

RELATIONSHIP BETWEEN ROLE CONFLICT, ROLE AMBIGUITY, AND
INTERPROFESSIONAL TEAM COLLABORATION AMONG NURSES CARING FOR
OLDER ADULTS IN THE INTENSIVE CARE UNIT (ICU)

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Abstract

The purpose of this cross-sectional study was to examine the relationship between role conflict, role ambiguity and interprofessional team collaboration (ITC) as reported by nurses caring for older adults in intensive care units (ICU). The study which used a random sample of nurses working in the ICU ($n = 403$) selected from the primary study by Fox (2014), relied on the Dillman et al. (2014) Tailored Design Method for surveys. ITC was measured by the Modified Index of Interdisciplinary Collaboration Subscale, while role ambiguity and role conflict were measured by the respective subscales of the role conflict and ambiguity scale developed by Rizzo, House, and Lirtzman (1970). Pearson's correlations showed statistically significant relationships between role ambiguity ($r = .354, p = .000$), role conflict ($r = -.111, p = .000$) and ITC. It also showed significant relationships between ITC and three extraneous variables: highest level of nursing education ($r = .048, p = .033$) resource availability ($r = .152, p = .000$), and institutional values ($r = .206, p = .000$). There was no statistical significant relationship between gender and ITC. Using regression analysis and controlling for the extraneous variables, a significant regression equation was found ($F(7, 403) = 21.19, p < 0.0$); whereas role ambiguity ($\beta = .45, p = .00$) had a statistical significant relationship with ITC, role conflict ($\beta = -.01, p = .84$) and the extraneous variables were not significantly associated with ITC. The adjusted model ($R^2 = .26$) indicated that when all the variables were added into the model, they contributed a proportional variance of .26 in the relationship with ITC. These results suggest a need to reduce role ambiguity through clearly defined role scope and boundaries to improve interprofessional collaboration. Further research is needed to identify other variables that have a relationship with interprofessional team collaboration.

Dedication

.....to my four little girls

Nnenna, Ugochi(Titi), Ugoeze(Zeze) and Ogechi(Daada)

your patience, understanding and love will always be the wind beneath my wings

Acknowledgement

The decision to take on this MScN project was influenced by the one person that has the capacity to help me do anything even when I thought I lacked the ability. She, it was who reassured me daily that I could do it. And when I was ready to quit, she convinced me that quitting wasn't in my nature. My darling wife, my best friend and "general manager", Ngozi, this thesis wouldn't have been completed if you're not with me. Thank you so much. My Supervisor, Dr Mary Fox, you're a true mentor. You painstakingly identified every tiny missed dot, comma or uncrossed "t", which I thought I could pass on. You put your foot down like a real mom. Your attention to details was unparalleled. Anything below excellence was not acceptable to you. And you patiently waited for me to get it right. Thank you very much. To my supervising committee – Dr Mary Fox (Chair), Dr Faye Dastjerdi and Dr Sherry Dahlke, I have become your student for life and I will forever cherish the time you spent reviewing my works from its elementary form to the end. I'm also hugely indebted to Nadine Cross, my forever preceptor and mentor, Dr Elisabeth Jensen, Dr Mina Singh, Dr Leslie Beagrie who brought me this far. Hugh McCague of the Institute for Social Research your support on this journey is highly appreciated. I cannot find enough words to thank Aqleema Khan of Graduate Program in Nursing, my thesis coordinators and the entire staff of the Faculty of Graduate Studies, your kind assistance and listening ears made the stress bearable. The University Health Network, I benefitted immensely from your abundant educational resources and unequalled support for education, please accept my gratitude.

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Background

According to the Institute for Research on Public Policy (IRPP) Task Force on Aging (2015) Canadians aged 65 years and older outnumbered those who are younger than 15 years of age in 2015 as predicted by the Canadian Institute for Health Information (2011). The IRPP (2015) also projected that the number of persons aged 65 years and older living in Canada will increase from 4.2 million in 2005 to 9.8 million by 2036. It is estimated that up to 54% of this projected population will be admitted to intensive care unit (ICU) at least once (Fowler & Hammer, 2013; IRPP, 2015). A study by Ehlenbach et al. (2010) indicated that the incidence of serious health conditions such as acute respiratory distress syndrome, acute lung injury (ALI), severe sepsis and the use of invasive procedures requiring ICU admission such as mechanical ventilation, angiogram and percutaneous coronary intervention (PCI) are increasingly higher among older adults. Older adults are presently the most rapidly growing population of patients admitted to intensive care units in developed countries; accounting for 55.8 percent of all ICU days (Balas, Casey, & Happ, 2008).

The challenge with caring for older adults is that they have complex health conditions resulting from reduced physiologic tolerance and multiple comorbidities, and present with atypical symptoms when admitted to hospital (Dahlke & Baumbusch, 2015; Ellis, Marshall, & Ritchie, 2014; Liddy, Blazkho, & Mill, 2014; Nguyen, Angus. Boumendil, Guidet, 2011). Currently, the care needs of older adults have surpassed the scope and capacity of one single healthcare professional (Sargeant, 2009). Thus physicians, nurses, pharmacists, respiratory therapists, physiotherapists, occupational therapists, dieticians, social workers, spiritual care specialists, and other healthcare professionals working in the ICU are required to collaborate in order to provide optimal care to older patients (Kydonia, Malamis, Giasnetsova, Tsiora & Gritsi-

Gerogianni, 2010; Leipzig et al., 2002). Registered nurses acutely understand the importance of collaboration and because nursing practice is wholistic, nurses are aware of the need to engage in cooperative partnership with other healthcare professionals in order to meet the complex needs of their patients (Miller, 2004).

Interprofessional team collaboration in healthcare is a complex process that brings a number of individuals with specialized and complementary healthcare training, skills and culture together into sharing common goals and exercising concerted physical and mental effort in collaboratively assessing, planning, providing or evaluating patient care, while respecting and supporting each other's contributions (D'Amour, Ferrada-Videla, Rodriguez, & Beaulieu, 2005, Hall, 2005; Nancarrow et al., 2013; Xyrichis & Ream, 2008). Prior research had shown that most adverse events in the care of patients in the ICU are due to the poor or lack of collaboration among healthcare professionals (Alexanian, Kitto, Rak, & Reeves, 2015; Fewster-Thuente & Velsor-Friedrich, 2008; Reader, Flin, Mearns, & Cuthbertson, 2007). Research has provided little knowledge on the factors that contribute to effective collaboration (Miller, 2004). A systematic review to explore the factors that inhibit or facilitate interprofessional team-working by Xyrichis and Lowton (2008) found that structure of the team, including proximity of its members, resources available, institutional values (such as clear and precise objectives), and scope of work devoid of conflict and ambiguity were prerequisites for effective interprofessional team collaboration. Knowledge of the roles of other professions reduces role stress, fosters respect for the unique contributions of all professionals and improves interprofessional collaboration by optimizing team participation in clinical decision-making within and across professions (MacDonald, et al., 2010).

The interaction between the various healthcare professionals in the care of the complex ICU patient and the challenges of caring for older adults causes an overlap in the roles and functions of different healthcare professionals. These two factors coupled with the increasing societal demand for efficient, cost-effective, and quality care blur role boundaries and create new role and relationship structures which expose nurses to multiple authorities, expectations and loyalties (Baggs, Norton, Schmitt, & Sellers, 2004; Kenning, Coventry & Bower, 2014; Nguyen et al., 2011; Salhani & Coulter, 2009). Multiple different interests, authorities and expectations disrupt people's orientation to their roles resulting in role ambiguity and role conflict (House, 1970, House & Rizzo, 1972; Rizzo, House & Lirtzman, 1970).

Role ambiguity occurs when the requirements and expectations of the rights, duties, and responsibilities of the role to be performed, the processes and/or procedures that will lead to the fulfillment of these expectations and the likely consequences of these role behaviors are non-existent or poorly communicated (Dodd-McCue, Tartaglia, Veazey, & Streetman, 2005). Role conflict on the other hand, is the incongruent expectation or demand that occurs between, and within roles when one's role directly interferes with one's ability to satisfy the requirements of another role, such as when nurses process multiple differing instructions from doctors, families, administrators, nursing supervisors, and other members of the interprofessional healthcare team (Chang & Hancock, 2003; Katz & Kahn, 1978b). Role conflict and role ambiguity are both forms of role stress (Tarrant & Sabo, 2010). According to House (1970), and House and Rizzo (1972), role conflict and/or role ambiguity occur when there is a disruption in the classical organizational chain of command which requires every individual in any role position to receive instructions from one source only and be accountable to one authority.

Lingard, Espin, Evans and Hawryluck (2004) noted that the ICU is a complex healthcare setting with different healthcare professionals of different backgrounds working together. It is therefore, a nexus for interprofessional tensions because of its pivotal role in the care of the hospital's most critically ill patients and in the management of critical care resources (Lingard et al., 2004). The complexity of the ICU patient population, multiple instructions and multiple expectations from the interprofessional team, leave the ICU nurse in a dilemma, resulting in nurses, who represent the largest healthcare workforce, providing and coordinating the 24-hour bedside care, being torn between key decisions as the different team members tend to work independently rather than collaboratively (Dahlke & Fox 2015; Registered Nurses Association of Ontario, 2006; Van De Cappelle, Hui, & Yan, 2012). Poor role delineation and multiple hierarchies, conflicting demands and loyalties contribute to ICU nurses' poor perception of interprofessional collaboration (Thomas, Sexton, Helmreich, 2003), and nurses' general feeling of being undervalued within interprofessional teams, which in turn undermines their efforts to collaborate (Dahlke & Fox, 2015).

Understanding the relationship between nurses' role conflict, role ambiguity and interprofessional team collaboration is complicated by limited research and a lack of conceptual consensus by scholars and yet knowledge of the relationship between role ambiguity, role conflict and interprofessional collaboration is vital to provide necessary information to assist in the development of initiatives to improve interprofessional team collaboration and outcomes for older adults admitted to the ICU.

Purpose

This study examined the relationships between role ambiguity, role conflict and interprofessional team collaboration as reported by nurses caring for older adults in the ICU.

The objective of the study was to use nurses self-reported perception of role ambiguity, role conflict and interprofessional team collaboration and examine the relationship that exist between these variables.

Literature Review

Literature Review Procedure

A review of the literature (Table 1) was conducted to assess the current state of science on the relationship between role ambiguity, role conflict and interprofessional team collaboration. The original plan to limit the review to studies conducted from 2005 onward was amended when limited studies were found within that time frame. The time span was therefore expanded to include studies conducted since 1999, where necessary, seminal articles dating earlier than 1999 were included.

The review was organized around the relationships between role ambiguity, role conflict and interprofessional team collaboration and starts with brief conceptual definitions of each concept. The review then proceeds to identify any theoretical and empirical evidence that supports the relationships between role ambiguity, role conflict and interprofessional team collaboration among nurses caring for older adults admitted to the ICU. The literature was also examined for extraneous variables that may exert an influence on the relationship between role ambiguity, role conflict and interprofessional team collaboration.

An iterative approach was used to conduct and refine the search strategy. The literature search began by testing the search terms role AND conflict and then incorporating new terms AND/OR ambiguity AND [interprofessional OR interdisciplinary OR multidisciplinary OR team OR group] AND [collaboration OR interdependence OR cooperation OR partnership] AND [nurs* OR health care OR healthcare] AND [“older adults” OR seniors OR aged] AND [intensive OR critical] AND care. The search was limited to articles written in English and relevant to terms under review, where extremely unavoidable the translated copy of a primary study was accepted.

The keywords used include: role stress; role conflict; role ambiguity; role clarity; job conflict; role confusion; role perception; interdisciplinary; multidisciplinary; interprofessional; inter-professional; team; collaboration, collaborative; cooperation; interdependence, teamwork; intensive care unit; ICU; critical care; urgent care; crucial care; nurs*; seniors; older adults; older people; older patients; the aged; geriatrics. Four bibliographic databases, CINAHL, Medline, Cochrane, Proquest were used for the search. Aggregated database, internet and e-journal searches yielded a total 490 relevant abstracts that were accepted for review. When the initial comprehensive search focusing on healthcare studies did not yield enough results, the search was broadened to include relevant studies within the fields of business, sports teams, sociology, psychology and organizational behaviour generally. The table below was used summarize the literature.

Table 1

Literature review table

Author/ Title of Article	Brief background	Design	Purpose	Sample/ Setting	Procedure/ Measurement	Results/ Findings/ Conclusions	Limitations /Weaknesses

Twelve studies were found that examined the relationships between role ambiguity and/or role conflict and team variables such as intra-team communication, team performance, team effective, and team cohesion. However, none of these studies specifically examined the relationship between role conflict, role ambiguity and interprofessional team collaboration in

healthcare. The majority of the studies were found in the areas of sports, industrial psychology, and business. The only few related studies conducted in healthcare examined the relationship between role conflict, role ambiguity and other team variables. Even then, these studies had limitations such as incomparable samples (e.g. teenagers and young adults, or largely male or female only samples, all of which differed from the typical healthcare team population); sampling strategies (such as using convenience sampling where random sampling would have been better suited). These drawbacks limit the applicability of these results to healthcare or most especially to nurses and the interprofessional team caring for older adults in critical and intensive care units. In light of the limited number of studies on the relationship between role conflict, role ambiguity and interprofessional team collaboration, the general objective of my study therefore, was to attempt to fill the gap in knowledge of the relationship between role ambiguity, role conflict and interprofessional team collaboration among nurses caring for older adults in intensive care units.

Description of Concepts

Role ambiguity. According to Kahn, Wolfe, Quinn, Snoek, and Rosenthal (1964) role ambiguity is the perception of the lack of clear, concise and consistent information about the expectations associated with one's position, especially when the individual must rely on others to perform their tasks and fulfill their responsibilities. Several scholars have provided further clarification of role ambiguity as the extent to which team members are unclear about (a) the scope of their role responsibilities; (b) the behaviors required to fulfill those role responsibilities; (c) how they are being evaluated for the performance of their role responsibilities; and (d) the consequences of not fulfilling their role responsibilities (Bauer, 2000; Bauer, 2002; Beauchamp & Bray, 2001; Beauchamp, Bray, Eys, & Carron, 2002; Bray, Beauchamp, Eys, & Carron, 2005;

Olivares-Faúndez, Gil-Monte, Mena, Jélvez-Wilke, & Figueiredo-Ferraz. 2014). Tarrant and Sabo (2010) found that role ambiguity occurs when an individual lacks necessary information to complete the required duties of a particular position. Dodd-McCue et al. (2005) concluded that role ambiguity results when the requirements and expectations of the rights, duties, and responsibilities of the role to be performed, the processes and/or procedures that lead to the fulfillment of these requirements/expectations, and the likely consequences of these role behaviors are poorly communicated or not communicated at all. The commonest sources of role ambiguity in interprofessional teams according to Eys, Carron, Beauchamp and Bray (2005b) are (a) the role sender (e.g. the nurse supervisor, physicians or other members of the interprofessional team); (b) the focal person (e.g. the nurse); and (c) the context/situation. Dodd-McCue et al. (2005) found that organizational factors (such as rapidly changing organizational structures and job feedback systems) and individual factors (e.g., information processing biases) have the tendency to contribute to role ambiguity.

Role conflict. Role conflict occurs when an individual is subjected to competing and/or conflicting sets of expectations and demands by different interests with stakes in that one position or role, resulting in the principle of chain or unity of command being violated as instructions and directives emanate from multiple sources (Tarrant & Sabo, 2010). According to role theory, role conflict results when two or more sets of incompatible demands involving work-related issues confront an individual (Kahn et al., 1964; Katz & Kahn, 1978a, 1978b). Role conflict is contextual according to a study by Hetch (2001) which found that when tested with variables such as time investment, role resources, and factors which structure roles, role conflict was determined by the work at hand. Tunc and Kutanis' (2009) study of 251 health-care professionals found that role conflict occurred when an individual had two or more role

requirements that work against each other. Healthcare professionals must clearly understand what is expected of their performance and this can be achieved when all members of the team have clearly defined roles and responsibilities or lines of collaboration (Mahfouz, Abood, Mohamed, & AbdelHamid, 2013). Separate studies by several scholars have concluded that the lack of role clarity, poor understanding of the scope of an individual's work or insufficient resources, inconsistent communication, perceived inappropriate behaviours, unrealistic expectations, differing perspectives regarding patient prognosis, needs or goals of care are among the commonest sources of role conflict that compound nurses' performance of their duties and relationships with other team members (Fassier & Azoulay, 2010; Kvarnström, 2008; Lynn & Kalay, 2015; Xyrichis & Lowton, 2008; Yeager, 2005).

Interprofessional team collaboration. Research offers a relatively poor or conflicting understanding of interprofessional team collaboration (Reeves & Lewin, 2004). There is also a lack of agreement among scholars on the best term to describe the interactive, interdependent collaborative work between healthcare professionals. Terms such as teamwork, interprofessional, multiprofessional, interdisciplinary, interspecialty, or multidisciplinary collaboration have been proposed at various times (Jones, 2006; Lingard et al., 2004; Paradis & Reeves, 2013). Recent studies (including this present study) have predominantly adopted the term, "interprofessional team collaboration" as a composite term to describe the collaborative interaction between healthcare professionals (Xyrichis & Ream, 2008). Interprofessional team collaboration is a partnership that involves various individual healthcare professionals, teams of healthcare professionals and the client in a participatory, collaborative and coordinated approach to shared decision-making on health issues that gives the patient the best outcome (Orchard, Curran, & Kabene, 2005). Effective collaboration amongst interprofessional team members has a direct

impact on patient safety and outcomes, as almost 70% of patient adverse events point to the lack of collaboration and communication among healthcare professionals as a main cause of error (Fleming, Opton & Terry, 2010). Hall, Weaver, Gravelle, and Thibault (2007) study of palliative care nurses caring for chronic and severely ill patients found that interprofessional collaborative practice improves patient care and creates satisfying work roles. An observation study by Stein-Parbury and Liaschenko (2007) on how intensive care unit collaborative culture, expressed through every day practices affected the care of patients found that collaboration among the interprofessional teams is linked to positive outcomes for patients. Studies (Coombs & Ersser, 2004; Stein-Parbury & Liaschenko, 2007) also found that a breakdown in healthcare team collaboration occurs when due to classical hierarchical organizational structures, some members of the healthcare team such as physicians believe that they are the final arbiter of clinical decisions. The Registered Nurses' Association of Ontario (2006) recognized interprofessional team collaboration as key to its best practice on healthy work environment for nurses.

Theoretical and Empirical Evidence

Theoretical and empirical evidence on relationship between interprofessional team collaboration and team variables. In this section, the literature to answer the research question on the relationship between the independent variables (role ambiguity and role conflict) and interprofessional team collaboration is presented.

There is limited research examining the association of role ambiguity and/or role conflict with interprofessional team collaboration. The few studies that have examined these relationships, have not specifically examined collaboration among healthcare team members. Consequently, I present here, five studies that examined the relationship that role ambiguity and role conflict have with variables that are conceptually related to interprofessional team

collaboration, including team cohesion, team performance, and team communication in other types of teams, such as sports, business and other project teams

Cunningham and Eys (2007) explored the relationship between athletes' perceptions of role ambiguity and intra-team communication within an interdependent sports team setting. Role ambiguity was measured using the Role Ambiguity Subscale (RAS; Beauchamp et al., 2002). Intra-team communication was measured by the Scale for Effective Communication in Team Sports ([SECTS], Sullivan & Feltz, 2003). Using stepwise regression, the study found that intra-team communication was significantly related to role ambiguity. The authors suggested that team communication could be a salient source of role ambiguity in interdependent team sport.

One major limitation of the Cunningham and Eys (2007) study was that the sample for their study had an almost equal ratio of males to female. This creates considerable external validity issues as the findings may not be easily generalizable to healthcare settings where the ratio of female to male is about 11:1 (Government of Canada, 2015; Sullivan, 2001). Another limitation that might challenge the internal validity of this study was the use of convenience sampling. The problem with convenience sampling according to Kothari (2004), and Im and Baskerville (2005) is that those available may be atypical of the population. A more representative sample would be obtained by a random sampling strategy.

Relying on data from self-reported questionnaires, Bosselut, McLaren, Eys, and Heuzé (2012) examined the relationship between role ambiguity and group cohesion among 162 team members of 12 youth interdependent sport teams. The study was based on the role episode model. After statistically controlling for extraneous variables and following a series of separate stepwise regression analyses, the study found that perceptions of role ambiguity predicted group cohesion dimension of interprofessional team collaboration.

One shortcoming of Bosselut et al. (2012) was that the study sample was predominantly teenagers which makes it difficult to generalize the result to nursing and healthcare where the average age is 44.5 years (College of Nurses of Ontario[CNO], 2014; CNO, 2016; Laschinger, Grau, Finegan, & Wilk, 2010; Service Canada, 2015). Secondly, the study used convenience sampling. In convenience sampling, there is a high risk of sampling bias, because the strategy is non-probable, accidental and only includes participants who are available at the given time/place and these might be an atypical population. (Im & Baskerville, 2005; Kothari, 2004; Polit & Beck, 2012).

Johnson (2012) hypothesized that (i) role ambiguity and team cohesion have a negative correlation, and (ii) that low levels of role ambiguity correlate with low levels of team cohesion. Johnson (2012) measured role ambiguity as a multi-dimensional construct which included a) scope of responsibilities, b) behavior to carry out role responsibilities c) how role performance will be evaluated, and d) the consequences of failing to fulfill role responsibilities. Using Pearson Correlations, the study found a significant relationship between role ambiguity and team cohesion. In particular, ambiguity related to scope of responsibilities and behaviours needed to fulfill those responsibilities showed a significant relationship to team cohesion.

Savelsbergh, Gevers, van-der-Heijden and Poell (2012) defined a project team as a temporary organization that operates with near autonomy within a larger group towards the attainment of a goal, on time, within budget, and in accordance with predetermined performance specifications to add value for the client. The study focused on project teams and explored the relationship between individual and team role stress (which they defined to include role conflict, role ambiguity and role overload), team learning behaviours and individual and team performance as outcomes of team collaboration. Using structural equation modeling (SEM),

Savelsbergh et al. (2012) showed that role conflict was not significantly related to team performance as an outcome of team collaboration ($\beta = .17$; *ns*) or had a significant negative relationship with self-rated team performance ($\beta = -.26$; $p < .05$).

In relation to the present study, Savelsbergh et al.'s (2012) definition of a team is problematic in that it described a team as a transient and temporary group set up for a project. This is not typical of healthcare teams and therefore limits the generalizability of their findings to healthcare. Another major threat to the external validity of the Savelsbergh et al.'s (2012) findings that the sample was comprised of construction workers, the nature of whose work differs from healthcare professionals, therefore, generalizability of the findings of Savelsbergh et al.'s (2012) study to the current study populated by nurses may be limited.

In another study, Drach-Zahavy and Freund (2007) examined the relationship between role ambiguity and role conflict and team variables from the perception of both as composites of role stress (measured by self-reported role conflict, role ambiguity and role overload) and team effectiveness in 73 community primary healthcare settings. The study found that whereas role conflict was negatively related to team effectiveness ($r = -0.34$, $p < 0.01$), role ambiguity was significantly and positively related to team effectiveness ($r = 0.31$, $p < 0.01$). A major threat to Drach-Zahavy and Freund (2007), which limits its generalizability was that it examined role stress as composite construct comprised of role ambiguity, role conflict and role overload, thus the boundary of each variable is fuzzy. This contrasts with the current research which studied each variable as separate concept with direct relationship with interprofessional collaboration.

Theoretical and empirical evidence on relationship between interprofessional team collaboration and extraneous variables. The review of literature suggests that there are

extraneous variables that might have relationship with interprofessional team collaboration. These variables include: level of education, gender, team resources, and institutional values.

Level of education. In a descriptive, comparative study of registered nurses in one Canadian province, Miller (2004) examined the relationship between nurses' level of education and their perceptions of interprofessional collaboration with other members of the healthcare team. Using a stratified random sample of 379 diploma/baccalaureate and graduate nurses, the study found that nurses with a baccalaureate degree or higher education had significantly higher collaboration scores than those with a diploma or associate degree. This finding suggests that the more educated the nurse, the higher their collaboration with other healthcare professionals.

Gender. There is some evidence to suggest that gender may have a relationship with interprofessional team collaboration. In a qualitative study by Wear and Keck-McNulty (2004, *p* .294) "a majority of female nurses, particularly those in surgery and emergency medicine, viewed their relationships with female physicians as more positive than their relationships with male physicians". A systematic review by Fewster-Theunte and Velsor-Freidrich (2008) concluded that female members of the interprofessional team are more collaborative and that when both the physicians and nurses were female, the level of collaboration was higher and the balance of power more equal.

Institutional values. A systematic review by San Martín-Rodríguez, Beaulieu, D'Amour, and Ferrada-Videla (2005) found that an organization's philosophy which values participation, fairness, freedom of expression, a climate of openness, risk-taking, integrity and trust and interdependence is essential for the development of collaboration within health care teams. In a systematic review of the literature on interdisciplinary team work, and the perceptions of over 253 staff from 11 community rehabilitation and intermediate care teams in the United Kingdom,

Nancarrow et al. (2013) found that having clear and focused organizational leadership and management, which is democratic; respects its people and understands the essence of shared leadership and responsibility; willing and ready to provide required support/supervision to its staff; and demonstrable personal commitment is one of the defining themes of effective interprofessional team collaboration.

Resource availability. McDonough and Doucette (2001) found that resources at the disposal of the nurse including personnel; finance; facilities, tools and equipment; and terms of work are among the determinants of the development and growth of collaborative relationships in healthcare settings. This finding was further strengthened by a systematic review of theoretical and empirical studies conducted by San Martin-Rodriguez et al. (2005) which found that a key condition for successful collaborative practice is the availability of human and material resources.

Conceptual Framework

This study is guided by a conceptual framework derived from the role episode theoretical model by Kahn et al. (1964). The role episode model evolved from the social sciences and proposes that interpersonal relationships are the product of the interaction between organizational factors (a social event, issue, problem, etc.); role sender's expectations coupled with the pressure inherent in that role; individual personality traits (of both the role sender and target person), and the target person's perception of their role based on past experience which determines their response. This model attempts to explain all aspects of human interaction from the viewpoint of roles, e.g., when I'm at home with my family, I'm a husband or father, or brother, son, uncle, nephew, or cousin; in my city I'm a citizen, a voter, a tax payer; at my work in the hospital I'm a nurse, an educator, a staff and so on. Each of these roles comes with rights, responsibilities, duties, privileges, boundaries, expectations which determine the interpersonal relationship between me and others. These role expectations and pressures/stressors could become ambiguous, conflicted, overlap or get confused with others and in return affect or interfere with interpersonal relationships. The role episode theoretical model by Kahn et al. (1964) had been suggested as the optimal model to examine the behavior of individuals in organizations (Dubinsky & Yammarino, 1984; Schuler, Aldag & Brief, 1977). The model proposes that the individual's perception of role ambiguity and role conflict significantly contributes to changes in organizational variables (such as interprofessional team collaboration). The Kahn et al. (1964) model has become the gold standard in role research, because it offers measurable standard and provides an easy to understand explanation of the influence of role conflict, and role ambiguity on interprofessional team collaboration. The model also suggests that there may be other unknown variables that might influence interprofessional team

collaboration which may not be readily identified. Accordingly, my conceptual framework (Figure 1) posits that role conflict and role ambiguity have the potential to influence interprofessional team collaboration. The framework also identifies the following as extraneous variables that may influence interprofessional team collaboration: highest level of nursing education; gender; institutional values and resource availability.

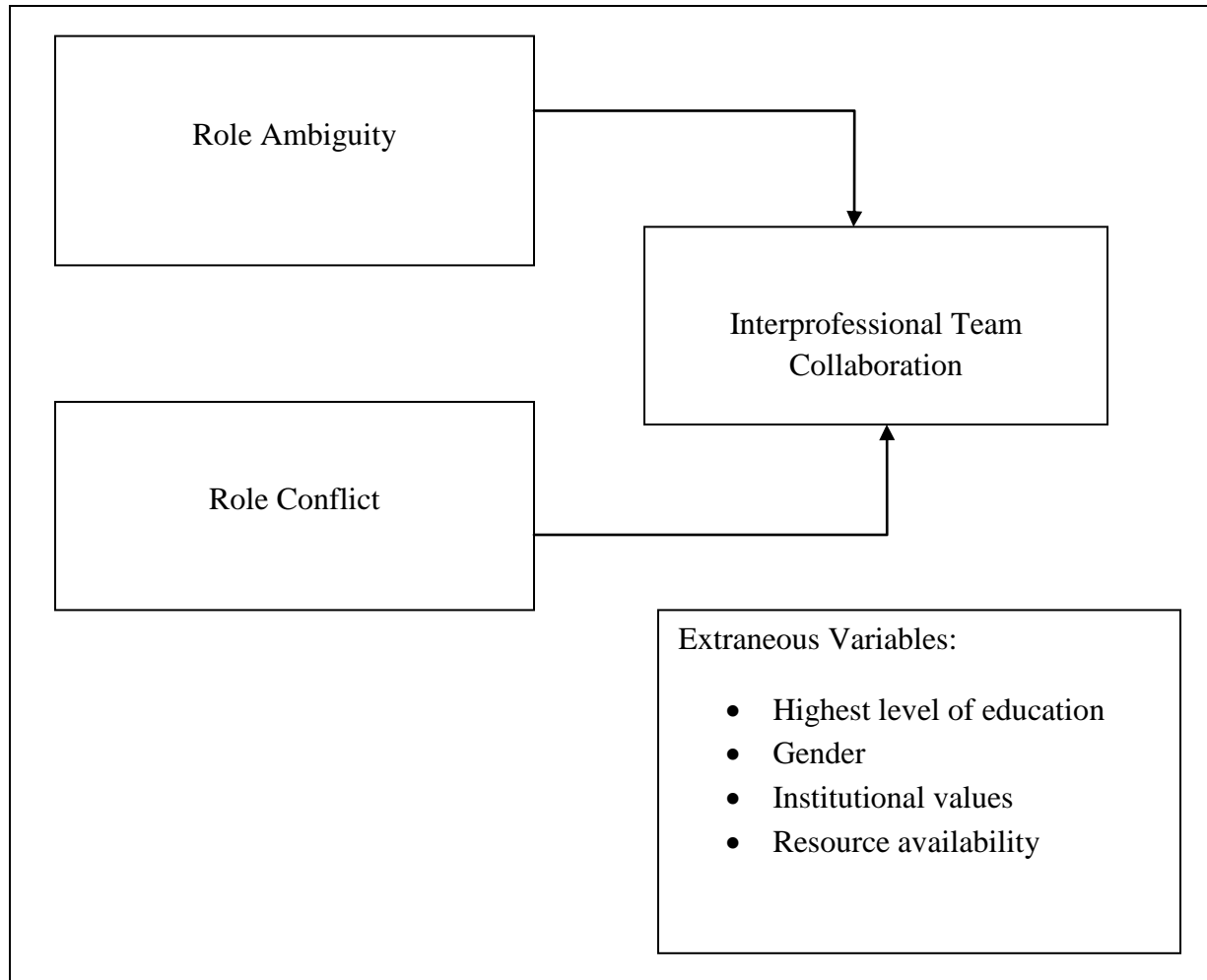


Figure 1. Conceptual framework of the relationship between role conflict, role ambiguity and interprofessional team collaboration

Research Questions

Guided by the conceptual model, the following research questions were posed.

- (i) What is the relationship between role ambiguity and interprofessional team collaboration?
- (ii) What is the relationship between role conflict and interprofessional team collaboration?

Methods

Design

This cross-sectional study is a secondary data analysis of Fox's (2014) study that used the Dillman, Smyth, and Christian (2014) Tailored Design Method (TDM) for surveys. TDM consists of a set of techniques to maximize participant response that include using a set of timed mailings personalized to encourage the participant's sense of contribution towards solving the research problem (Fox, Crask, & Kim, 1988). TDM is also known to elicit significantly higher response rate than many other mailing procedures (Sutherland, Beaton, Mazer, Kriukov, & Boyd, 1996).

Setting and Sample

The sample for this study is a subset of the data collected for the primary study by Fox (2014). Based on a population of 24,102 nurses, the primary study randomly selected a sample of 2012 nurses working in 148 hospitals in Ontario who met the eligibility criteria. Out of this sample, the current study selected all of the 403 (20.6%) nurses working in critical, coronary and intensive care units. The sample was randomly selected from the College of Nurses of Ontario (CNO) database, using a proportional stratified random sampling strategy. Data were collected from a province-wide cross-sectional survey of a sample of acute care nurses who provide direct care to older adults admitted to the ICU of acute care hospitals. Nurses were considered eligible if: their registered status with CNO is "active"; practice location was "Ontario"; they worked in the hospital sector and acute care subsector; their primary practice area was in critical, coronary or intensive care; they worked as a staff nurse; and, had consented to release their names for research purposes. Any Registered Nurse (RN) and Registered Practical Nurse (RPN) practising in the critical, coronary and intensive care units (hereinafter referred to as intensive care unit -

ICU) of the in-patient unit of any acute care hospitals in Ontario was eligible to participate in the study. The sample for this study includes the 403 RNs and RPNs from Fox's data set working in ICU. The sample size of 403 is considered adequate to conduct the planned regression analyses. According to Green (1991) and Burmeister and Aitkin (2012) sample size for regression analysis can use the 20:1 rule of thumb, which states that the ratio of the sample size to the number of parameters in a regression model should be at least 20 to 1. The sample size was constrained by the number of nurses working in ICU in the data set. The data structure was also constrained by the design and data structure of the primary study. The current study used a multiple regression test to examine the relationship between two independent variables (role conflict and role ambiguity), four extraneous variables (level of education, gender, resources and institutional values) – 6 variables and a dependent variable (interprofessional team collaboration) and therefore meets the 20:1 rule of thumb.

Procedures

The survey materials for the primary study were pilot-tested for comprehension, ease of navigation, clarity, and time demand. The study was approved by the York University Ethics Committee. TDM survey methodology used involved initially establishing contact with nurses, whose names were selected from the CNO database, through a mailed pre-notification letter informing them of the survey and its importance. The survey questionnaire was sent to the participants with a cover letter explaining the details of the study and the participant's rights as research participants. Within one week of sending the survey the research team sent the participant a postcard as a token of gratitude and as a reminder to those yet to respond. As a follow up, non-responders were sent up to 2 further reminders about 2 to 4 weeks later, in the form of a letter and a replacement survey with a postage paid envelope to facilitate response. .

Measures

Interprofessional Team Collaboration was measured by the Interdependence Subscale of the Modified Index of Interdisciplinary Collaboration developed by Oliver, Wittenberg-Lyles, and Day (2007). The subscale contains 13 items (Appendix B) that measure the extent to which team members rely on and collaborate with each other to accomplish their tasks and goals. Participants' answers were reported on a 5-point Likert-type scale ranked Strongly Disagree = 1; Disagree = 2; Neither Agree/Disagree = 3; Agree = 4; Strongly Agree = 5. The mean of the responses was taken. The subscale demonstrated internal consistency reliability (Cronbach alpha = .87) and factorial validity (one factor structure with loadings $\geq .30$, Bronstein, 2002; Oliver et al., 2007). A mean score of 5 indicates perceived high interprofessional collaboration while a score of 1 indicates perceived very low interprofessional team collaboration.

Role Ambiguity and Role Conflict were measured by the role conflict and ambiguity (RCA) scales developed by Rizzo, House, and Lirtzman (1970). The role Ambiguity Subscale has 6 items (Appendix B). The items were displayed on a 7-point Likert-type scale that range from "Very False" = 1 to "Very True" = 7. A higher score indicated lower perceived role ambiguity, while a lower score indicated higher perceived role ambiguity. Role conflict was measured using the Role Conflict Subscale which has 8 items (Appendix B). The items were displayed on a 7-point Likert-type scale that range from "Very False" = 1 to "Very True" = 7. A higher score indicated higher perceived role conflict, while a lower score indicated lower perceived role conflict. Studies have consistently found that the role conflict and role ambiguity subscales demonstrated internal consistency reliability ($\alpha = > .78$ for both scales) and construct validity (Gonzalez-Roma, & Lloret, 1989; Khan, Yusoff, Khan, Yasir, & Khan, 2014; Schwab, Iwanicki, & Piers, 1983).

Resource Availability was assessed using the Resource Availability Subscale of the Geriatric Institutional Assessment Profile. The primary measure, GIAP is a valid and reliable instrument to evaluate employee perception of work environment, institutional structure and other measures of organizational alignment (Malone, Capezuti & Palmer, 2014). The Resource Availability Subscale scores ranged from 0 (lowest possible score) to 32 (highest possible score) calculated from an 8-item questionnaire displayed on a 5-point Likert-type scale and ranked from “Greatly Interferes = 0”, to “Does Not Interfere at all = 5” (Fox, 2014). The questions probe the participant about resources and obstacles to making good decisions about the care provided to older adults.

Institutional Values was measured using the Institutional Values Regarding Older People and Staff Subscale of the Geriatric Institutional Assessment Profile. The questionnaire asks the extent to which the participant disagrees or agrees with each of the 7 statements about the vision and mission of their primary hospital. The responses were displayed on a 5-point Likert-type scale with ranking from “Strongly Disagree = 0” to “Strongly Agree = 4” (Fox, 2014). Scores may be between 0 and 28. A higher score indicated the nurse’s agreement with the institution’s values while a lower score indicated the nurses’ perception that the institution’s values do not promote policies and practices that engender interprofessional team collaboration.

To describe the sample, demographic variables included in this study were highest level of education, gender and professional designation. Highest Level of Education required the participant to report on their highest level of nursing education or other areas. The response was stored as a categorical value that could be either of: 1 = Diploma; 2 = Bachelor’s degree; 3 = Master's degree; 4 = Other.

Similarly, Gender was assessed as part of the demographics that asks the participant to indicate their gender as male or female. This scale can only return a nominal value of either 0 = Male; or 1 = Female. Professional designation was reported in accordance to the participant's registration with the CNO as registered nurse (RN) or registered practical nurses (RPN).

Data Analysis

Data were analyzed using the IBM Statistical Package for Social Sciences (SPSS). Descriptive statistics were employed to describe the sample in terms of average standing on the variables, variation on the variables, and to determine the amount of missing data. They were also used to compute the skewness, kurtosis as well as Tolerance and Variation Inflation Factor to test for data normality and collinearity among the variables. Missing data were handled "listwise", using system-defined values. The forced-entry method was adopted in entering the variables.

In order to answer the research question, Pearson correlations were computed to examine the association of the dependent variable (interprofessional team collaboration) with the independent variables (role ambiguity and role conflict) and extraneous variables (highest level of nursing education, resource availability, institutional values and gender). Pearson correlation was measured by the correlation coefficient while the statistical significance (2-tailed) was assessed by the p-value associated with the correlation. The standard index in most correlational designs is the product-moment correlation coefficient, r . Moment correlation coefficient, r is a widely used index of effect that conveys information both on the magnitude of the relationship between variables and its direction (Durlak, 2009) The coefficient of correlations takes values between -1 to 0 to +1, with -1 indicating a perfect negative correlation, +1 indicating a perfect positive correlation, and 0 indicating no correlation at all (Rosenthal & Rosenthal, 2011).

Pearson correlations was preferred when data is quantitative (Hauke & Kossowski, 2011). Considering that Pearson correlations do not provide information on the magnitude of the relationship between variables when multiple variables are included in the model, inferential testing using multiple linear regression was conducted to evaluate the magnitude and direction of the association of role ambiguity and role conflict with interprofessional team collaboration, while controlling for gender, level of education, resource availability, and institutional values. Cohen's (1992) effect-size benchmarks were used to explain the magnitude of the standardized path coefficients $\beta < .10$ indicates small association, up to $.30$ is considered a medium association and $> .50$ indicates large or high association (Cohen, 1992; Dulark, 2009; Grissom & Kim, 2012). In this study, multiple regression analysis was used to identify the relationships between the independent variables (role ambiguity, role conflict, resource availability, institutional values, highest level of nursing education and gender) and interprofessional team collaboration.

Results

Sample Description

The majority of the participants in this study were Registered Nurses (RN, $n = 397$, 98.51%), with only few Registered Practical Nurses (RPN, $n = 6$, 1.49%). The average age of the nurses was 45.6 ($SD = 10.2$, Table A1). There was a higher number of females ($n = 370$, 91.8%) than males ($n = 30$, 7.4%). On average, the nurses had been practising for 14.9 years ($SD = 9.7$). Most of the nurses worked fulltime (72.1%), averaging 36.9 hours a week ($SD = 8.72$). Most of the nurses (71.2%) worked in teaching hospitals with 100 beds or more (88.7%). Most of the hospitals (87.4%) were located within the Ontario Central, Local Health Integration Network (LHIN).

Average Standing on Variables and Test of Statistical Assumptions

Descriptive statistics computed for interprofessional team collaboration, role ambiguity, role conflict, institutional values, resource availability showed no major departures from normality and no violation of the assumptions underlying the statistical tests used in this study (Table A1). On a scale of 1 to 5, the average nurse reported above midpoint level of interprofessional team collaboration (mean = 3.80, $SD = .41$). Given the role ambiguity and role conflict mean score of 1 to 7, the average nurse reported a role ambiguity score of slightly above the midpoint ($M = 4.04$, $SD = .64$), and below medium level role conflict score ($M = 2.92$, $SD = .89$). Nurses' average score on resource availability which has a total scale score of 0 to 32, was at a mid-range level (mean 22.19, $SD = 6.28$). Similarly, the average nurse reported a medium level ($M = 24.4$, $SD = 5.13$) of institutional values given that the subscale mean could range from 0 to 28.

Skewness and kurtosis values (Table A2) were computed. The kurtosis for all the variables ranged from -.442 to +.387. Kurtosis values between -2 and +2 are considered acceptable in order to indicate normal univariate distribution (George & Mallery, 2010). The skewness was between -.576 and +.195. Normal or approximate distribution is a symmetric distribution with skewness values of -.05 and +0.5 (National Institute of Standards and Technology, 2013), indicating that data were symmetrical and evenly distributed. The histogram (Figure A1) indicated that the regression standardized residuals clustered around the mean and were normally distributed.

Tolerance and the Variance Inflation Factor (VIF) collinearity diagnostics were performed on the independent variables. As Table A4 shows, all independent variables had Tolerance greater than 0.1 and VIF less than 10, indicating that multi-collinearity amongst the independent variables was not problematic. According to Hair, Anderson, Tatham, and Black, (1995) and Miles (2009), when tolerance is greater than 0.1 and the VIF is less than 10, multi-collinearity is not problematic.

Inferential Results

The questions that this research set out to answer were:

- (i) What is the relationship between role ambiguity and interprofessional team collaboration?
- (ii) What is the relationship between role conflict and interprofessional team collaboration?

To answer these questions, 2-tailed Pearson correlations were first computed. Table A3 showed that role ambiguity score was significantly correlated with interprofessional team collaboration score ($r = .354, p = .000$). Role conflict score ($r = -.111, p = .000$) was also

significantly and negatively correlated with interprofessional team collaboration. Table A3 also showed that three of the extraneous variables, resource availability ($r = .152, p = .000$), institutional values ($r = .206, p = .000$) and highest level of nursing education ($r = .048, p = .033$) had statistically significant relationships with interprofessional team collaboration. On the other hand, gender ($r = .042, p = .066$) had no statistically significant relationship with interprofessional team collaboration.

Next, multiple linear regression (Table A5, Table A6) was applied. While controlling for the extraneous variables (gender, highest level of nursing education, resource availability, and institutional values), a significant regression equation was found ($F(7, 403) = 21.19, p < 0.0$). The results showed that whereas role conflict (Standardized Beta (β) = $-.01, p = .84$) and the extraneous variables were not significantly associated with interprofessional collaboration, role ambiguity ($\beta = .45, p = .00$) was significantly and moderately associated with interprofessional collaboration. The adjusted model ($R^2 = .26$) indicated that when all the variables were added into the model, they contributed a proportional variance of .26 in the relationship with interprofessional team collaboration.

Discussion

Although a considerable body of research has studied the association between role ambiguity, role conflict and team outcomes in other populations, this study was the first attempt to examine the association of role ambiguity and role conflict with interprofessional team collaboration in healthcare, as perceived by nurses in intensive care units. In my review of the literature, I found only a few studies which were related to the present research. Even then, these studies did not examine the relationship between role ambiguity, role conflict and interprofessional team collaboration. Also, they were not conducted with nurses, thus limiting the generalizability of the findings to nurses. Most of the studies focused mainly on the relationship between role ambiguity and/or role conflict and any or a combination of team variables such as team performance (Savelsbergh et al., 2012), team effectiveness (Drach-Zahavy & Freund, 2007), team cohesion (Bosselut et al., 2012; Johnson, 2012) and team communication (Cunningham & Eys, 2007). Each of these studies differed from the present study in different ways. For example, the studies by Cunningham and Eys (2007) and Bosselut et al. (2012) were conducted with sports teams of all males or all females with average age of 20.6 years which is much younger than the average for nurses in Ontario, with an average age of about 45.6 years. The gender-mix is uncharacteristic of nursing and healthcare teams which are usually a mixed team of females and males. It limits the generalizability of their findings to nursing healthcare. Cunningham and Eys (2007) also relied on a convenience sample in contrast to this study which used a randomly selected sample of nurses. Johnson (2012) relied only on findings from Pearson correlations compared to the present study which evaluated the relationships using both Pearson correlations and multiple regression. Another relevant study but which also differed in population and setting from the present study was Savelsbergh et al.

(2012) which studied teams of construction workers and therefore is not generalizable to the nursing population and healthcare setting. Drach-Zahavy and Freund (2007) examined the relationships from the perspective of role stress, which they defined as including role ambiguity, role conflict and role overload. By examining these three variables as a composite of role stress it becomes difficult to interpret the results for each variable, thus limiting the generalizability of the findings to practice and policy. Given the intense promotion of interprofessional team collaboration as a key factor in healthcare (Fewster-Thuente & Velsor-Friedrich, 2008; Romanow, 2002; Wheelan, 2003) having a better understanding of the individual factors that are associated with interprofessional team collaboration has great potential to inform team development initiatives.

The study sample had demographic characteristics that were similar to the nursing demographics in Ontario. For instance, the average age of nurses in this study was 45.6 years, and the average experience in years was 14.9 years. The percentage of females and males was 91.8% and 7.4% respectively. These characteristics are comparable to the demographics in Ontario with average nurse age (44.5 years); average years of experience (14.5) and percentage of females and males (92.9% and 7.1% respectively, College of Nurses of Ontario, 2016; Service Canada, 2015).

The majority of the nurses in the study were Registered Nurses (RNs). The study included very few Registered Practical Nurses (RPNs). This study did not specifically test for differences in perceptions of interprofessional team collaboration between the RNs and RPNs but controlled for level of education in nursing (e.g. RPN diploma, RN diploma, RN degree, Master's degree). The results of the multiple regression model showed that higher level of education was not significantly related to interprofessional team collaboration, however, this lack

of significance may be related to the fact that the study sample contained too few RPNs to detect significant differences.

The interprofessional team collaboration, role ambiguity and role conflict subscales scores were reported as the mean value of the respective items. The average nurse reported an above midpoint level of interprofessional team collaboration, indicating that nurses' perception of working in an interactive, collaborative process that involves them and other members of the healthcare team relying on each other in the care of the patient was slightly above the average. On average, nurses also reported their level of role ambiguity to be slightly above the midpoint indicating that nurses had slightly above average perception of a lack of clear, concise and consistent information about the expectations associated with their position.

With respect to role conflict, the average nurse reported a low level of role conflict. This result suggests that nurses perceived that, in the course of their work with the interprofessional team, they had not been compelled to do things differently, receive assignments without enough resources to complete them, work with groups with differing objectives among others, to an extent that it would interfere with their ability to collaborate with the interprofessional team. This finding of low role conflict among ICU nurses though surprising, is quite understandable. ICU nurses have greater access to human health resources than nurses in other settings. For example, in a Level 3 ICU (where patients have unpredictable, critical, intensive and unstable conditions requiring hourly observation/intervention), the nurse to patient ratio is 1:1. In a Level 2 ICU (where patients are stable but require care that is intensive and a minimum of every 2-hourly observation/intervention), the nurse to patient ratio is 1:2. In a Level 1 ICU (where patients are stable with predictable conditions that require observation/ intervention at least once every 4 hours), the ratio is 1:3 (Intensive Care Society, 2009). This workload is much different than in

general medicine or surgical settings where the ratio may be as high as 1:6 (Ontario Nurses Association, 2017). In comparison to general medicine and surgical settings, ICUs have more accessible resources and faster interprofessional team intervention (Lampert, 2015; Marshall et al., 2017). Because of the low patient ratio and the high accessibility of resources, the nurse in the ICU has a much narrower focus, more time to complete tasks, think critically and collaborate with the interprofessional team.

It is also noteworthy that nurses' average reporting on resource availability was at the mid-point, indicating that nurses perceived having an average level of resources available to perform their work. Similarly, the average score on institutional values was above the mid-point level, indicating that nurses had above average positive perception that the policies of their hospitals encouraged/demonstrated respect for the patients, and involved nurses in patient care policy.

The results from my data analysis using the Pearson Correlation Coefficients concur with previous studies which found statistically significant relationships between role ambiguity, role conflict and other team variables that are conceptually related to interprofessional team collaboration. According to the findings from Johnson (2012), and Drach-Zahavy and Freund (2012) role ambiguity was related to team variables (team cohesion and team effectiveness, respectively). Results from my Pearson Correlation analysis also indicated that role conflict had a significant but negative relationship with interprofessional team collaboration. This result concurs with the findings by Savelsbergh et al. (2012), Drach-Zahavy and Freund (2007), and Pearsall et al. (2009) indicating that role conflict was significantly and negatively related to team performance. Using Pearson Correlation, three out of the four extraneous variables resource availability, institutional values and highest level of nursing education were also found to have

significant relationships with interprofessional team collaboration. These results concur with other studies (McDonough & Doucette, 2001; Miller, 2004; San Martín-Rodríguez et al., 2005). On the other hand, gender was found to have no significant relationship with interprofessional team collaboration. This finding differs from the research by Wear and Keck-McNulty (2001) which found that female nurses experienced more positive relationships with female physicians than with male physicians. Wear and Keck-McNulty (2001) study was a qualitative study, and this may account for a difference in the findings of the two studies.

The problem with using simple correlations to compute the relationship between multiple variables is that simple correlations do not provide a reliable measure of the magnitude, proportion of variance or direction of the relationship between variables (Trochim, 2006; Trochim, Donnelly & Arora, 2015). In order to examine the magnitude of the relationship between variables, multiple regression was applied. According to Rosenthal and Rosenthal (2011), the regression adjusted model R^2 shows the proportion of variance in the dependent variable attributed to all the variables in the model, while the standardized regression coefficient (β) resulting from multiple regression shows the magnitude of the relationship between the dependent variable and the independent and extraneous variables. Results of the multiple regression analysis showed that all the variables (role conflict, role ambiguity and the extraneous variables) together accounted for 26 percent of the variance in interprofessional collaboration. This finding suggests that there may be variables, other than those tested that are related to interprofessional team collaboration. The results also showed that, whereas the magnitude of the relationship between role ambiguity and interprofessional team collaboration was notably significant, role conflict and the extraneous variables were not significantly associated with interprofessional collaboration. These findings concur with previous studies on the association

between role ambiguity and interprofessional team collaboration. They also they go further to provide support for the magnitude of the relationship between role ambiguity and interprofessional team collaboration when role conflict and extraneous variables are included in the model. While further research might be required to clearly understand that nature and extent of relationship between the variables, the difference in the results of this study and previous studies may be attributed to their different designs, methods of analysis, and sampling strategies.

Implications for Theory

My conceptual framework, adapted from the role episode theoretical model (Khan et al., 1964), proposes that there is a relationship between role ambiguity, role conflict and interprofessional team collaboration. The framework also posits that there may be other variables that have relationships with interprofessional team collaboration. My data analysis using simple correlation showed that, with the exception of gender, all the other variables had a significant relationship with interprofessional team collaboration. This result lends credence to existing theory (House & Rizzo, 1972) that proposes there is a relationship between interprofessional team collaboration and team variables such as role ambiguity and role conflict. On the other hand, the results from the multiple regression analysis showed that of all the independent and extraneous variables, role ambiguity was the only variable with a significant relationship with interprofessional team collaboration. This finding provided only partial support to the conceptual framework. This finding challenges existing theories and highlights the flaw that previous role theories were based on a sequential/hierarchical model which did not take into account the fact that instructions and demands on a role could come from multiple sources as is the case with nursing.

Role ambiguity and role conflict among nurses in the ICU is rooted in the structure of the healthcare system which creates multiple authorities and subordinations. Therefore, any study of the relationship between these variables and other team variables which is guided by existing theories (most of which are rooted in hierarchical and sequential theories of other disciplines or sectors) is likely going to be problematic. This is essentially because such studies may not take into consideration the perspectives of the many stakeholders involved in healthcare decision making or actions. The findings from this study elicit the development of a nursing-focused role theory that would take into account the existence multiple role senders and role stressors that potentially affect the relationship between the role senders and role recipient.

Implications for Research

Role conflict and role ambiguity are among the team variables which have been most cited in the research literature (Quah & Campbell, 1994) and yet not much is known about their relationship with interprofessional team collaboration among nurses in the intensive care unit. The results of this study showed that the combination of all the six variables examined in the model accounted for only 26% of the proportion of variance in interprofessional team collaboration. Results using regression analysis also indicated that, with the exception of role ambiguity, the other variables tested had no notable relationship with interprofessional team collaboration. These findings have implications for future studies.

Future research in which other variables are included is needed to identify the variables, other than those examined in this study, that are related to interprofessional team collaboration. Communication is an essential element of interprofessional team collaboration (Rose, 2011; San Martin-Rodriguez et al., 2005), but communication tools, technology and strategies used in typical healthcare settings have been shown to be piecemeal and often too fragmented,

cumbersome and complicated to foster collaboration (Cebul, Rebitzer, Taylor, & Votruba, 2013). Information and communication technologies which connect people, machines, resources and systems are changing collaboration among healthcare professionals and the way healthcare is delivered (Graves & Doucet, 2016). MacDonald et al. (2010) and Reeves et al. (2008) found that knowledge of the professional role of other disciplines through interprofessional education reduces role stress, fosters respect for the unique contributions of all professionals and improves interprofessional collaboration. Team structure, especially team premises, team size and composition have been posited as some of the factors that determine interprofessional team collaboration among nurses in the ICU (Xyrichis and Lowton, 2008). Future studies that include technology, knowledge of the professional role of other disciplines and team structure variables in the model might help provide further explanation about other variables that are related to interprofessional team collaboration.

My findings on gender differ significantly from the findings of the qualitative studies in the literature reviewed. The finding from my study may be attributed to the sample's variance on gender - the sample contained very few men. When there is little variance in a variable it is not likely that a statistically significant result will be generated. Future studies using stratified sampling technique to sample an equal number of men and women are needed to better understand the relationship that gender has with interprofessional team collaboration.

Implications for Practice

One of the reasons that gave impetus to this research was the concern that the growing number of older adults admitted to the ICU was creating increasingly new interprofessional team collaboration challenges to nurses. The findings from this study have a number of implications for nursing practice. Caring for older adults is progressively assuming complex dimensions as

many older adults aided with technology are now exposed to procedures previously considered intricate. Nurses are more than ever before compelled to participate in and share the care of one patient with numerous other members of the interprofessional team at the same time. The complex interactions that emerge as the interprofessional team share the care of patients blur role boundaries and create relationship structures which leave nurses, who are at the centre of patient care and care coordination in the middle of contending stakeholders. Previous studies found that when nurses collaborate as equals with other healthcare professionals, coordination and communication between healthcare professionals are improved as are patient outcomes and quality of care (D'Armour et al., 2005; Stephen, 2015). The findings from this study highlight the importance of clearly defining nursing roles to the interprofessional team. As Weiss (1984) stated, "until nursing is clear about its role, its activities will continue to be defined by others". The results of this study suggest that when nurses perceive their roles as ambiguous they perceive their collaboration to be low. Thus, when role ambiguity is decreased through clearly defined and delineated role boundaries, collaboration among the interprofessional team would be improved.

This study highlights the importance for nurses, healthcare management and the interprofessional team to understand the scope, boundaries, demands, expectations and consequences of nurses' roles in order to improve collaboration through decreased role ambiguity as MacDonald et al. (2010) suggested. Although my study did not focus on the perspectives of other members of the interprofessional team, the perspective of the nurses indicate that nurses perceive that other professionals do not have a full understanding of the role of nurses. It might be necessary to require every healthcare discipline to be educated about the

roles of other disciplines in their education curriculum in order to reduce ambiguity and improve collaboration.

Poorly defined roles are a source of friction in clinical teams that lead to inefficiencies in the healthcare system which include wastes, duplication of services, delays in care delivery, and failed transitions between care settings (Brault et al., 2014). In Ontario, 1% of the entire population comprised of mainly of those living with complex health conditions such as older adults in the ICU, consume 30% of the overall health care costs and resources (Goldhar et al., 2013). Goldhar et al. (2013) suggests that effective collaboration among healthcare teams will reduce bottlenecks that lead to duplication, delays, and excessive costs. The results of my study indicate that role ambiguity is related to interprofessional team collaboration and suggests that a reduction in role ambiguity will improve team collaboration. This improvement might help healthcare management to cut costs and reduce wastes associated with duplication of services. It is therefore vitally important for healthcare policy makers and managers to design and implement standards, policies, procedures and protocols such as focused training, personnel development, work specification and so on which help reduce role ambiguity and improve interprofessional team collaboration. Organizational focus on strategies that create the structures required for interprofessional collaboration (Rose, 2011) need therefore, needs to shift to finding strategies to reduce role ambiguity.

Regulatory and professional organizations such as the CNO and the Registered Nurses Association of Ontario may also use the results of this study as the basis for developing best practice guidelines on clearly defining the roles of each discipline in the interprofessional team involved in the care of patients where role ambiguity is most likely to occur. According to Nancarrow et al. (2013), the need for greater interprofessional team collaboration has currently

become more urgent due to the larger numbers of older patients with more complex needs in the ICU, the increasing complexity of skills and knowledge required to provide comprehensive care to patients. Given that interprofessional team collaboration has been associated with improved patient outcomes (Bauer, 2015; Coombs, 2003; D'Armour et al., 2005; Fewster-Thuente & Velsor-Friedrich, 2008; Fleming, Opton & Terry, 2010; Martin, Ummenhofer, Manser, & Spirig, 2010), defining interprofessional team roles has the potential to improve interprofessional team collaboration and ultimately older patients' outcomes as well as reduce the cost of care.

Limitations

The results of this research represent a promising start in studying the relationship between role ambiguity, role conflict and interprofessional team collaboration. The following limitations were noted:

- (i) It is not possible to infer causation from the correlational design of the present study.

Future research employing controlled experimental longitudinal designs are needed to infer causality.

- (ii) Data were constrained by the structure of the primary study. All of the measures in the study were based on self-reported questionnaires.

- (iii) Self-reported measures may be influenced by common method variance which may inflate the size of the correlations observed.

- (iv) This study focused on nurses' perspectives of the relationship between role ambiguity, role conflict and interprofessional team collaboration. Future research to examine the association of role ambiguity and role conflict with interprofessional team collaboration which takes into account the perspective of the entire interprofessional

team is necessary if we are to acquire a broad understanding of the relationship between these variables.

Conclusion

This study provided support for the relationship between role ambiguity and interprofessional team collaboration but failed to find a significant relationship between role conflict and interprofessional team collaboration in a model that included both role ambiguity and conflict, with extraneous variables. It is therefore important that each of the healthcare and interprofessional teams shift their focus towards strategies to reduce role ambiguity as ways to forge greater collaborative partnerships. It is imperative that for collaboration to flourish, the interprofessional team recognize those boundaries that create role conflict or ambiguity and work collaboratively to eliminate or, in the least, minimize them. I associate myself with the findings of Bray, Beauchamp, Eys, and Carron (2005) that role clarity moderates the relationship between role ambiguity and related team variables. Consistency of instructions or directives through unit protocols and procedures, team rounds, shift huddles and transfer of accountability at bedside are some measures that might help reduce role ambiguity and in turn improve interprofessional team collaboration. I also agree with the suggestions by O'Donnell (2007a) for clinical practice to include clear definitions of role boundaries and communicate them consistently to both the nurses and the entire interprofessional team as ways to reduce role ambiguity and improve team collaboration. Healthcare education curriculum should also include significant knowledge of the roles of other professions and disciplines that make up the healthcare interprofessional team.

References

- Alexanian, J. A., Kitto, S., Rak, K. J., & Reeves, S. (2015). Beyond the team: Understanding interprofessional work in two North American ICUs. *Critical Care Medicine*, 43(9), 1880-1886.
- Baggs, J. G., Norton, S. A., Schmitt, M. H., & Sellers, C. R. (2004). The dying patient in the ICU: Role of the interdisciplinary team. *Critical Care Clinics*, 20, 525–540. doi:10.1016/j.ccc.2004.03.008.
- Balas, M., Casey, C. M., & Happ, M. B. (2008). Assessment and management of older adults with complex illness in the critical care unit. *Hartford Institute for Geriatric Nursing*. Retrieved from http://hartfordign.org/uploads/File/gnec_state_of_science_papers/gnec_critical_care.pdf.
- Bauer, J. C., & Simmons, P. (2000). Role ambiguity: A review and integration of the literature. *Journal of Modern Business*, 3, 41-47.
- Bauer, J. C. (2002). A longitudinal evaluation of the impact of organizational structure on role ambiguity and work group performance. (*Unpublished doctoral dissertation*). University of Sarasota: Sarasota, FL. Retrieved from <http://homepages.uc.edu/~bauerjy/JCBauerDissertationFinal.htm>
- Bauer, S. (2015, February 1). *Using teamwork to improve patient outcomes*. Retrieved from <http://www.sccm.org/Communications/Critical-Connections/Archives/Pages/Using-Teamwork-to-Improve-Patient-Outcomes.aspx>
- Beauchamp, M. R., & Bray, S. R. (2001). Role ambiguity and role conflict within interdependent teams. *Small Group Research*, 32(2), 133-157.
- Beauchamp, M. R., Bray, S. R., Eys, M. A., & Carron, A. V. (2002). Role ambiguity, role efficacy, and role performance: Multidimensional and mediational relationships within interdependent sport teams. *Group Dynamics: Theory, Research, and Practice*, 6, 229–242.
- Beauchamp, M. R., Bray, S. R., Eys, M. A., & Carron, A. V. (2005b). Multidimensional role ambiguity and role satisfaction: A prospective examination using interdependent sport teams. *Journal of Applied Social Psychology*, 35, 2560e2576.
- Bosselut, G., McLaren, C. D., Eys, M. A., & Heuzé, J. P. (2012). Reciprocity of the relationship between role ambiguity and group cohesion in youth interdependent sport. *Psychology of Sport and Exercise*, 13(3), 341-348.
- Bray, S. R., Beauchamp, M. R., Eys, M. A., & Carron, A. V. (2005). Does the need for role clarity moderate the relationship between role ambiguity and athlete satisfaction? *Journal of Applied Sport Psychology*, 17(4), 306-318.
- Bronstein, L. R. (2002). Index of interdisciplinary collaboration. *Social Work Research*, 26(2), 113-126.
- Burmeister, E., & Aitken, L. M. (2012). Sample size: How many is enough? *Australian Critical Care*, 25(4), 271-274.
- Canadian Institute for Health Information. (2011). *Health care in Canada 2011: A Focus on seniors and aging*. Ottawa: CIHI. Retrieved on October 28, 2015 from: https://secure.cihi.ca/free_products/HCIC_2011_seniors_report_en.pdf

- Cebul, R., Rebitzer, J. B., Taylor, L. J., & Votruba, M. (2013). Organizational fragmentation and care quality in the US health care system. *The Fragmentation of US Health Care: Causes and Solutions*. New York: Oxford University Press. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.555.4452&rep=rep1&type=pdf>
- Chang, E., & Hancock, K. (2003). Role stress and role ambiguity in new nursing graduates in Australia. *Nursing & Health Sciences*, 5(2), 155-163.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155-159. doi:10.1037/0033-2909.112.1.155.
- College of Nurses of Ontario (2014). *Membership statistics highlights*. Retrieved on April 5, 2017, Retrieved from http://www.cno.org/globalassets/docs/general/43069_stats/43069_membershipstatistics-highlights.pdf.
- College of Nurses of Ontario (2016). *Standard of Care: Statistics report*. Retrieved on 09/20/2016 Retrieved from <http://www.cno.org/en/what-is-cno/nursing-demographics/statistical-reports/>
- Coombs, M. (2003). Power and conflict in intensive care clinical decision making. *Intensive and Critical Care Nursing*, 19(3), 125-135.
- Coombs, M., & Ersser, S. J. (2004). Medical hegemony in decision-making—a barrier to interdisciplinary working in intensive care? *Journal of Advanced Nursing*, 46(3), 245-252.
- Cunningham, I. J., & Eys, M. A. (2007). Role Ambiguity and intra-team communication in interdependent sport teams. *Journal of Applied Social Psychology*, 37(10), 2220-2237.
- Dahlke, S., & Fox, M. (2015). Navigating relationships: Nursing teamwork in the care of older adults. *Canadian Journal of Nursing Research(CJNR)*, 47(4), 61-79.
- Dahlke, S., & Baumbusch, J. (2015). Nursing teams caring for hospitalised older adults. *Journal of Clinical Nursing*, 24(21-22), 3177-3185.
- D'Amour, D., Ferrada-Videla, M., Rodriguez, L., & Beaulieu, M. (2005). The conceptual basis for interprofessional collaboration: Core concepts and theoretical frameworks. *Journal of Interprofessional Care*, 19116-131.
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed mode surveys: The tailored design method* (4th ed.). Hoboken, NJ: John Wiley & Sons Inc.
- Dodd-McCue, D., Tartaglia, A., Veazey, K. W., & Streetman, P. S. (2005). The impact of protocol on nurses' role stress: A longitudinal perspective. *Journal of Nursing Administration*, 35(4), 205-216.
- Drach-Zahavy, A., & Freund, A. (2007). Team effectiveness under stress: A structural contingency approach. *Journal of Organizational Behavior*, 28(4), 423-450.
- Dubinsky, A. J., & Yammarino, F. J. (1984). Differential impact of role conflict and ambiguity on selected correlates: A two-sample test. *Psychological Reports*, 55(3), 699-707.
- Durlak, J. A. (2009). How to select, calculate, and interpret effect sizes. *Journal of Pediatric Psychology*, 34, 917– 928.
- Ehlenbach, W. J., Hough, C. L., Crane, P. K., Haneuse, S. J., Carson, S. S., Curtis, J. R., & Larson, E. B. (2010). Association between acute care and critical illness hospitalization and

- cognitive function in older adults. *Jama Network*, 303(8), 763-770.
doi:10.1001/jama.2010.167 Retrieved from
<https://jamanetwork.com/journals/jama/fullarticle/185435>
- Ellis, G., Marshall, T., & Ritchie, C. (2014). Comprehensive geriatric assessment in the emergency department. *Clinical Interventions in Aging*, 9, 2033.
- Fassier, T., & Azoulay, E. (2010). Conflicts and communication gaps in the intensive care unit. *Current Opinion in Critical Care*, 16, 654–665. doi:10.1097/MCC.0b013e32834044f0.
- Fewster-Thuente, L., & Velsor-Friedrich, B. (2008). Interdisciplinary collaboration for healthcare professionals. *Nursing Administration Quarterly*, 32(1), 40-48.
- Fleming, T., Opton, L., & Terry, A. (2011). Interprofessional team members' roles and responsibilities: Myth busters. *Clinical Simulation in Nursing*, 7(6), e251-2.
doi:10.1016/j.ecns.2011.09.028.
- Fowler, R., & Hammer, M. (2013). End-of-life care in Canada. *Clinical & Investigative Medicine*, 36(3), 127-132.
- Fox, Mary. (2014). Nurse and organizational readiness to deliver best elder care: The key to Ontario's ability to design and implement senior friendly hospital plans (pp. 1-42). Unpublished report submitted to Health System Strategy and Policy Division of the Ontario Ministry of Health and Long-Term Care. Grant number 06651.
- Fox, R. J., Crask, M. R., & Kim, J. (1988). Mail survey response rate: A meta-analysis of selected techniques for inducing response. *Public Opinion Quarterly*, 52(4), 467-491.
- George, D., & Mallery, M. (2010). *SPSS for Windows Step by Step: A Simple Guide and Reference*, 17.0 update (10a ed.) Boston, MA: Pearson.
- Goldhar, J., Daub, S., Dhalla, I., Ellison, P., Purbhoo, D., & Sinha, S. K. (2014). Integrated client care for frail older adults in the community: Preliminary report on a system-wide approach. *Healthcare Quarterly*, 17(3), 61-69.
- Gonzalez-Roma, V., & Lloret, S. (1989). Construct validation of Rizzo et al.'s (1970) role conflict and ambiguity scales: A multisample study. *Applied Psychology: An International Review*, 47, 535-545.
- Graves, M., & Doucet, S. (2016). Factors affecting interprofessional collaboration when communicating through the use of information and communication technologies: a literature review. *Journal of Research in Interprofessional Practice and Education*, 6(2).
DOI: <http://dx.doi.org/10.22230/jripe.2017v6n2a234>
- Green, S. B. (1991). How many subjects does it take to do a regression analysis. *Multivariate Behavioral Research*, 26(3), 499-510.
- Grissom, R. J., & Kim, J. J. (2012). *Effect sizes for research: Univariate and multivariate applications* (2nd ed.). New York, NY: Routledge.
- Hair, J. F. Jr., Anderson, R. E., Tatham, R. L. & Black, W. C. (1995). *Multivariate data analysis* (3rd ed.). New York, NY: Macmillan.
- Hauke, J. & Kossowski, T. (2011). Comparison of values of Pearsons and Spearmans correlation coefficients on the same sets of data. *Quaestiones Geographicae* 30(2), 87-93.

- Hall, P. (2005). Interprofessional teamwork: Professional cultures as barriers. *Journal of Interprofessional Care*, 19(S1), 188-196.
- Hall, P., Weaver, L., Gravelle, D., & Thibault, H. (2007). Developing collaborative person-centred practice: a pilot project on a palliative care unit. *Journal of Interprofessional Care*, 21(1), 69–81. doi:10.1080/13561820600906593.
- House, R (1970) Role conflict and multiple authority in complex organizations. *California Management Review*. (12) 4, 53-60.
- House, R. J., & Rizzo, J. R. (1972). Role conflict and ambiguity as critical variables in a model of organizational behavior. *Organizational Behavior and Human Performance*, 7(3), 467-505.
- Im, G. P., & Baskerville, R. L. (2005). A longitudinal study of information system threat categories: The enduring problem of human error. *ACM SIGMIS Database*, 36(4), 68-79.
- Institute for Research on Public Policy (IRPP) Task Force on Aging. (2015) Designing a national seniors strategy for Canada. Ottawa: Institute for Research on Public Policy.
- Intensive Care Society. (2009). Levels of critical care for adult patients. *Intensive Care Society Standards*. Retrieved from <https://www.networks.nhs.uk/nhs-networks/south-east-coast-critical-care-network/transfers/policies-and-guidelines/appendix-5-levels-of-critical-care-for-adult-patients-ics-2009>
- JIVE Whitepaper. (2017). *Ending fragmentation and improving collaboration in the healthcare industry*. Retrieved from https://www.jivesoftware.com/pdf/whitepaper/2017/02/Fragmentation-to-Connection_WP_HealthCare_AU_1017.pdf.
- Johnson, K. E. (2012) *Role ambiguity and team cohesion in division one athletes*. (Unpublished thesis). Retrieved on March 10, 2016 from http://www.pilotscholar.up.edu/cgi/viewcontent.cgi?article=1081&content=cst_studpubs.
- Jones, A. (2006). Multidisciplinary team working: Collaboration and conflict. *International Journal of Mental Health Nursing*, 15(1), 19-28.
- Khan, A., Yusoff, R. B. M., Khan, M. M., Yasir, M., & Khan, F. (2014). Psychometric analysis of role conflict and ambiguity scales in academia. *International Education Studies*, 7(8), 104.
- Kahn, R. L., Wolfe, D. M., Quinn, R. P., Snoek, J. D., & Rosenthal, R. A. (1964). *Occupational stress: Studies in role conflict and ambiguity*. New York, NY: Wiley.
- Katz, D., & Kahn, R. L. (1978a). *The social psychology of organizations: The social psychology of organisations*. New York, NY: John Wiley and Sons.
- Katz, D., & Kahn, R. L. (1978b). Organizations and the system concept. *Classics of Organization Theory*, 161-172.
- Kenning, C., Coventry, P. A., & Bower, P. (2014). Self-management interventions in patients with long-term conditions: a structured review of approaches to reporting inclusion, assessment, and outcomes in multimorbidity. *Journal of Comorbidity*, 4(1), 37-45.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International: New Delhi

- Kvarnström, S. (2008). Difficulties in collaboration: A critical incident study of interprofessional healthcare teamwork. *Journal of Interprofessional Care*, 22(2), 191-203.
- Kydonas, C. K., Malamis, G., Giasnetsova, T., Tsiora, V., & Gritsi-Gerogianni, N. (2010). The level of teamwork as an index of quality in ICU performance. *Hippokratia*, 14(2), 94.
- Lampert, L. (2015, November 9). *Differences between medical-surgical nursing and ICU nursing*. Retrieved from <https://www.ausmed.com/articles/medical-surgical-nursing-and-icu/>
- Laschinger, H. K. S., Grau, A. L., Finegan, J., & Wilk, P. (2010). New graduate nurses' experiences of bullying and burnout in hospital settings. *Journal of Advanced Nursing*, 66(12), 2732-2742.
- Leipzig, R. M., Hyer, K., Ek, K., Wallenstein, S., Vezina, M. L., Fairchild, S., ... & Howe, J. L. (2002). Attitudes toward working on interdisciplinary healthcare teams: A comparison by discipline. *Journal of the American Geriatrics Society*, 50(6), 1141-1148.
- Liddy, C., Blazkho, V., & Mill, K. (2014). Challenges of self-management when living with multiple chronic conditions: Systematic review of the qualitative literature. *Canadian Family Physician*, 60(12), 1123-1133.
- Lingard, L., Espin, S., Evans, C., & Hawryluck, L. (2004). The rules of the game: Interprofessional collaboration on the intensive care unit team. *Critical Care*, 8(6), R403-R408.
- Lynn, G., & Kalay, F. (2015). The effect of vision and role clarity on team performance. *Journal of Business Economics and Finance*, 4(3), 473-499.
- MacDonald, M. B., Bally, J. M., Ferguson, L. M., Lee Murray, B., Fowler-Kerry, S. E., & Anonson, J. M. S. (2010). Knowledge of the professional role of others: A key interprofessional competency. *Nurse Education in Practice*, 10(4), 238-242. doi:10.1016/j.nepr.2009.11.012.
- Mahfouz, E M.; Abood, S A.; Mohamed, F R. & AbdelHamid, E. (2013). Effect of role conflict and role ambiguity on nurses' performance at Minia and Suzan Mubarak University Hospitals. *Researchgate*. Retrieved from https://www.researchgate.net/publication/236209262_Effect_of_role_conflict_and_role_ambiguity_on_nurse's_performance.
- Marshall, J. C., Bosco, L., Adhikari, N. K., Connolly, B., Diaz, J. V., Dorman, T., ... & Vincent, J. L. (2017). What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. *Journal of Critical Care*, 37, 270-276.
- Martin, J. S., Ummenhofer, W., Manser, T., & Spirig, R. (2010). Interprofessional collaboration among nurses and physicians: Making a difference in patient outcome. *Swiss Medical Weekly*, 140, w13062.
- McDonough, R., & Doucette, W. (2001). Developing collaborative working relationships between pharmacists and physicians. *Journal of the American Pharmaceutical Association*, 41(5), 682-692.
- Miles, J. (2009). Tolerance and variance inflation factor. *Wiley StatsRef: Statistics Reference Online*. DOI: 10.1002/9781118445112.stat06593.

- Miller, J. L. (2004). Level of RN educational preparation: Its impact on collaboration and the relationship between collaboration and professional identity. *Canadian Journal of Nursing Research(CJNR)*, 36(2), 132-147.
- Nancarrow, S. A., Booth, A., Ariss, S., Smith, T., Enderby, P., & Roots, A. (2013). Ten principles of good interdisciplinary team work. *Human Resources for Health*, 11(1), 19.
- National Institute of Standards and Technology. (2013, October 30). *NIST/SEMATECH e-Handbook of statistical methods*. Retrieved on June 12, 2017 from <https://www.itl.nist.gov/div898/handbook/>
- Nguyen, Y. L., Angus, D. C., Boumendil, A., & Guidet, B. (2011). The challenge of admitting the very elderly to intensive care. *Annals of Intensive Care*, 1(1), 29.
- O'Donnell, L. (2007a). Ethical dilemmas among nurses as they transition to hospital case management: Implications for organizational ethics, Part I. *Professional Case Management*, 12(3), 160–169.
- Olivares-Faúndez, V. E., Gil-Monte, P. R., Mena, L., Jélvez-Wilke, C., & Figueiredo-Ferraz, H. (2014). Relationships between burnout and role ambiguity, role conflict and employee absenteeism among health workers. *Terapia Psicológica*, 32(2), 111-20.
- Oliver, D.P., Wittenberg-Lyles, E.M., & Day, M. (2007). Measuring interdisciplinary perceptions of collaboration on hospice teams. *American Journal of Hospice and Palliative Medicine*, 24(1), 49-53.
- Ontario Nurses Association (ONA). (2017, December 14). *Submission on 2018 pre-budget consultations to standing committee on finance and economic affairs*. Retrieved from https://www.ona.org/wp-content/uploads/ona_2018prebudgetsubmission_20171215.pdf.
- Orchard, C. A., Curran, V., & Kabene, S. (2005). Creating a culture for interdisciplinary collaborative professional practice. *Medical Education Online*, 10(11), 1-13.
- Paradis, E., & Reeves, S. (2013). Key trends in interprofessional research: A macrosociological analysis from 1970 to 2010. *Journal of Interprofessional Care*, 27(2), 113-122.
- Polit, D. F., & Beck, C. T. (2012). *Nursing research: Generating and assessing evidence for nursing practice*. Philadelphia, PA: Lippincott, Williams & Wilkins.
- Quah, J., & Campbell, K. M., (1994). Role conflict and role ambiguity as factors in work stress among managers in Singapore: Some Moderator Variables, *Research and Practice in Human Resource Management*, 2(1), 21-33.
- Reader, T. W., Flin, R., Mearns, K., & Cuthbertson, B. H. (2007). Interdisciplinary communication in the intensive care unit. *British Journal of Anaesthesia*, 98(3), 347-352.
- Registered Nurses' Association of Ontario (2006). *Collaborative practice among nursing teams*. Toronto, Canada: Registered Nurses' Association of Ontario. Retrieved from http://rnao.ca/sites/rnao-ca/files/Collaborative_Practice_Among_Nursing_Teams.pdf
- Reeves, S., & Lewin, S. (2004). Interprofessional collaboration in the hospital: Strategies and meanings. *Journal of Health Services Research & Policy*, 9(4), 218-225.
- Reeves, S., Zwarenstein, M., Goldman, J., Barr, H., Freeth, D., Hammick, M., & Koppel, I. (2008). Interprofessional education: Effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews*, 1(1).

- Rizzo, J. R., House, R. J., & Lirtzman, S. I. (1970). Role conflict and ambiguity in complex organizations. *Administrative Science Quarterly*, 150-163. Retrieved from <http://jwalkonline.org/docs/Grad%20Classes/Survey/articles/psyclimate/noted/role%20amb%20and%20con%20scales%201970.pdf>
- Romanow R.J. (2002). Building on values: The future of health care in Canada. Ottawa (ON): Canada, Commission on the Future of Health Care in Canada; Retrieved from <http://publications.gc.ca/collections/Collection/CP32-85-2002E.pdf>.
- Rose, L. (2011). Interprofessional collaboration in the ICU: how to define? *Nursing in Critical Care*, 16(1), 5-10.
- Rosenthal, G., & Rosenthal, J. A. (2011). *Statistics and data interpretation for social work*. New York, NY: Springer Publishing Company.
- Salhani, D., & Coulter, I. (2009). The politics of interprofessional working and the struggle for professional autonomy in nursing. *Social Science & Medicine*, 68(7), 1221-1228.
- San Martín-Rodríguez, L., Beaulieu, M. D., D'Amour, D., & Ferrada-Videla, M. (2005). The determinants of successful collaboration: A review of theoretical and empirical studies. *Journal of Interprofessional Care*, 19(sup1), 132-147.
- Sargeant, J. (2009). Theories to aid understanding and implementation of interprofessional education. *Journal of Continuing Education in the Health Professions*, 29(3), 178-184.
- Savelsbergh, C., Gevers, J. M., van der Heijden, B. I., & Poell, R. F. (2012). Team role stress: Relationships with team learning and performance in project teams. *Group & Organization Management*, 1059601111431977.
- Schuler, R. S., Aldag, R. J., & Brief, A. P. (1977). Role conflict and ambiguity: A scale analysis. *Organizational Behavior and Human Performance*, 20(1), 111-128.
- Schwab, R. L., Iwanicki, E. F., & Pierson, D. A. (1983). Assessing role conflict and role ambiguity: A cross validation study. *Educational and Psychological Measurement*, 43(2), 587-593.
- Government of Canada, Office of Nursing Policy Health Canada (2015). *Nursing Issues: General Statistics*. Retrieved on July 27, 2016 from <http://www.hc-sc.gc.ca/hcs-sss/pubs/nurs-infirm/onp-bpsi-fs-if/2006-stat-eng.php#a4>.
- Stein-Parbury, J., & Liaschenko, J. (2007). Understanding collaboration between nurses and physicians as knowledge at work. *American Journal of Critical Care*, 16(5), 470-477.
- Stephen, A. (2015, August 8). *Fostering interprofessional collaboration: Campaign for Action*. Retrieved from: <https://campaignforaction.org/fostering-interprofessional-collaboration-healthcare/>.
- Sullivan, P. (2001). Nurses decry profession's 1:19 female-to-male ratios. *Canadian Medical Association Journal*, 164(12), 1738-1738.
- Sullivan, P. J., & Feltz, D. L. (2003). The preliminary development of the Scale for Effective Communication in Team Sports (SECTS). *Journal of Applied Social Psychology*, 33, 1693-1715.

- Sutherland, H. J., M. Beaton, R. Mazer, V. Kriukov, & Boyd, N.F. (1996). A randomized trial of the total design method for the postal follow-up of women in a cancer prevention trial. *European Journal of Cancer Prevention* 5(3), 165-168.
- Tarrant, T., & Sabo, C. E. (2010). Role conflict, role ambiguity, and job satisfaction in nurse executives. *Nursing Administration Quarterly*, 34(1), 72-82.
- Thomas, E. J., Sexton, J. B., & Helmreich, R. L. (2003). Discrepant attitudes about teamwork among critical care nurses and physicians. *Critical Care Medicine*, 31(3), 956-959.
- Trochim, W. M. K. (2006). *The research methods knowledge base*, Retrieved August 15, 2016 from: <http://www.socialresearchmethods.net/kb/contents.php>.
- Trochim, W., Donnelly, J. P., & Arora, K. (2015). *Research methods: The essential knowledge base*. Boston, MA: Nelson Education.
- Tunc, T., & Kutanis, R. O. (2009). Role conflict, role ambiguity, and burnout in nurses and physicians at a university hospital in Turkey. *Nursing & Health Sciences*, 11(4), 410-416.
- Van De Cappelle, C., Hui, Y., & Yan, A. (2012). Interdisciplinary collaboration and relevant perspectives in critical care: Suggestions to the medical student. *University of Western Ontario Medical Journal*, 18(1), 33-35.
- Wear, D., & Keck-McNulty, C. (2004). Attitudes of female nurses and female residents toward each other: A qualitative study in one US teaching hospital. *Academic Medicine*, 79(4), 291-301.
- Wheelan, S. A., Burchill, C. N., & Tilin, F. (2003). The link between teamwork and patients' outcomes in intensive care units. *American Journal of Critical Care*, 12(6), 527-534.
- Xyrichis, A., & Ream, E. (2008). Teamwork: a concept analysis. *Journal of Advanced Nursing*, 61(2), 232-241.
- Xyrichis, A., & Lowton, K. (2008). What fosters or prevents interprofessional teamworking in primary and community care? A literature review. *International Journal of Nursing Studies*, 45(1), 140-153.
- Yeager, S. (2005). Interdisciplinary collaboration: The heart and soul of health care. *Critical Care Nursing Clinics of North America*, 17(2), 143-148.

Appendix A

Tables and Figures

Table A1

Average standing on variables

Variable	Mean	Standard Deviation
Interdisciplinary team collaboration	3.80	.41
Role ambiguity subscale	4.04	.64
Role conflict subscale	2.92	.89
Resource availability subscale	22.19	6.28
Institutional values scale	24.43	5.13
Age	45.66	10.21
How long have you been working at this hospital?	14.93	9.70

Note. Variables reported by name of scale/subscale.

Table A2

Test of skewness and kurtosis

Variables	N	Skewness	Kurtosis
Interdisciplinary Team Collaboration	1993	.195	.110
Role Ambiguity	1998	-.576	.387
Role Conflict	1997	-.005	-.442
Resource Availability	1997	.177	-.248
Institutional Values	2000	-.250	-.046

Table A3

Test of Correlation using Pearson's Correlation

Independent Variables	Interprofessional Team Collaboration	
	Pearson Correlation	p-value(2-tailed)
Role ambiguity	.354**	.000
Role conflict	-.111**	.000
Resource availability	.152**	.000
Institutional values	.206**	.000
Gender	-.042	.066
Highest level of nursing education	.048*	.033

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

Table A4

Test of Collinearity

Model	Collinearity Statistics	
	Tolerance	VIF
		.723
(Constant)		1.383
Role Ambiguity	.684	1.461
Role Conflict	.988	1.012
Highest Level of Nursing Education	.994	1.006
Gender	.742	1.347
Resource Availability		
Institutional Values	.591	1.692

Note. VIF = Variance Inflation Factor. Collinearity diagnostics showing tolerance and Variance Inflation Factor

Table A5

Multiple Linear Regression

Model	r	r-Square	Adjusted r-square	Std Error of the Estimate	r-square change	F change	df1	df2	Sig. F change
1	.524 ^a	.274	.261	.39009	.274	21.147	6	336	.000

Predictors: (Interdisciplinary team collaboration - constant), Institutional values, Gender, Highest level of nursing education, Role ambiguity, Resource availability, Role conflict.

Table A6

Product-moment regression coefficients

Model	Unstandardized Coefficients		Standardized Coefficients Beta (β)	t	Sig.
	B	Std. Error			
(Constant)	2.575	.278		9.248	.000
Role ambiguity	.313	.038	.453	8.285	.000
Role conflict	-.006	.029	-.012	-.207	.836
Highest level of nursing education	-.054	.043	-.060	-1.277	.203
Gender	.053	.077	.032	.685	.494
Resource availability	.005	.004	.070	1.305	.193
Institutional values	.006	.005	.066	1.096	.274

Uses standardized coefficients (β) to explain the magnitude and direction of the relationships between interprofessional team collaboration (dependent variable) and each of the independent variables.

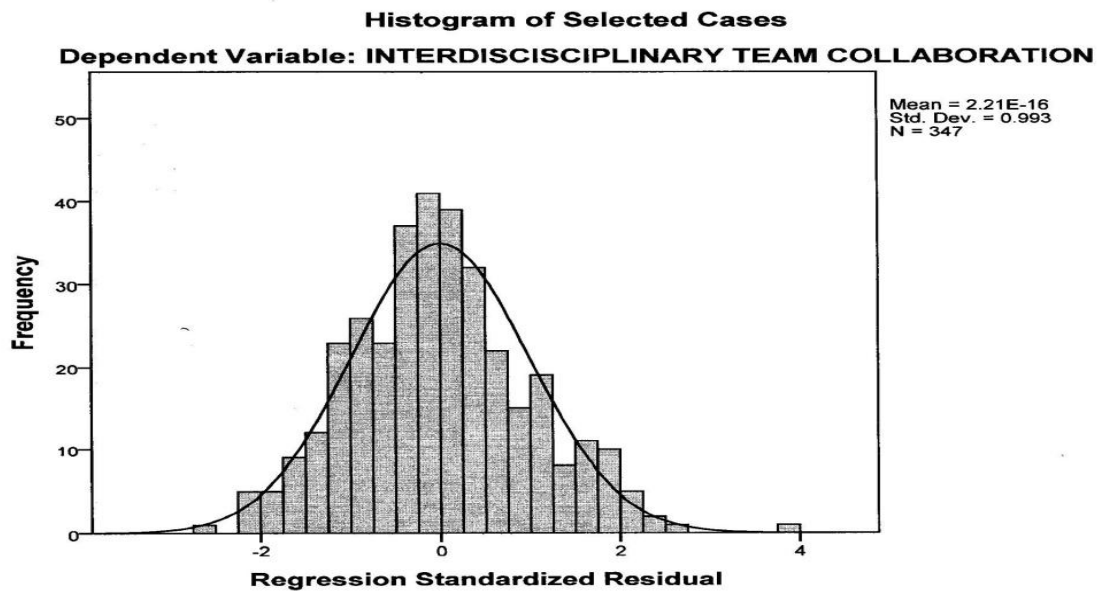


Figure A1. Histogram showing the distribution of the standardized model residuals

Appendix B

Survey Scales

Role ambiguity subscale

	Very false						Very true
I feel certain about how much authority I have	1	2	3	4	5	6	7
Clear, planned goals and objectives exist for my job	1	2	3	4	5	6	7
I know that I have divided my time properly	1	2	3	4	5	6	7
I know what my responsibilities are	1	2	3	4	5	6	7
I know exactly what is expected of me	1	2	3	4	5	6	7
Explanation is clear of what has to be done	1	2	3	4	5	6	7

Role conflict subscale

	Very false						Very true
I have to do things that should be done differently	1	2	3	4	5	6	7
I receive an assignment without the manpower to complete it	1	2	3	4	5	6	7
I have to buck/ bend a rule or policy in order to carry out an assignment	1	2	3	4	5	6	7
I work with two or more groups who operate quite differently	1	2	3	4	5	6	7
I receive incompatible requests from two or more people	1	2	3	4	5	6	7
I do things that are apt to be accepted by one person and not accepted by others	1	2	3	4	5	6	7
I receive an assignment without adequate resources and materials to execute it	1	2	3	4	5	6	7
I work on unnecessary things	1	2	3	4	5	6	7

Interdisciplinary team collaboration subscale

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I utilize other professionals in different disciplines for their particular expertise.	1	2	3	4	5
I consistently give feedback to other professionals in my setting.	1	2	3	4	5
Professionals in different disciplines in my setting utilize me for a range of tasks.	1	2	3	4	5
Teamwork with professionals from other disciplines is not important in my ability to help clients.	1	2	3	4	5
The colleagues from other professional disciplines and I rarely communicate.	1	2	3	4	5
The colleagues from other disciplines with whom I work have a good understanding of the distinction between my role and their role(s).	1	2	3	4	5
My colleagues from other disciplines make inappropriate referrals to me	1	2	3	4	5
I can define those areas that are distinct in my professional role from that of professionals from	1	2	3	4	5

other disciplines with whom I work.					
I view part of my professional role as supporting the role of others with whom I work.	1	2	3	4	5
My colleagues from other disciplines refer to me often.	1	2	3	4	5
Cooperative work with colleagues from other disciplines is not a part of my job description.	1	2	3	4	5
My colleagues from other professional disciplines do not treat me as an equal	1	2	3	4	5
My colleagues from other disciplines believe that they could not do their jobs as well without my professional discipline.	1	2	3	4	5