussed the specific CPB in the qualitative response (Creswell & Plano Clark, 2018). The frequency of each key concept was converted to percentages and reported for each individual profession. Inferences were made across quantitative and qualitative strands of data by linking the most frequently and least frequently reported key concepts to changes in ICCAS item mean scores. The linking of quantitative and qualitative data provided further explanation of study results (Creswell & Plano Clark, 2018). Quantitative analysis was performed with STATA (Version 14.0). Qualitative responses were analyzed with the web-based platform Dedoose (Version 8.0). A second researcher scrutinized entries to make sure that the assigned key concept was a good fit for each qualitative entry.

c. Ethical Considerations. Internal review board (IRB) approval was obtained from the University (#2019-0912) and Hospital (#2019-3017) prior to initiation of this study. At the beginning of each ACLS/PALS class, participants were informed of the study's purpose, potential risks and benefits, participant rights, and measures taken to ensure privacy and confidentiality while participating in the study. Informed consent was obtained in the first question of the electronic Qualtrics survey.

C. Results

1. Quantitative Findings

Of the 218 participants enrolled in the study, 98% ($n = 214$) completed the pre - ICCAS tool, 96% ($n = 209$) completed the post – ICCAS tool immediately after taking the interprofessional AHA course, and 63% ($n = 138$) completed the ICCAS tool six weeks later. By profession, the largest group of participants of the 218 were registered nurses (RN 69%; $n = 152$), followed by attending physicians (MD 9%; $n = 19$), fellows (FE 2%; $n = 8$), nurse practitioners (NP 7%; $n = 16$), respiratory therapists (RT 6.0%; $n = 13$), and other professions

which included pharmacists and emergency medical technicians (OP 3%; $n = 6$). Demographics of subjects included 92% female ($n = 201$) and 8% male ($n = 17$) who completed AHA courses, with 68% participating in PALS courses ($n = 148$) and 32% participating in ACLS courses ($n = 70$). Additional participant demographics (*unit, highest education, professional years of experience, and years of experience on an interprofessional team*) are described in Table IV.

Demographic Characteristics of Participants.

TABLE IV.
DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Demographic Variable	(n)	(%)
Hospital Unit		
Emergency room / transport	36	17
Inpatient unit	50	23
Intensive care unit	83	38
Operating room / Outpatient	47	22
Highest Education		
Associates Degree	10	5
Bachelors' Degree	123	57
Masters' Degree	53	24
Doctoral Degree	32	14
Years of Experience in Profession		
< 1 year	3	1
1-10 years	152	70
11-20 years	41	19
>20 years	22	10
Years of Experience on an Interprofessional Team		
< 1 year	2	1
1-10 years	141	65
11-20 years	49	22
>20 years	26	12

Note: N = 218.

Largest percentage of health care professionals in each category is noted in bold.

The ICCAS tool is comprised of five competencies, according to the CIHC:
communication, collaboration, conflict management and team functioning, roles and responsibilities, and patient-centered care. See Table V. *Collaborative Practice Behaviors (CPBs) and Behavioral Descriptors.*

TABLE V
 COLLABORATIVE PRACTICE BEHAVIORS (CPBS) AND BEHAVIORAL DESCRIPTORS

CPB Domains	Behavioral Descriptors
Communication	• Promote effective communication among IP members • Actively listen to IP members' ideas, concerns • Express my ideas and concerns without being judgmental • Provide constructive feedback to the IP team members • Express my ideas clearly and precisely
Collaboration	• Seek out IP members to address issues • Work closely with IP team members to enhance care • Learn from IP team members to enhance care
Conflict Management and Team Functioning	• Actively listen to the perspective of the IP team member • Take into account the ideas of the IP team members • Address team conflict in a respectful manner • Develop an effective care plan with IP team members • Negotiate responsibilities within overlapping scopes of practice
Patient-Centered Care	• Use an IP team approach with patient to assess • Use an IP team approach with the patient to provide whole person care • Include the patient and family in decision-making
Roles and Responsibilities	• Identify and describe my abilities and contributions to the IP team • Be accountable for my contributions to the IP team • Understand the abilities and contributions of IP team members • Recognize how others' skills and knowledge complement my own

Note: This chart depicting *Collaborative Practice Behaviors (CPBs) and Behavioral Descriptors* in this chart are adopted from Schmitz, C. C., Radosevich, D. M., Jardine, P., MacDonald, C. J., Trumpower, D., & Archibald, D. (2017). The Interprofessional Collaborative Competency Attainment Survey (ICCAS): A replication validation study. *Journal of Interprofessional Care*, 31(1), 28-34. doi:10.1080/13561820.2016.1233096

The ICCAS tool is posited to have these five competencies translate into five factors that fall under a single domain of collaborative practice behaviors. Based on the results of Bartlett's test of sphericity, pre CPB scores ($\chi^2 = 992.541$, $df(190)$, $p < .001$), post CPB scores ($\chi^2 = 12968.836$, $df(190)$, $p < .001$) and 6 week CPB scores ($\chi^2 = 6390.138$, $df(190)$, $p < .001$) and Kaiser – Meyer – Olkin (KMO) Measure of Sampling Adequacy Test, pre CPB scores (KMO = 0.962), post CPB scores (KMO = 0.955), and 6 week CPB scores (KMO = 0.947) it was determined exploratory factor analysis was useful for this study's data. Small values ($p < 0.05$) for Bartlett's test of sphericity indicate a factor analysis may be useful as it validates that the data's correlation matrix is an identity matrix which would reveal variables are unconnected. A KMO statistic close to 1.0 indicates the proportion of variance in the items could be caused by underlying factors and that a factor analysis could be useful for a study's data. (Brohen, et al., 2016).

a. Exploratory factor analysis (EFA). Based on the results of the EFA in this study, a single total score for *self-reported collaborative practice behaviors* was utilized for data analysis. Component variable of factor proportion explained was 0.9037 for the first component on the ICCAS tool, (*promote effective communication among members of an interprofessional team*), indicating that the first component explained 90% of the variance in all components. See Table VI. *Component Variable Percent Explained of Interprofessional Collaborative Competency Attainment Survey (ICCAS)*.

TABLE VI
COMPONENT PERCENT EXPLAINED OF INTERPROFESSIONAL COLLABORATIVE
COMPETENCY ATTAINMENT SURVEY (ICCAS)

Component	Proportion	Cumulative
1 - component	0.9037	0.9037
2 - component	0.0356	0.9393
3 - component	0.0262	0.9655
4 - component	0.0220	0.9875
5 - component	0.0153	1.0028
6 - component	0.0131	1.0160
7 - component	0.0105	1.0265
8 - component	0.0085	1.0349
9 - component	0.0059	1.0409
10 - component	0.0039	1.0448
11 - component	0.0019	1.0467
12 - component	-0.0007	1.0460
13 - component	-0.0017	1.0443
14 - component	-0.0032	1.0411
15 - component	-0.0038	1.0372
16 - component	-0.0045	1.0327
17 - component	-0.0061	1.0266
18 - component	-0.076	1.0191
19 - component	-0.0085	1.0105
20 - component	-0.0105	1.0000

Note. The extraction method was exploratory factor analysis, proportion and cumulative.
Adapted from “The Interprofessional Collaborative Competency Attainment Survey (ICCAS): A replication validation study,” by C. C. . Schmitz, D. M. Radosevich, P. Jardine, C. J. MacDonald, D. Trumpower, and D. Archibald, 2017, *Journal of Interprofessional Care*, 31(1), p. 28-34 (doi:10.1080/13561820.2016.1233096).

The work of Archibald, Trumpower and MacDonald (2014) suggest courses impact health care professionals’ understanding of interprofessional care and future research should determine evidence of score validity when assessing the impact of various courses on collaborative practice behaviors. In an EFA of the 20 ICCAS items, responses from all combined professions in this study were examined, revealing all 20 items fell under a single domain of *collaborative practice behaviors*. An eigenvalue of 11.2 was demonstrated for the first item on the ICCAS tool, (*promote effective communication among members of an interprofessional*

team) with a factor proportion explained of 90.0%. This single domain result is supported by Kaiser's rule as the first factor eigen value exceeds one therefore a single factor solution is appropriate (Kaufman & Dunlap, 2000). Further evidence of a single factor solution is seen in the Scree plot which demonstrates leveling of the diagram after the first factor. When performing a factor analysis factors with eigen values less than one on the Scree plot are dropped (Acock, 2016). See Figure 3. *Scree Plot of Eigenvalues*.

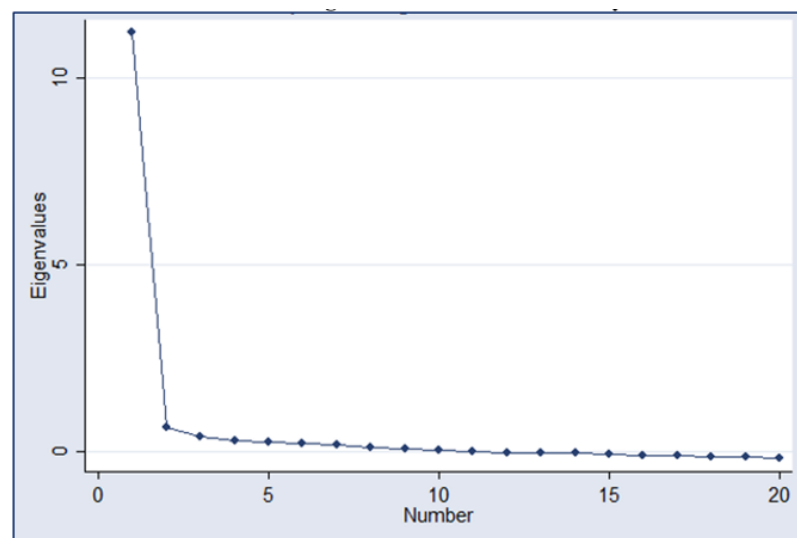


Figure 3. Scree Plot of Eigenvalues

Note. A Single factor solution is seen in the Scree plot which demonstrates leveling of the diagram after the first factor.

b. EFA across time. The EFA results for both the pre – CPB and post – CPB scores were similar for all professions indicating that the factor structure did not change overtime which further strengthens the validity of the ICCAS tool. Overall EFA results demonstrated the range of factor one loading values were; pre – CPB scores (0.4908 to 0.8498), post CPB scores

(0.6732 to 0.8463) and 6 - week CPB scores (0.6270 – 0.8448) indicating that the 20 variables were highly correlated with factor one. A factor loading of 0.4 or higher represents that the factor extracts enough variance from the specified variable (Acock, 2016). See Table VII. *Factor Loadings for Collaborative Practice Behavior Scores, Over time* and Table VIII. *Factor Loadings for Collaborative Practice Behavior Scores, Pre - Collaborative Practice Behavior Scores*.

TABLE VII
FACTOR LOADINGS FOR COLLABORATIVE PRACTICE BEHAVIOR SCORES,
OVER TIME

Variable	Pre- CPBs Factor 1	Post CPBs Factor 1	6 Week CPBs Factor 1
CPB1	0.7520	0.8229	0.7100
CPB2	0.7662	0.8328	0.7342
CPB3	0.7307	0.7751	0.6790
CPB4	0.4908	0.7803	0.6451
CPB5	0.4983	0.7974	0.7350
CPB6	0.6687	0.8035	0.6381
CPB7	0.7969	0.8206	0.8143
CPB8	0.7328	0.8439	0.7040
CPB9	0.7754	0.8247	0.7995
CPB10	0.8326	0.8421	0.7748
CPB11	0.8183	0.8234	0.7788
CPB12	0.6996	0.8397	0.7185
CPB13	0.8413	0.8596	0.8299
CPB14	0.8498	0.8463	0.8083
CPB15	0.7744	0.6732	0.6270
CPB16	0.8222	0.8232	0.8448
CPB17	0.7232	0.8717	0.8098
CPB18	0.8491	0.7276	0.6838
CPB19	0.8443	0.8539	0.7866
CPB20	0.5489	0.8199	0.6624

Note. The extraction method was exploratory factor analysis, pre / post / 6 week collaborative practice scores. Adapted from “The Interprofessional Collaborative Competency Attainment Survey (ICCAS): A replication validation study,” by C. C. . Schmitz, D. M. Radosevich, P. Jardine, C. J. MacDonald, D. Trumpower, and D. Archibald, 2017, *Journal of Interprofessional Care*, 31(1), p. 28-34 (doi:10.1080/13561820.2016.1233096).

TABLE VIII
FACTOR LOADINGS FOR COLLABORATIVE PRACTICE BEHAVIOR SCORES, PRE – COLLABORATIVE PRACTICE
BEHAVIOR SCORES

Variable	Factors									
	1	2	3	4	5	6	7	8	9	10
CPB 1	0.7520	0.2114	0.2243	-0.1553	0.1120	-0.0096	-0.0461	-0.0171	-0.0626	0.0029
CPB 2	0.7662	-0.1321	0.2492	0.0202	0.1057	-0.1776	-0.0380	0.0044	-0.0980	-0.0229
CPB 3	0.7307	0.2696	0.1022	0.1044	0.0339	-0.0689	0.0080	0.0858	0.0574	-0.0149
CPB 4	0.4908	0.3293	0.2136	0.0951	-0.1411	0.0537	0.1380	-0.0778	0.0255	0.0015
CPB 5	0.4983	0.2815	-0.0177	0.0226	0.1834	0.0548	-0.0320	0.0440	0.0299	0.0296
CPB 6	0.6687	-0.0386	-0.2364	-0.0417	0.2778	-0.0193	0.0042	0.0433	0.0283	-0.0286
CPB 7	0.7969	-0.0993	0.0297	-0.0961	0.0547	-0.1374	-0.0215	-0.0454	0.1243	-0.0101
CPB 8	0.7328	0.1984	-0.0916	0.1002	0.0882	0.0324	0.1095	-0.1075	-0.0056	0.0061
CPB 9	0.7754	-0.0724	-0.0930	-0.1668	-0.0245	-0.0744	0.1250	0.0327	-0.0652	0.0617
CPB 10	0.8326	0.0441	-0.2009	-0.0811	-0.0878	-0.1410	0.1501	-0.0411	-0.0247	-0.0193
CPB 11	0.8183	0.0437	-0.2158	0.0496	-0.0777	0.0324	-0.0842	-0.1261	-0.0215	0.0008
CPB 12	0.6996	0.0182	0.0605	-0.2143	-0.1853	-0.0751	-0.0765	0.0498	0.0728	0.0251
CPB 13	0.8413	-0.0403	0.0147	-0.1235	-0.0666	0.1269	-0.1377	-0.0937	-0.0114	-0.0166
CPB 14	0.8498	-0.1156	0.0580	-0.1335	0.0024	0.2054	0.0432	-0.0038	0.0032	-0.0542
CPB 15	0.7744	-0.3698	0.0701	0.1433	-0.0521	-0.0314	0.0122	-0.0333	0.0288	0.0092
CPB 16	0.8222	-0.2122	0.0619	0.2476	0.0541	-0.0292	-0.0402	-0.0543	0.0162	0.0327
CPB 17	0.7232	-0.0121	-0.0509	0.1443	-0.1536	-0.0252	0.0462	0.1362	-0.0262	-0.0524
CPB 18	0.8491	-0.0013	-0.0409	0.0745	0.0031	0.1075	-0.1006	0.0447	-0.0339	0.0205
CPB 19	0.8443	0.1331	-0.1207	0.0713	-0.1104	0.0294	-0.1095	0.1154	-0.0191	0.0181
CPB 20	0.5489	-0.2471	0.0939	-0.0379	0.0559	0.1984	0.1602	0.0813	0.02160	0.0266

Note. The extraction method was exploratory factor analysis, pre / post / 6-week collaborative practice scores. Adapted from “The Interprofessional Collaborative Competency Attainment Survey (ICCAS): A replication validation study,” by C. C. . Schmitz, D. M. Radosevich, P. Jardine, C. J. MacDonald, D. Trumpower, and D. Archibald, 2017, *Journal of Interprofessional Care*, 31(1), p. 28-34 (doi:10.1080/13561820.2016.1233096).

c. **EFA within each profession.** A similar single domain (*collaborative practice behaviors*) results were seen when performing the EFA for each individual health care profession, suggesting all health care professions were interpreting the items on the ICCAS tool in the same fashion. Eigenvalues for individual professions ranged from 10.3 – 17.0 for the first item on the ICCAS tool, (*promote effective communication among members of an interprofessional team*) with a factor proportion explained of 62.0% – 90.0%. This single domain result is supported by Kaiser’s rule as the first factor eigen value for each profession exceeds one therefore a single factor solution is appropriate (Kaufman & Dunlap, 2000). See Table IX. *Factor Analysis of Interprofessional Collaborative Competency Attainment Survey (ICCAS)*.

TABLE IX.
FACTOR ANALYSIS OF INTERPROFESSIONAL COLLABORATIVE
COMPETENCY ATTAINMENT SURVEY (ICCAS)

Profession	Pre - ICCAS (Eigenvalue) Factor 1	Proportion Percentage % Factor 1	Post ICCAS (Eigenvalue) Factor 1	Proportion Percentage % Factor 1
Attending MD	13.6	64.8	14.6	74.4
Fellow MD	12.4	62.0	15.1	75.7
Nurse Practitioner	14.1	70.6	13.7	68.8
Respiratory Therapist	17.0	87.2	18.2	91.9
Registered Nurse	10.3	85.0	12.6	86.3
All Professions	11.2	90.0	13.2	90.3

Note. Pre - ICCAS *N* = 214, Post - ICCAS *N* = 209. The extraction method was exploratory factor analysis, by profession and total professions. Adapted from “The Interprofessional Collaborative Competency Attainment Survey (ICCAS): A replication validation study,” by C. . Schmitz, D. M. Radosevich, P. Jardine, C. J. MacDonald, D. Trumpower, and D. Archibald, 2017, *Journal of Interprofessional Care*, 31(1), p. 28-34 (doi:10.1080/13561820.2016.1233096).

Comparing results of health care *professionals*, the proportion explained by the first factor for health care *professionals*; registered nurses (85%) and respiratory therapists (87%) remained high, however there is a decrease in proportion explained by the first factor for; attendings (64%), fellows (62%), and nurse practitioners (70%). This decrease in attendings, fellows (MDs), and nurse practitioners' (NPs) proportion explained by the first factor could be due to the differences in their roles and responsibilities versus roles and responsibilities of registered nurses (RNs) and respiratory therapists (RTs). This finding suggests MDs and NPs could interpret the ICCAS instrument differently than RNs and RTs, however based on the reported eigen values and Kaiser's rule a single factor solution was utilized. (See Table IX. *Factor Analysis of Interprofessional Collaborative Competency Attainment Survey (ICCAS)*). Based on the results of the CFA in this study, a single total score for *self-reported collaborative practice behaviors* was utilized for data analysis. Scores from all professions were analyzed except for the group called *other professions*.

d. Descriptive statistics. Mean *self-reported collaborative practice behavior* scores for the total sample and for each individual profession (attending physicians, fellows, registered nurses, nurse practitioners, respiratory therapists) increased immediately after and six weeks after completion of the interprofessional AHA course. See Table X. *Mean Self-Reported Collaborative Practice Scores by Profession*.

TABLE X.
MEAN SELF-REPORTED COLLABORATIVE PRACTICE SCORES BY PROFESSION

	<i>Pre-AHA course</i> (N = 214)				<i>Post-AHA Course</i> (N = 209)				<i>6-weeks post-AHA Course</i> (N = 138)			
Profession	(n)	(%)	(M)	(SD±)	(n)	(%)	(M)	(SD±)	(n)	(%)	(M)	(SD±)
Attending	19	8.8	3.79	.696	19	9.0	4.08	.652	15	10	4.15	.685
Fellow	8	3.7	3.70	.507	8	3.8	3.81	.553	4	2.8	4.28	.295
Nurse Practitioner	16	7.4	3.41	.699	15	7.1	3.80	.590	11	5	4.05	.393
Registered Nurse	152	71	3.55	.548	149	71	3.93	.534	97	71	4.00	.519
Respiratory Therapist	13	6.0	3.67	.816	12	5.7	3.80	.710	9	6.5	4.10	.525
Other Professions	6	2.8	3.15	.462	6	2.8	3.82	.676	2	3.6	3.97	.381
All Professions	214	100	3.56	.593	209	100	3.92	.562	138	100	4.01	.522

Note: N = 214

Largest change in Mean Self-Reported Collaborative Practice score is noted in bold.

In a comparison of results across professions, nurse practitioners (NP) demonstrated the greatest change in *self-reported collaborative practice behaviors* over time (NP pre-course M = $3.41 \pm .699$ vs. NP post-course M = $3.80 \pm .590$ vs. NP 6-week post-course M = $4.05 \pm .399$). A paired *t* test revealed a statistically significant difference in self-reported CPBs scores across all professions before and after completion of an AHA course ($t(208) = -12.76$; $p < .001$). The score for self-reported CPBs post-course (M $\pm$ SD = $3.92 \pm .562$) was significantly higher than pre-course (M $\pm$ SD = $3.56 \pm .589$).

e. **Inferential Statistics - Paired *t* tests.** Differences in self-reported CPBs scores, pre- and post-course, were statistically significant for each profession (attending, ($t(18) = -3.43$; $p < .05$); fellows, ($t(7) = -2.01$; $p < .05$); RNs ($t(148) = -11.63$; $p < .001$), NPs ($t(14) = -3.32$; $p < .05$); and RTs ($t(11) = -1.80$; $p < .05$). Self-reported CPBs for the total sample and for each profession were significantly increased by AHA course participation immediately after completion however only the total sample self-reported CPBs increased across time from post

AHA course to six weeks. Missing data for some healthcare professionals was noted during data analysis. Considering missing mean CPB score data for registered nurses ($n = 5$) and respiratory therapy ($n = 4$) a comparison of immediate post-course to 6-week post-course CPB scores by paired t tests demonstrated no statistically significant difference for each profession (attending, ($t(14) = -0.10$; $\rho = .458$); fellows ($t(3) = -0.80$; $\rho = .239$); RNs ($t(92) = -0.92$; $\rho = .180$); NPs ($t(6) = -1.09$; $\rho = .157$); and RTs ($t(4) = 0.43$; $\rho = .655$)). This non-significant finding suggests, the positive impact of interprofessional AHA courses on health care professionals self-reported CPBs was sustained over the 6-week period, after health care professionals returned to work on their respective units. Comparing all combined profession' to each individual profession's paired t tests results only the all combined profession self-reported CPBs significantly increased after 6 – weeks. The difference in this finding could be attributed to performing the analysis with the smaller group size of each individual profession or it could suggest that as a collective interprofessional group the impact of the AHA courses on self – reported CPBs continued to increase over 6 – weeks. See Table XI. *Impact of AHA Courses on Self-Reported Collaborative Practice Behaviors (CPBs) by Profession Over Time.*

TABLE XI
IMPACT OF AHA COURSES ON SELF-REPORTED COLLABORATIVE PRACTICE BEHAVIORS (CPBS) BY PROFESSION,
OVER TIME

Profession	Pre-Course CPBs Scores	Post-Course CPBs Scores	6-week Post-Course CPBs Scores	Pre-/Post-Course CPBs Scores (<i>t</i> test) Post-/6-week Post Course CPBs Scores (<i>t</i> test)
Attending MD	M $\pm$ SD = 3.79 $\pm$.696	M $\pm$ SD = 4.08 $\pm$.652 M $\pm$ SD = 4.12 $\pm$.730	M $\pm$ SD = 4.15 $\pm$.685	<i>t</i> (18) = -3.43; ρ < .05 <i>t</i> (14) = -0.10; ρ = .458
Fellow MD	M $\pm$ SD = 3.70 $\pm$.507	M $\pm$ SD = 3.81 $\pm$.553 M $\pm$ SD = 4.06 $\pm$.555	M $\pm$ SD = 4.28 $\pm$.295	<i>t</i> (7) = -2.01; ρ < .05 <i>t</i> (3) = -0.80; ρ = .239
Nurse Practitioner	M $\pm$ SD = 3.33 $\pm$.631	M $\pm$ SD = 3.80 $\pm$.590 M $\pm$ SD = 3.81 $\pm$.640	M $\pm$ SD = 4.05 $\pm$.393	<i>t</i> (14) = -3.32; ρ < .05 <i>t</i> (6) = -1.09; ρ = .157
Registered Nurse	M $\pm$ SD = 3.55 $\pm$.548	M $\pm$ SD = 3.93 $\pm$.534 M $\pm$ SD = 3.91 $\pm$.530	M $\pm$ SD = 4.00 $\pm$.508	<i>t</i> (148) = -11.63; ρ < .001 <i>t</i> (92) = -0.92; ρ = .180
Respiratory Therapist	M $\pm$ SD = 3.61 $\pm$.819	M $\pm$ SD = 3.80 $\pm$.710 M $\pm$ SD = 3.61 $\pm$.729	M $\pm$ SD = 4.11 $\pm$.558	<i>t</i> (11) = -1.80; ρ < .05 <i>t</i> (4) = -0.43; ρ = .655
All Professions	M $\pm$ SD = 3.56 $\pm$.589	M $\pm$ SD = 3.92 $\pm$.562 M $\pm$ SD = 3.92 $\pm$.050	M $\pm$ SD = 4.04 $\pm$.045	<i>t</i> (208) = -12.76; ρ < .001 <i>t</i> (130) = -1.68; ρ = .046

Note. Self-reported CPBs for all combined professions and for each individual profession increased immediately after completion of the AHA course. A comparison of immediate post-course to 6-week post-course CPB scores by paired *t* tests demonstrated no statistically significant difference for each profession

f. **Mixed effects model.** In a comparison of mean scores for self-reported *collaborative practice behaviors* between professions, utilizing a mixed effects model to test differences of means, the null hypothesis states all changes in professionals' mean scores were equal to zero. A test of difference between the five professions indicated support for this hypothesis ($z = 6.46$, $\text{Chi}^2 \rho > 0.2639$) indicating that there was not a significant mean score difference between the professional groups. See Table XII. *Mixed Effects Model Regression*

TABLE XII.
MIXED EFFECTS MODEL REGRESSION

Profession	Chi ²	N	P	B	z	p
Fellow				-.1566963	-0.86	0.390
Registered Nurse				-.1964665	-1.91	0.056
Nurse Practitioner				-.3102985	-2.10	0.035
Other Profession				-.3823129	-1.94	0.052
Respiratory Therapist				-.1505228	-0.98	0.328
Physician				3.999064	41.29	0.000
	6.46	561	0.2639			

Note. The insignificant finding ($z = 6.46$ Chi^2 , $p < 0.2639$) supports that all health care professionals recognize collaborative practice behaviors in the same fashion and this recognition of CPBs was consistent over time.

This insignificant finding supports that all health care professionals recognize collaborative practice behaviors in the same fashion and this recognition of CPBs was consistent over time. See Figure 2. *Comparison of Mean Scores Between Professions Using Self-Reports on Collaborative Practice Behaviors (CPBs).*

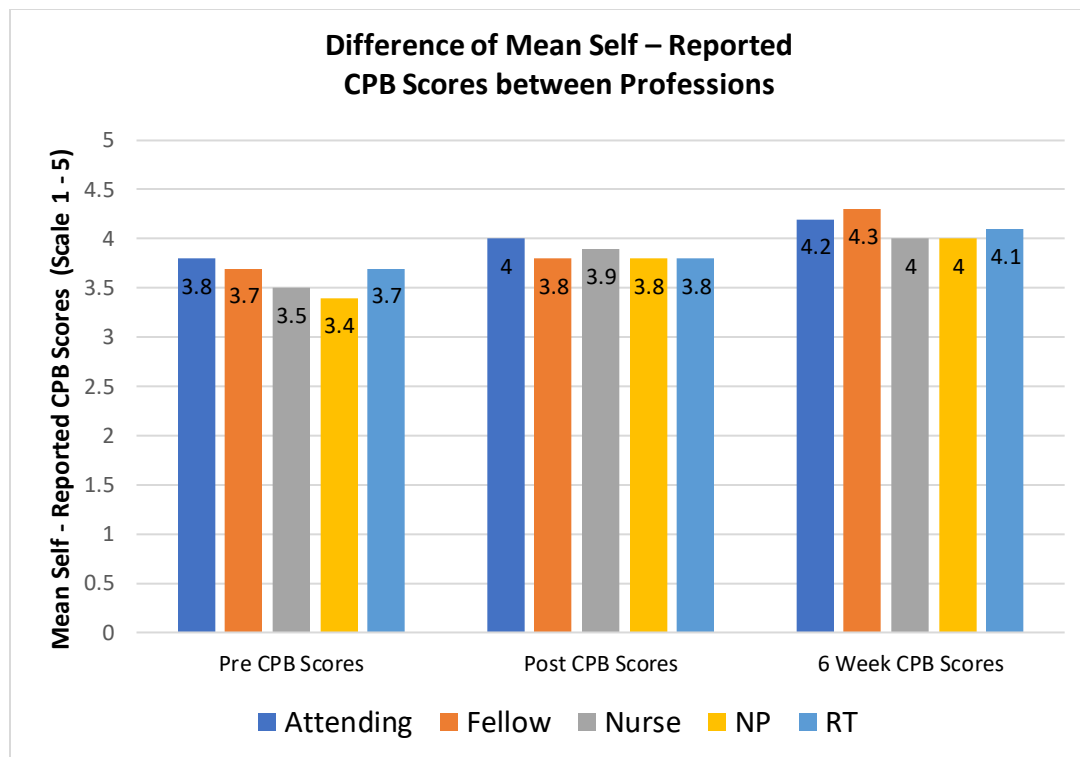


Figure 3. Comparison of Mean Scores Between Professions Using Self-Reports on Collaborative Practice Behaviors (CPBs)

Note. Mean scores using self-reported collaborative practice behaviors (CPBs) are shown by professions. Bars represent changes in mean scores between professions. ($z = 6.46$ Chi², $p < 0.02639$)

A mixed effects model was used to determine significance of change in *collaborative practice behavior* scores within professions over time. A statistically significant interaction effect was found between self-reported CPB scores over time and participation in AHA resuscitation courses ($z = 104.8$, Chi² $p < .001$). Improvement in each professions' mean CPB scores occurred 6 - weeks after completion of interprofessional AHA courses. The narrowing gap in the health care professionals CPB mean scores at 6 – weeks is a strong indicator that AHA courses impacted health care professionals CPBs and this impact was increased over time. This finding also suggests as health care professionals worked on their units in an interprofessional

setting they continued to increase their CPB recognition and concurred on the meaning of self – reported CPBs which could indicate they were strengthening their CPBs within interprofessional teams in clinical practice. The estimated marginal means for each profession at 6 weeks is seen in Figure 3. *Significance of Change in Mean Scores Within Professions Over Time Using Self-Reports on Collaborative Practice Behaviors.*

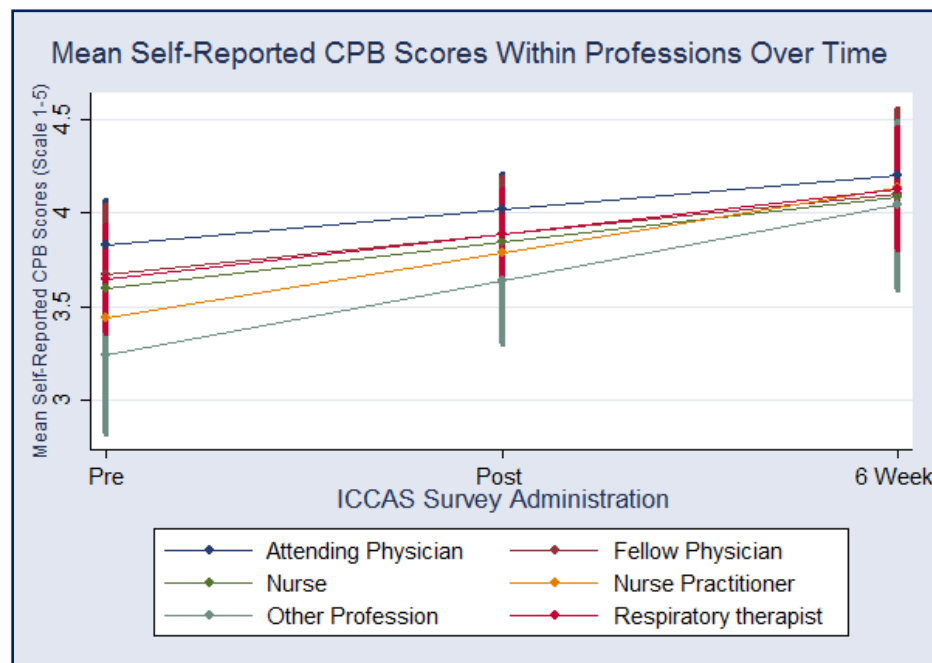


Figure 4. Significance of Change in Mean Scores Within Professions Over Time Using Self-Reports on Collaborative Practice Behaviors (CPBs)

Note. Mean scores using self-reported collaborative practice behaviors (CPBs) are shown by professions. Lines represent changes in mean scores within professions over time. ($z=104.8$ CHI^2 , $p < .001$)

2. Qualitative Findings

a. **Directed Content Analysis.** A directed content analysis was performed on qualitative responses to examine the impact of interprofessional AHA courses on individual professions 6-weeks post course. Content analysis focused on the five competencies of collaborative practice behaviors as described by CIHC: *communication, collaboration, conflict management and team functioning, roles and responsibilities and patient centered care*. See Table V. *Collaborative Practice Behaviors (CPBs) and Behavioral Descriptors*. A total of 133 qualitative responses were collected six weeks after the health care professionals completed the interprofessional AHA course: physicians ($n = 18$), registered nurses ($n = 97$), nurse practitioners ($n = 11$), respiratory therapists ($n = 7$). In their qualitative responses, the CPB that physicians discussed most frequently was *roles and responsibilities* (94 %, $n = 17$). *Communication* was most frequently discussed by registered nurses (78%, $n = 76$), NPs (100%, $n = 11$) and respiratory therapists (71%, $n = 5$). For all professions, conflict management and team functioning were the least frequently mentioned qualitative response about CPBs, as reported by: physicians (22 %, $n = 4$), registered nurses (27%, $n = 26$), NPs (18%, $n = 2$) and respiratory therapists (0%, $n = 0$).

When asked how CPBs learned in the interprofessional AHA courses were demonstrated in clinical practice, health care professionals most strongly associated the CPBs with *interprofessional teams*. A high percentage of physicians (94%, $n = 17$) and NPs (72%, $n = 8$) said that learning about CPBs in an interprofessional AHA course influenced *interprofessional teams* in clinical practice. Approximately half of the registered nurses (57%, $n = 56$) and RTs (42%, $n = 3$) agreed. Although health care professionals from most professions described feeling

the impact of the CPBs learned in the interprofessional AHA courses on their clinical

interprofessional teams to some extent, a nurse described it best:

“Going through the PALS course helped me recognize the roles and thoughts of other providers during emergency situations. It was helpful to hear how others feel, process, and respond to these situations. It gave me a greater understanding of why they may respond in certain ways or make certain decisions during real life emergency situations.” (Hospital, RN)

When asked to describe which CPBs learned in interprofessional AHA courses they applied to their clinical practices, a much lower percentage of individuals in each profession said *enhanced patient care*: physicians (28% n = 5), registered nurses (33% n = 32), NPs (27% n = 3), and RTs (14%, n = 1). This low percentage of reports that suggested the CPBs learned in the interprofessional AHA courses did not impact how they provide *patient care* in the clinical setting are supported by the following quotes:

“I work in an environment that necessitates interprofessional collaboration - so I do not think that the ACLS course I completed impacted this aspect of my patient care in any way.” (Hospital, MD)

“For me, the class just refreshes the mind, informs change of practices and allows time to work with staff that are not part of the code/ICU team.” (Hospital, NP)

3. **Mixed Methods Findings**

An analysis of each item on the 20-item ICCAS tool suggests that the qualitative results support the quantitative results of this study. For example, one item on the ICCAS *identify and describe my abilities and contributions to the IP team*, under the category of *roles and responsibilities*, matched the largest mean change for physicians from pre- to 6-weeks post-course (M, SD $\pm$ 3.21, 1.27) to (M, SD $\pm$ 3.94, 0.705), suggesting that the AHA resuscitation courses impacted how physicians relay their contributions to the interprofessional team, to team members. Another item, *be accountable for my contributions to the IP team*, had the highest

item mean score both pre-course and 6-weeks post-course for physicians (M, SD $\pm$ 4.15, .764) to (M, SD $\pm$ 4.21, 0.630) suggesting that roles and responsibilities was an important item for physicians both before and after the AHA resuscitation course. Furthermore, physicians' mean item scores were supported by the qualitative themes in their responses, as evidenced by these quotes:

"It showed me what knowledge, skills and practices are common amongst nurses and RTs in emergency situations -- some of which I wouldn't have thought of myself. Their "first instinct" is sometimes different than mine but we usually complemented one another. This made me appreciate everything that they do for the patient even before they ever call me about a problem." (Hospital, MD)

"There is always a hierarchy with me being at the top as the doctor. Because of that, I will need to be intentional about asking for input from certain team members who would not otherwise feel comfortable bringing up their ideas to the MD...Maintaining trust with the team and the patient/family is paramount." (Hospital, MD)

In the category of *communication*, nurses and nurse practitioners showed the largest mean score change in the item: *express my ideas and concerns without being judgmental* for RNs (M, SD $\pm$ 3.41, .775) to (M, SD $\pm$ 3.91, 0.696), and NPs (M, SD $\pm$ 3.31, .793) to (M, SD $\pm$ 3.86, 0.639), suggesting attending AHA resuscitation courses impacted the way nurses (RNs and NPs) communicate to some extent. Item *actively listen to IP team members' ideas and concerns* had the highest item mean score both pre-course and 6-weeks post-course for RNs (M, SD $\pm$ 3.79, .730) to (M, SD $\pm$ 4.04, 0.645) and NPs (M, SD $\pm$ 3.56, .813) to (M, SD $\pm$ 3.93, 0.703), suggesting that RNs and NPs understand the act of listening is an important component in the CPB of communication. RN and NP mean score changes in *communication* were supported by nursing professionals' qualitative responses:

"I strive to use clear and effective communication when talking with the patients, families, or anyone apart of the care team...and as the RN, I am able to present my first-hand feedback to the providers." (Hospital, RN)

“Communication is a key factor in palliative care and we communicate with both patient/family... All our work is centered around the care of our clients and being advocates for them.” (Hospital, NP)

Respiratory therapists also showed the largest mean score change for *communication*, but it was under the item *provide constructive feedback to IP team members* from pre-course to 6-weeks post-course (M, SD ± 3.23 , .725) to (M, SD ± 3.75 , 0.7532), suggesting that AHA resuscitation courses impacted respiratory therapists’ ability to provide feedback to the interprofessional team. RTs’ score changes were supported by the quote:

“Communication and Collaboration are key to all successful patient care... It made me more self-aware of how I interact with RNs and DRs.” (Hospital, RT)

The least reported competency was *conflict management and team functioning*. The item within that competency that began with the lowest pre-course mean score yet showed the largest mean score change at 6-weeks post-course for all professions except respiratory therapy was *address team conflict in a respectful manner*: physicians (M, SD ± 3.36 , .955) to (M, SD ± 3.89 , 0.809); registered nurses (M, SD ± 3.36 , .857) to (M, SD ± 3.82 , 0.750), and NPs (M, SD ± 3.37 , .957) to (M, SD ± 3.73 , 0.703), suggesting that the AHA resuscitation courses stressed the importance of being respectful to all team members when working on an interprofessional team. This mean score change is described qualitatively in the following quotes:

“Conflict management affects the health of the team—it’s about treating others as you would like to be treated, resulting in more efficient team interactions which is better for patient care.” (Hospital, MD)

“Conflict management and team functioning are important elements of a strong interprofessional team. Open communication is important for these things to happen successfully. For example, when I am approached with a concern by a patient’s caregiver, I respond with open ears and a nonjudgmental attitude. I find this sets us up for a better chance of conflict resolution and continued team functioning. When I approach a member

of the interprofessional team I aim to voice my concerns in a professional, nonjudgmental way as well.” (Hospital, RN)

“PALS...Sometimes eye-opening but also a trusting and learning environment.... We’re all on the same team and working to improve the care we provide, regardless of the situation.” (Hospital, NP)

Upon further examination of the CPB *conflict management and team functioning*, all of the professions’ mean scores decreased for the item *negotiate responsibilities within overlapping scopes of practice* from pre- to 6-weeks post-course: physicians (M, SD $\pm$ 3.57, .901) to (M, SD $\pm$ 3.0, 0.816); registered nurses (M, SD $\pm$ 3.43, .770) to (M, SD $\pm$ 2.93, 0.659); NPs (M, SD $\pm$ 3.12, .957) to (M, SD $\pm$ 2.80, 0.774); and RTs (M, SD $\pm$ 3.53, 1.05) to (M, SD $\pm$ 2.91, 0.792). The decrease in this item mean score suggests that after the AHA courses all professions had a better understanding of each professions’ roles and responsibilities within the interprofessional team however it was challenging to negotiate responsibilities within the team in the clinical setting. The quantitative results from the ICCAS item *negotiate responsibilities within overlapping scopes of practice* are further supported by the following qualitative responses:

“Attending the inter professional course stresses the importance of communication between team members so that everyone is aware of what’s going on and can then collaborate by providing their expertise from their own fields. It’s important to have roles, as this creates a streamlined process to enhance patient care—i.e. provide more client-centered care.” (Hospital, MD)

“I think that keeping closed loop communication is very important when working with other team members to effectively collaborate. Making sure my role is understood and staying within that scope is important.” (Hospital, NP)

“My ACLS class re-enforced that Communication and Collaboration are key to all successful patient care. It made me more self-aware of how I interact with RNs and DRs. It helped me to understand that although each of us has clear roles and responsibilities, we are one team and can respectfully assist each other.” (Hospital, RT)

“I used to be intimidated by other professionals (and some nurses) in my area. After the course, I really started to think about how important it is for me to speak up when I see something out of protocols or notice a difference in the patient's status. I've leaned into the anxiety I was feeling and just started talking about what I was seeing and keeping people in line with our protocols and what our patients need.” (Hospital, RN)

D. Discussion

Results of previous IPE research demonstrated increased mean scores in healthcare professionals' psychomotor skills, knowledge, and leadership skills that were sustained for six months after attending an interprofessional resuscitation course; however, the focus of these studies was not self-reported CPBs (Stellfeug, Anantasit et al., 2016; & Alsohime et al., 2018; Stellfeug, 2018; & Settles, Jeffries, Smith, & Meyers, 2011). All health care professionals in the current study showed an increase in mean self-reported CPB scores immediately after attending interprofessional AHA resuscitation courses, suggesting that the courses positively impacted their CPBs. Further, this study demonstrated that increased mean CPB scores were sustained over 6 weeks. Sustained improvement of CPBs was similar between the healthcare professions, which included physicians, registered nurses, nurse practitioners, and respiratory therapists. Demonstrating improvements in psychomotor skills and knowledge are important in IPE research, however drilling down on specific CBPs of frontline health care professionals is paramount because these specific CPBs are the building blocks for successful interprofessional teams working in a collaborative practice (Paradis & Whitehead, 2018). This research study was novel for two reasons. First, this research deconstructed the concept of *collaborative practice behavior* by focusing on five individual self-reported CPBs (*communication, collaboration, conflict management and team functioning, roles and responsibilities, and client centered care*) through qualitative responses and then reported quantitatively on the singular concept of *collaborative practice behavior*. The evaluation of both the deconstructed and singular concept

of *collaborative practice behavior* addresses two criticisms of current IPE research: 1) failing to give a voice to frontline health care professionals and 2) failing to frame IPE research on an established framework (Meleis, 2015). Addressing these two criticisms are important for future IPE researchers because it improves the rigor of a mixed methods research design. This study satisfied these criticisms through: 1) qualitative responses that provided a voice and understanding of frontline health care professionals daily collaborative practice and 2) utilization of the CIHC framework to analyze study results which increased the rigor of this research study.

Second, this study integrated health care professionals' perceptions of CPBs demonstrated during the interprofessional AHA resuscitation courses with their perceptions of *interprofessional teams* and *enhanced patient care* in the clinical setting. Health care professionals' qualitative responses indicated that *roles and responsibilities* and *communication* were the most influential CBPs that they gained from completion of interprofessional AHA resuscitation courses and then brought back to their clinical practice upon return to their respective hospital units. Results from this study are similar to the IPE qualitative research that Lingard, Espin, Evans, and Hawryluck (2004) discovered—that defining collaborative practice in complex environments is difficult; however, healthcare professionals continually discuss the theme of *ownership and trade* when defining their roles and responsibilities within an interprofessional team. Other qualitative IPE research also focused on participants' positive perceptions of *communication*, as well as their understanding of professional *roles and responsibilities* after attending IPE (Goucke et al., 2013; Muller-Juge et al., 2014).

The health care professionals surveyed in this study agreed on the importance of *communication* and *roles and responsibility* and this agreement is evident throughout the qualitative responses. As a group, health care professionals realized that each profession has a

different role when working in an interprofessional team, it is important to understand everyone's role collectively, and to discuss their individual roles in an interprofessional setting. Health care professionals agreed that effective communication between team members is critical as it makes everyone on the team aware of what is going on. Further, upon returning to their clinical practice, health care professionals reported they were able to have a better understanding of physician, nursing, nurse practitioner and respiratory therapists' roles and how to utilize "closed loop" communication when working together. These findings are valuable to IPE researchers and educators as they suggest healthcare professionals are understanding the importance of select collaborative practice behaviors in the classroom and they can carry this behavior into their clinical practice. This link between the classroom and clinical collaborative practice behaviors lays the foundation for future IPE research based on specific collaborative practice behaviors and the impact of specific CPBs on patient outcomes.

Past research studies supported positive themes on CPBs needed to resolve *conflict management and team functioning* like increased communication and willingness to collaborate, facilitation of shared goals, emergence of team leaders, openness to share responsibilities, and perceived value in the IPE experience. However, no studies were based on attending an interprofessional AHA resuscitation course as in this study (Lancaster, Kolakowsky-Hayner, Kovacich, & Greer-Williams, 2015; Goucke et al., 2013; Muller-Juge et al., 2014).

In this study, healthcare professionals' quantitative and qualitative responses suggested that their CPB of *conflict management and team functioning* improved after attending the interprofessional AHA courses. Current literature demonstrates various results when studies focused on *conflict management and team functioning*. Some studies suggested that views of leadership changes, including a lower level of physician authority being perceived after attending

IPE (Bonifas & Gray, 2013). Other studies demonstrated no occurrence of change, and reported qualitative findings implying that issues such as *hierarchy and conflict resolution*, were unresolved following the interprofessional experiences (Boland, Scott, Kim, White, & Adams, 2016). Even though the results from the CPB *conflict management and team functioning* in this study suggested improvements, only a small number of participating health care professionals discussed conflict management and team functioning (23% $n = 32$). Quantitatively ICCAS item mean scores related to this CPB increased over the 6 - week period, however the positive responses on *conflict management and team functioning* were the least qualitatively reported CPB overall. These findings suggest that *conflict management and team functioning* can be understood and positively impacted after attending AHA courses, but health care professionals could be reluctant to discuss this CPB, offer constructive criticism, or provide feedback to individuals outside of their own professions when surveyed. These findings point to the historical notion of an embedded hierarchy (physicians at the top) in interprofessional teams and IPE's pursuit of restructuring this embedded hierarchy. (Meleis, 2015).

Bias in organizational power and preconceived hierarchies within health care can create barriers to discussing *conflict management and team functioning* which can perpetuate barriers to interprofessional collaboration (Gergeric et al. 2018). Future IPE should focus on finding ways to empower health care professionals to freely discuss their perceptions of *conflict management and team functioning and remove established hierarchies* in an interprofessional setting. As evidenced by interprofessional team and teamwork competencies, IPE leaders need to inform health care professionals on how to 1) apply leadership practices that support collaborative practice, 2) constructively manage disagreements about values, roles, goals, actions and 3) share accountability with other professions for patient outcomes (IPEC, 2016). Physician power is

widely supported, valued, and prevalent in the health care setting (Meleis, 2015). IPE should focus on a level culture of interprofessional teams by promoting interprofessional equality in health care professionals' relationships and skills to create interprofessional dialogue when equality is not established. Evaluation of these newly focused IPE courses should include learner experience level, profession, and change in behaviors as it could lead to understanding how the shift towards removing health care team hierarchies can occur (Gergeric et. al. 2018).

This study contributes to the literature by bringing awareness of self-reported CPBs to two interprofessional settings: the classroom and the clinical setting. An additional contribution is the integration of quantitative and qualitative strands of data to further describe health care professionals' self-reported CPBs after attending an interprofessional AHA resuscitation course. Integrating these two strands of data demonstrated that participants' qualitative responses supported this study's quantitative findings. IPE research that utilizes a mixed method design and demonstrates an integration of data is limited. However, a few studies have utilized quasi-experimental, pre- and post-intervention surveys while sparingly using qualitative methods to compliment the results of their research (Cusack T, & O'Donoghue G. 2012, Baker et. al. 2011, Mohaupt, 2012).

E. Limitations

Generalizations of this study's findings are limited by multiple factors. First, the study utilized self-reported CPBs rather than using direct observations to assess healthcare professionals' CPBs during and after attendance at interprofessional AHA courses. Second, the present study did not have an alternative or comparison group to evaluate differences between treatment groups (e.g., a control group that did not participate in interprofessional AHA courses compared to an intervention group that did).

Another limitation was the inclusion of health care professionals from different units within the hospital. Each hospital unit could have varying degrees of collaborative practice and patient acuity, which could affect health care professionals' perceptions and responses to qualitative questions and the ICCAS tool at 6-weeks post-course. Also, the sample was limited to pediatric health care professionals.

Attrition can be a source of bias if participants are lost to follow up or their characteristics differ from the original sample, although that did not happen in this research study. A 36% attrition rate ($N = 76$) occurred for the 6-week post-course survey, including; physicians ($n = 8$), registered nurses ($n = 55$), nurse practitioners ($n = 5$), and respiratory therapists ($n = 6$). All 76 participants who failed to complete the study were emailed to ask why they did not follow up. A consistent theme arose from participants' responses: they *did not have the time*, or they *forgot to complete the survey*. Schultz and Grimes (2002) suggested that participant loss to follow up of less than 5% is of little concern, but a loss of greater than 20% means the reader should consider the possibility of bias when reviewing study results.

A final limitation was an unbalanced sample size within each profession, with registered nurses (RN 69%; $n = 152$), followed by attending physicians (MD 9%; $n = 19$), fellows (FE 2%; $n = 8$), nurse practitioners (NP 7%; $n = 16$), respiratory therapists (RT 6.0%; $n = 13$). Based on the aforementioned imitations, this study's findings should be interpreted with caution. Further research is needed to determine how our findings translate to health care professionals and other hospital settings.

F. Future Recommendations

Educators and researchers must establish a greater understanding of CPBs in our front-line health care professionals. Determining how skilled-based, validated, interprofessional instruction like that found in AHA resuscitation courses influences clinical practice is one way to begin to understand CPBs. It is imperative to gain a more accurate portrayal of the skills required to work in an interprofessional team, which will inform our understanding of how collaborative practice is established in everyday clinical practice (Lingard et al., 2004). Future research should focus on using rigorous mixed methods IPE studies to clearly conceptualize *collaborative practice behaviors* (Reeves, Pelone, Harrison, Goldman, & Zwarenstein, 2017). Additional interpretive research studies incorporating the voices of frontline health care professionals are needed to improve the functioning of interprofessional teams, the delivery of IPE, and enhance patient care in the clinical setting.

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VITA

Education

- 2016 - University of Illinois at Chicago, Fourth year Nursing PhD candidate
- 2010 -2012 Gonzaga University, Spokane WA. Master of Science in Nursing Education
- 1993 -1995 Villanova University, Villanova, PA. Bachelor of Science in Nursing
- 1984 -1988 Mount St Mary's College, Emmittsburg, MD. Bachelor of Science Business and Finance

Professional Experience

- 2018-present Director of the Clinical Learning Resource Center, UIC, Chicago IL.
- 2016 –2018 Teaching Assistant, Professional Nurse I &II, UIC, Chicago IL.
- 2016-2018 Nurse Educator, Special Care Nursery, Westlake Hospital, Melrose Park, IL
- 2015-2016 Director of Nursing Education, Mount Sinai Hospital, Chicago IL
- 2014-2015 Simulation Lab Coordinator, Ivy Tech Community College, Gary IN.
- 2012-2015 Pediatric Nurse Educator, Mount Sinai Hospital, Chicago IL.
- 2011-2012 Clinical Instructor, Lewis University, Romeo IL
- 2010-2012 Pediatric Nurse Educator, La Rabida Children's Hospital, Chicago IL
- 2007-2010 Staff Nurse, NICU, Comer Children's Hospital, Chicago IL.
- 2007-2008 Transport Nurse, Children's Memorial Hospital, Chicago IL.
- 2001-2007 Traveling Nurse, NICU, Cross Country Trav Corps, U.S.A
- 1995-2001 Staff Nurse, NICU, Children's Hospital of Philadelphia, Philadelphia, PA.

Research Funding

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| 2019 | Sigma Theta Tau International Honor Society of Nursing, Alpha Lambda Chapter Research Award (\$500) |
| 2019 | Seth and Denise Rosen Student Research Award (\$500) |
| 2019 | UIC Interprofessional Education Steering Committee Research Award |

Peer Reviewed Publications

Kilroy, S., Kent, D., Vanderzwan, K, Jones, K., Hiller, A., Reese, C., Woroch, R., & McPherson, S. (2020). Development of a Multisite Nursing Simulation WorkGroup Focusing on INACSL Standards. *Journal of Nursing Education*. Submitted.

Manuscripts in Preparation

Kilroy, S., Corte, C., Corbridge, S. (2020). Identifying Contributing Factors for Pediatric Health Care Professionals' Collaborative Practice Behaviors. In Preparation.

Kilroy, S., Corte, C., Corbridge, S. (2020). Integrative Review: Interprofessional Education and Collaborative Practice Behaviors for Pediatric Professionals. In Preparation.

Presentations

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| August 2019 | Workshop Presentation. Designing Innovative High Quality Foundational Interprofessional Curriculum, NEXUS Conference, Minneapolis MN. |
| August 2019 | IPE Clinical Learning Environment Challenge. Neonatal Abstinence Syndrome, NEXUS Conference, Minneapolis MN. |
| April 2019 | Guest Lecture. Health Care Administration. Rapid Response Team and Interprofessional Collaboration. |
| October 2018 | Guest Lecture. Professional Nursing I. Quality Improvement in the Clinical Setting. |
| March 2017 | Guest Lecture. Professional Nursing II. Clinical Ethics- A Neonatal Case Study. |
| May 2016 | Poster Presentation. The Effects of Diabetes Education on Nurses Knowledge of Diabetes Care, Mount Sinai Health Systems' Nursing Poster Fair, Chicago IL. |
| July 2014 | Poster Presentation. Supplemental Staffing in Sticky Situations, 30 th Annual Pediatric Conference, Washington D.C. |

Professional Nursing Memberships

2019 - Present	Society for Simulation in Health Care
2019- Present	Sigma Theta Tau – Secretary, Alpha Lambda Chapter
2018- Present	American Interprofessional Health Collaborative
2016- Present	National League for Nurses
2012 – 2015	National Association of Neonatal Nurses
1995-Present	Sigma Theta Tau – Alpha Nu Chapter

Service Activities

2019 – Present	University of Illinois at Chicago Simulation Work Group Director
June 2016	Global Volunteers – Monopoli, Italy
2016 – Present	University of Illinois at Chicago Interprofessional Education Steering Committee
2016 – Present	University of Illinois at Chicago Pre – Licensure Curriculum Work Group
2019 – Present	University of Illinois at Chicago Simulation Work Group Director
May 2012	Brothers of St. Charles of Lawanga- School and Clinic Nairobi, Kenya