Interdisciplinary Rounding and Associations with Team Collaboration and Practitioner and Patient Experiences: Does Design Matter?

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Abstract

The first two decades of the 21st century brought a surge in popularity for interdisciplinary rounding practices on hospital units as a means to promote collaboration and patient-centered care. However, there are still challenges to full-scale implementation rooted in the historical dominance of physicians over rounding practices as well as increasing complexity of hospital care. This dissertation includes four manuscripts addressing the topic of interdisciplinary rounding. The first, a literature review, concluded that while there is a growing body of evidence to support that implementing interdisciplinary rounding may increase practitioner collaboration and satisfaction there is limited understanding on how the practice affects patients. Additionally, there is limited evidence on how the design (i.e., location, use of script, and leader role) of interdisciplinary rounding associates with elements of collaboration, team effectiveness, and patient experiences. In the next manuscript, a historical analysis revealed that nurses often served in support roles to physicians during rounds during the early 20th century. In response to decreased hospital staff during World War II and nurses' burgeoning professionalism following the war, some nurses strayed away from participating in rounds with physicians, perhaps leading to struggles seen today in implementing a truly interdisciplinary practice. Using a conceptual framework as guidance, the primary research study presented in this paper sought to explore how different interdisciplinary rounding designs associated with practitioners' perceptions of collaboration, team effectiveness and patients' experiences of seeing the team working together and being included in decision making. A total of 174 practitioners from fifteen general care inpatient units across two academic health centers completed a survey measuring elements of collaboration (partnership and cooperation) and team effectiveness. Patient experience data was collected the unit-level using two questions from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. Additionally, open-ended questions were asked of practitioners regarding their experiences with interdisciplinary rounding practices. The quantitative data were analyzed with multilevel modeling for the individual level data and general descriptive statistics and comparisons for the unit-level data. The role of the leader had a significant impact on cooperation. Units with nurse-led and shared-led rounds demonstrated higher levels of cooperation than those with physician-led rounds after controlling for age and hospital. The role of leader remained significant when included in a model controlling for age, hospital, location and script. In this model, use of a script also had a significant positive association with cooperation. Cooperation moderated the relationship between location and team effectiveness and leader role and team effectiveness as well. Script was also associated with higher levels of team effectiveness after controlling for age, hospital and the interaction with cooperation. There was a significant inverse relationship between cooperation and patient inclusion, but no association between design features and patient experiences. Lastly, a content analysis was conducted with the responses from the open-ended questions. Three themes emerged from the analysis: 1) setting the stage, 2) work of the team, and 3) benefits to patient care. The results of this study point to new areas for future inquiry as well as important implications for hospital leadership when planning and implementing or restructuring interdisciplinary rounding practices.

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Chapter 1: Introduction

Dissertation Overview and Organization

This dissertation comprises a synthesis of scholarly work related to the study of interdisciplinary rounding practices. Most scholarly work on this subject to date has consisted of single-site, quality improvement studies. To the author's knowledge, no study has attempted to look at multiple design features across multiple units and their influence on both practitioners and patients. Additionally, the qualitative data obtained by practitioners' responses to open-ended questions will provide a rich context upon which the author can base conclusions and generate new questions for future lines of inquiry.

The dissertation is formatted to comply with the University of Virginia's School of Nursing dissertation manuscript option. The manuscript option will be comprised of seven chapters. Chapter One serves as the introduction to the dissertation topic and includes the specific aims and key definitions. Chapter Two is the revised proposal reflecting changes made during the study period after consultation with the dissertation chair and key committee members. Chapter Three is the literature review manuscript. Chapter Four is the history paper which offers an historical perspective of nurses' involvement with physician rounding between 1873 and 1973. The historical perspective provides context to some of the challenges experienced today by hospital units attempting to implement or sustain practices. Chapter Five is the manuscript generated from the quantitative data. Chapter Six is the manuscript generated from the qualitative data. Lastly, Chapter Seven serves as the culminating discussion and conclusion section.

Introduction of Topic and Specific Aims

Quality healthcare in the United States continues to lag despite being a major focus over the first two decades of the 21st century (Conn, Kenaszchuk, Dainty, Zwarenstein, & Reeves, 2014; Nembhard, Alexander, Hoff, & Ramanujam, 2009; O'Leary et al., 2010). Achieving high quality care demands effective interdisciplinary team collaboration and improved patient experiences. Hierarchical relationships between physicians and other healthcare practitioners as well as the traditional power structure between practitioners and patients act as barriers to achieving high quality care (MacMillan & Reeves, 2014). To help mitigate these barriers in the inpatient setting, healthcare leaders advocate for micro-system level solutions such as interdisciplinary rounding (IDR), a team-based model of care, where healthcare team members from multiple disciplines gather daily to discuss patient plans of care (Institute for Healthcare Improvement, 2015). Interdisciplinary rounding aims to foster a team collaboration process consisting of communication, coordination of care and patient-centered shared decision making (Gonzalo, Himes, McGillen, Shifflet, & Lehman, 2016). However, despite IDR's ability to bring team members from different disciplines together in one place, how IDR supports team collaboration and improving practitioner and patient experiences is uncertain (Pannick et al., 2015; Paradis, Leslie, & Gropper, 2015; Zwarenstein, Rice, Gotlib-Conn, Kenaszchuk, & Reeves, 2013). Design features such as where the rounds occur, use of a script and who leads the rounds, and whether the patient is present may influence IDR's effectiveness. More information is needed on how these design features associate with team collaboration as well as healthcare practitioner and patient experiences.

The proposed study draws on Donabedian's structure, process, outcomes model for examining health services and evaluating quality of care (1966, 1978, 1980) and Gittell's

relational coordination theory (2003, 2009). IDR is a *structural* intervention that serves as a coordinating mechanism between practitioners (Gittell, 2002a). Having IDR provides an opportunity for team collaboration to take place. Team collaboration is an *interpersonal process* built on partnerships, coordination, cooperation and shared decision making (Orchard, Curran, & Kabene, 2005). Effective team collaboration leads to improved *outcomes* for both patients and practitioners (Zwarenstein, Goldman, & Reeves, 2009). Team collaboration may serve as a moderator between the IDR structure and the outcomes: experiences of practitioners and patients. It is thought that as team collaboration increases, the relationship between IDR practices and outcomes strengthens. Previous research supports that practitioners engaged in high levels of team collaboration perceive themselves as a highly effective team. Additionally, patients have the ability to recognize the effectiveness of their practitioners as a team and whether they were included in decisions about their treatment (Song, Ryan, et al., 2015).

Literature on IDR neither provides consensus on whether the practice directly improves outcomes, nor does it provide guidance on best design for the practice (O'Leary, Johnson, & Auerbach, 2016). Findings suggest uncertainty that by having an IDR practice in place means team collaboration becomes salient to the team members (Paradis et al., 2015; Zwarenstein et al., 2013). A systematic review found evidence that IDR practices have a positive association with decreased length of stay and improved staff satisfaction, but failed to provide support for an association with patient satisfaction (Bhamidipati et al., 2016). A different systematic review concluded that interventions like IDR did not consistently reduce risk of early readmission, early mortality or a reduction in length of stay (Pannick et al., 2015). It is difficult to tie improved patient experiences directly to IDR due to the multiple confounding factors influencing patient care (O'Leary et al., 2016). However, it is generally accepted that effective team collaboration

processes lead to improved outcomes. Therefore, a potential reason for the mixed findings is that not all models of IDR foster effective team collaboration equally (O'Leary et al., 2016). The proposed study explores design features as potential factors in the mixed findings seen in the current literature.

Multiple variations of IDR can be found across hospital units. Currently, healthcare leadership has little guidance for designing IDR practices as evidence for specific variations is weak (Lane, Ferri, Lemaire, McLaughlin, & Stelfox, 2013). A thorough understanding of how IDR design features are associated with effective team collaboration and their contribution to practitioner and patient experiences can inform hospital leadership about ways to design their services to improve outcomes and further engage patients in the co-production of their own healthcare (Batalden et al., 2016). The study proposed uses a cross-sectional, mixed method design describing IDR on fifteen inpatient units across two hospitals. The **specific aims** are as follows:

1. To examine the association between selected IDR design features and team collaboration.
2. To examine the association between selected IDR design features, team collaboration and practitioner experiences.
3. To examine the association between selected IDR design features, team collaboration, practitioner experiences and patient experiences.
4. To explore healthcare practitioners' perceptions of factors affecting IDR practices, team collaboration and concomitant outcomes.

Definition of Terms

In the proposed study, the variables are as follows:

Interdisciplinary Rounding Practices- Interdisciplinary rounding practices are structured group meetings held on inpatient units. The typical team membership includes physicians, nurse practitioners, nursing, pharmacists, social workers, case managers, occupational and physical therapists. Interdisciplinary rounding practices can look different from unit to unit within hospital systems (Curley, McEachern, & Speroff, 1998). The practices each have physical and procedural design features that will serve as the independent variables for the proposed study.

Physical- Interdisciplinary rounding practices have different physical configurations. These design features would be apparent to a lay observer. The practices can be held at a patient's bedside, in the hallway, a conference room or a combination of hallway and patient's bedside (Hendricks, LaMothe, Kara, & Miller, 2017).

Procedural- The procedural design features of IDR may not be as apparent to a lay observer. Procedural design features include whether a script is used, which practitioner leads the discussion and whether the patient or a family representative is present for the discussion (Paradis et al., 2015). *Script.* Some units have adopted scripted IDR to help maximize efficiency. For example, items from a typical nursing script may include patient goals, overnight events, intake/output and comfort. Other units may not have a script for each discipline's contributions. *Leadership.* Physicians historically lead rounds, but as the practice has more frequently become interdisciplinary, nursing or a different practitioner may take on the role as facilitator of the rounding discussion. Leadership can also be shared between two disciplines. *Patient presence.* Patients and/or family members can be present and included in IDR practices even when they are

away from the bedside.[1]

Team Collaboration- Team collaboration is an interpersonal process involving partnerships, coordination and cooperation within practitioner groups. It is marked by mutual respect amongst team members, having a means for conflict resolution and the free-flowing of input from all members of team. The concept also captures practitioners' perceptions of how the patient is included as a collaborative team member (Orchard, Curran, & Kabene, 2005).

Practitioner Experiences- Practitioner experiences can encompass satisfaction, joy in work, burnout and team effectiveness (Song, Chien, et al., 2015). For the purposes of the dissertation, team effectiveness is the experience of interest.

Patient Experiences- While patients have many experiences in the hospital and during their continuum of care, this study focuses on patients' experience of being included in decisions as well as their experience of whether their healthcare team worked together.

Theoretical Influences

The study utilizes a conceptual framework based on Donabedian's (1966, 1978, 1980) model of structure, process and outcomes and Gittell's relational coordination theory (2010) to explain the relationship between IDR design, team collaboration and practitioner and patient experiences. According to Donabedian, the structure, process, outcomes framework provides a linear way to assess the quality of healthcare delivery. Relational coordination theory adds specificity to the Structure Process Outcomes model by framing IDR as a high-performance work practice that leads to more effective interpersonal processes and subsequent outcomes (Gittell, 2011). For the purposes of this dissertation, the conceptual framework reflects the

[1] After recruitment of units for the study, there were no units that included patients or family members in the interdisciplinary rounding discussion that occurred in a location other than the bedside. Therefore, the decision was made to remove patient presence as a variable in the study. Revisions made in proposal.

classic Structure-Process-Outcomes Model and pulls from Relational coordination theory by identifying interdisciplinary rounding as a component of the structure that affects team collaboration (process) and subsequent outcomes. The following sections further explain the theoretical origins of the conceptual framework as rooted in the structure-process-outcome model of quality methodology and relational coordination theory.

Structure-Process-Outcome Model. The conceptual framework used in this study draws on quality methodology. Avedis Donabedian was the first scholar to describe the structure, process, outcomes framework for evaluating quality in the healthcare setting (Donabedian, 1966). The idea is that structure affects processes which in turn affects outcomes. This framework defines structures as administrative and work practices directing care. The structure of healthcare refers to such things as the equipment, resources, skill-mix and qualifications of staff. Donabedian argues that good structure consists of an appropriate design and sufficient resources. He also argues that structure may be the most important factor influencing healthcare quality (Donabedian, 1980). In the initial introduction of this framework, Donabedian conceptualized *processes* as predominantly occurring at the level of physician-patient interaction (1966). Donabedian stated that processes needed to be technically strong (i.e., scientifically sound), but also meet the interpersonal needs of individuals such as privacy, empathy, etc. (1988). In the second half of the twentieth century, healthcare has expanded the conceptualization to include interactions within and across all involved parties to include the Quality Health Outcomes model championed by nursing as a more dynamic approach to evaluating how the components of care interact (Mitchell, Ferketich, & Jennings, 1998).

Relational coordination theory. Gittell's work with relational coordination lends focus to Donabedian's work. Relational coordination theory isolates work practices specific to the

structure and offers a way to define and measure the interpersonal processes between roles leading to improved outcomes (Gittell et al., 2010).

How work is organized and structured influences the development of relational coordination between roles (Gittell, 2000). The organizational structure partly consists of the work practices used within an organization. Gittell identified work practices, or structural coordinating mechanisms, contributing to improved relational coordination in the healthcare setting. Borrowing from organizational design theory, she tested three mechanisms and their influence on coordination. She found boundary spanners (individuals that serve as liaisons between roles), team meetings, and routines as having the ability to help organizations achieve coordination in uncertain environments like healthcare (Gittell, 2002a). These findings broke from traditional organizational design theory that posited routines were less effective in uncertain environments. Continuing to test the role of relational coordination as the mediator between coordinating mechanisms and performance outcomes, Gittell identified six work practices contributing to improved relationships between roles. She termed these work practices as *high-performance work practices* for their ability to overcome silos within an organization (Gittell et al., 2010). The six high-performance work practices defined by Relational Coordination theory include cross-functional: selection, conflict resolution, performance measurement, boundary spanners, and team meetings (Gittell et al., 2010). The term cross-functional refers to work practices that involve participants from across different areas. IDR is an example of a cross-functional team meeting that leads to higher relational coordination. Higher levels of relational coordination arise when organizations implement high-performance work practices into their structure, which leads to improved performance outcomes.

Relational coordination is associated with many outcomes in the healthcare setting related to quality, efficiency, patient/family engagement and team members (workers). Gittell found improved patient satisfaction and better post-operative pain control as well as reduced medication errors, hospital acquired infections and patient falls associated with higher levels of relational coordination (Gittell, Fairfield, Bierbaum, & Head, 2000; Havens, Vasey, Gittell, & Lin, 2010). Relational coordination is also associated with decreased length of stay and reduced total cost in hospital care (Gittell et al., 2000; Gittell, Weinberg, Bennett, & Miller, 2008). In regards to patient/family engagement outcomes, relational coordination is associated with improved patient trust and confidence in their practitioners (Gittell, 2002b). Lastly, team members benefit from experiencing increased relational coordination in their jobs. Increased job satisfaction, professional efficacy and reduced burnout are all associated with relational coordination (Gittell, Weinberg, Pfefferle, & Bishop, 2008; Havens et al., 2010).

Organization theory/design. Relational coordination theory stems from several bodies of work in the organizational theory and design fields. Relational coordination theory blurs the lines of two perspectives often used to understand organizational work---the structural frame and human resource frame (Bolman & Deal, 2013). One of the earliest scholars contributing to the development of Gittell's relational coordination theory was Mary Parker Follett (2011). Social psychology, a relatively new field at the time, influenced Follett's work. She was one of the first organizational theorists to emphasize the importance of individual relationships in organizational work (Follett, 1924). She recognized the problem with power imbalances in relationships and the lack of coordination occurring as a result. Gittell combines Follett's underlying philosophy with contingencies inspired by other organizational theorists. As argued by Thompson (1967), coordination is necessary when tasks are *interdependent*, that is when team members depend on

the actions of other team members to complete their work. Additionally, coordination is more critical when the environment is uncertain and time constraints exist, such as often the case in the healthcare setting (Adler, 1995; Argote, 1982). Relational coordination theory also aligns with complexity theory because of its focus on interactions and relationships as part of a larger whole (Thompson, Fazio, Kustra, Patrick, & Stanley, 2016). Where Gittell's work defines itself is the emphasis on relationships between roles rather than individuals (Gittell, 2002c). Additionally, Gittell calls for redesign rather than replacing work practices to achieve higher levels of relational coordination (Gittell et al., 2010).

This chapter has provided a brief introduction to the dissertation study and its specific aims. Key definitions were presented along with the overarching theoretical influences. The following chapter will discuss IDR and its impact on patients, practitioners and organizations according to the current literature. Additionally, the conceptual framework will be further defined alongside a discussion of competing theories. Lastly, the methods for the dissertation study will be presented.

References

Adler, P. S. (1995). Interdepartmental interdependence and coordination: The case of the design/manufacturing interface. *Organization Science*, *6*(2), 147–167. https://doi.org/10.1287/orsc.6.2.147

Argote, L. (1982). Input uncertainty and organizational coordination in hospital emergency units. *Administrative Science Quarterly*, *27*(3), 420–434.

Batalden, M., Batalden, P., Margolis, P., Seid, M., Armstrong, G., Opipari-Arrigan, L., & Hartung, H. (2016). Coproduction of healthcare service. *BMJ Quality and Safety*, *25*, 509–517. https://doi.org/10.1136/bmjqs-2015-004315

Bhamidipati, V. S., Elliott, D. J., Justice, E. M., Belleh, E., Sonnad, S. S., & Robinson, E. J. (2016). Structure and outcomes of interdisciplinary rounds in hospitalized medicine patients: A systematic review and suggested taxonomy. *Journal of Hospital Medicine*, *11*(7), 513–523. https://doi.org/10.1002/jhm.2575

Bolman, L. G., & Deal, T. E. (2013). *Reframing organizations*. San Francisco, CA: Jossey-Bass.

Conn, L. G., Kenaszchuk, C., Dainty, K., Zwarenstein, M., & Reeves, S. (2014). Nurse-physician collaboration in general internal medicine: A synthesis of survey and ethnographic techniques. *Health and Interprofessinal Practice*, *2*(2), 1–14. Retrieved from https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKEwiu08_Nk6_MAhWIXiwKHXq7DjMQFggkMAE&url=http://commons.pacificu.edu/cgi/viewcontent.cgi?article=1057&context=hip&usg=AFQjCNGhiNbk9qOfiwqFfhBgH9CienHzGQ&bvm=bv.12055159

Curley, C., McEachern, J. E., & Speroff, T. (1998). A firm trial of interdisciplinary rounds on the inpatient medical wards: An intervention designed using continuous quality improvement.

Medical Care, *36*(8).

Donabedian, A. (1966). Evaluating the Quality of Medical Care. *Millbank Memorial Fund*, *44*(3), 166–206.

Donabedian, A. (1978). The quality of medical care. *Science*, *200*(4344), 856–864.

Donabedian, A. (1980). *Explorations in quality assessment and monitoring*. Ann Arbor, MI: Health Administration Press.

Donabedian, A. (1988). The quality of care. How can it be assessed? *Journal of the American Medical Association*, *260*(12), 1743–1748. https://doi.org/10.1001/jama.260.12.1743

Follett, M. P. (1924). *Creative experience*. *Creative Experience*. New York, NY: Longmans, Green and Co. https://doi.org/10.2307/2179540

Gittell, J. H. (2000). Organizing work to support relational coordination. *The International Journal of Human Resource Management*, *11*(3), 517–539. https://doi.org/10.1080/095851900339747

Gittell, J. H. (2002a). Coordinating mechanisms in care provider groups: Relational coordination as a mediator and input uncertainty as a moderator of performance effects. *Management Science*, *48*(11), 1408–1426. https://doi.org/10.1287/mnsc.48.11.1408.268

Gittell, J. H. (2002b). Relationships between service providers and their impact on customers. *Journal of Service Research*, *4*(4), 299–311.

Gittell, J. H. (2002c). Service providers and their impact on customers. *Journal of Service Research*, *4*(4), 299–311.

Gittell, J. H. (2003). *The Southwest airlines way: Using the power of relationships to achieve high performance*. McGraw Hill.

Gittell, J. H. (2009). *High performance healthcare: Using the power of relationships to achieve*

quality, efficiency and resilience. McGraw Hill Professional.

Gittell, J. H. (2011). New directions for relational coordination theory. In *The Oxford Handbook of Positive Organizational Scholarship* (pp. 400–411). https://doi.org/10.1093/oxfordhb/9780199734610.013.0030

Gittell, J. H., Fairfield, K. M., Bierbaum, B., & Head, W. (2000). Impact of relational coordination on quality of care, postoperative pain and functioning, and length of stay: A nine-hospital study of surgical patients. *Medical Care, 38*(8), 807–819.

Gittell, J. H., Seidner, R., & Wimbush, J. (2010). A relational model of how high-performance work systems work. *Organization Science*, *21*(2), 490–506. https://doi.org/10.1287/orsc.1090.0446

Gittell, J. H., Weinberg, D., Pfefferle, S., & Bishop, C. (2008). Impact of relational coordination on job satisfaction and quality outcomes: A study of nursing homes. *Human Resource Management Journal*, *18*(2), 154–170. https://doi.org/10.1111/j.1748-8583.2007.00063.x

Gonzalo, J. D., Himes, J., McGillen, B., Shifflet, V., & Lehman, E. (2016). Interprofessional collaborative care characteristics and the occurrence of bedside interprofessional rounds: A cross-sectional analysis. *BMC Health Services Research*, *16*, 459. https://doi.org/10.1186/s12913-016-1714-x

Havens, D. S., Vasey, J., Gittell, J. H., & Lin, W. T. (2010). Relational coordination among nurses and other providers: Impact on the quality of patient care. *Journal of Nursing Management*, *18*(8), 926–937. https://doi.org/10.1111/j.1365-2834.2010.01138.x

Hendricks, S., LaMothe, V. J., Kara, A., & Miller, J. (2017). Facilitators and barriers for interprofessional rounding: A qualitative study. *Clinical Nurse Specialist*, *31*(4), 219–228. https://doi.org/10.1097/NUR.0000000000000310

Institute for Healthcare Improvement. (2015). How-to guide: Multidisciplinary rounds, (February).

Lane, D., Ferri, M., Lemaire, J., McLaughlin, K., & Stelfox, H. T. (2013). A systematic review of evidence-informed practices for patient care rounds in the ICU. *Critical Care Medicine, 41*(8), 2015–29. https://doi.org/10.1097/CCM.0b013e31828a435f

MacMillan, K., & Reeves, S. (2014). Editorial: Interprofessional education and collaboration: the need for a socio-historical framing. *Journal of Interprofessional Care*, *28*(2), 89–91. https://doi.org/10.3109/13561820.2014.885335

Mitchell, P. H., Ferketich, S., & Jennings, B. M. (1998). Quality Health Outcomes Model. *Journal of Nursing Scholarship*, *30*(1), 43–46. https://doi.org/10.1111/j.1547-5069.1998.tb01234.x

Nembhard, I. M., Alexander, J. A., Hoff, T. J., & Ramanujam, R. (2009). Why does the quality of health care continue to lag? Insights from management research. *Academy of Management Perspectives, 23*(1), 24–42. https://doi.org/10.5465/AMP.2009.37008001

O'Leary, K. J., Johnson, J. K., & Auerbach, A. D. (2016). Do interdisciplinary rounds improve patient outcomes? Only if they improve teamwork. *Journal of Hospital Medicine, 11*(7), 524–525. https://doi.org/10.1002/jhm.2587

O'Leary, K. J., Thompson, J. A., Landler, M. P., Kulkarni, N., Haviley, C., Hahn, K., … Williams, M. V. (2010). Patterns of nurse-physician communication and agreement on the plan of care. *Quality and Safety in Health Care, 19*(3), 195–199. https://doi.org/10.1136/qshc.2008.030221

Orchard, C., Curran, V., & Kabene, S. (2005). Creating a Culture for Interdisciplinary Collaborative Professional Practice. *Medical Education Online*, *10*(11), 1–13.

https://doi.org/10.3402/meo.v10i0.4387

Pannick, S., Davis, R., Ashrafian, H., Byrne, B. E., Beveridge, I., Athanasiou, T., … Sevdalis, N. (2015). Effects of interdisciplinary team care interventions on general medical wards: A systematic review. *JAMA Internal Medicine, 175*(8), 1288–1298. https://doi.org/10.1001/jamainternmed.2015.2421

Paradis, E., Leslie, M., & Gropper, M. A. (2015). Interprofessional rhetoric and operational realities: An ethnographic study of rounds in four intensive care units. *Advances in Health Sciences Education, 21*(4), 1–14. https://doi.org/10.1007/s10459-015-9662-5

Song, H., Chien, A. T., Fisher, J., Martin, J., Peters, A. S., Hacker, K., … Singer, S. J. (2015). Development and validation of the primary care team dynamics survey. *Health Services Research, 50*(3), 897–921. https://doi.org/10.1111/1475-6773.12257

Song, H., Ryan, M., Tendulkar, S., Fisher, J., Martin, J., Peters, A. S., … Singer, S. J. (2015). Team dynamics, clinical work satisfaction, and patient care coordination between primary care providers. *Health Care Management Review, 0*(0), 1. https://doi.org/10.1097/HMR.0000000000000091

Thompson, D. S., Fazio, X., Kustra, E., Patrick, L., & Stanley, D. (2016). Scoping review of complexity theory in health services research. *BMC Health Services Research, 16*(1), 84–87. https://doi.org/10.1186/s12913-016-1343-4 [doi]

Zwarenstein, M., Goldman, J., & Reeves, S. (2009). Interprofessional collaboration: Effects of practice-based interventions on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews*, (3), CD000072. https://doi.org/10.1002/14651858.CD000072.pub2

Zwarenstein, M., Rice, K., Gotlib-Conn, L., Kenaszchuk, C., & Reeves, S. (2013). Disengaged:

A qualitative study of communication and collaboration between physicians and other professions on general internal medicine wards. *BMC Health Services Research, 13*. Retrieved from http://www.biomedcentral.com/1472-6963/13/494

Chapter 2: Revised Proposal

Significance and Background

The seminal Institute of Medicine reports, *To Err is Human: Building a Safer Health System* (1999) and *Crossing the Quality Chasm: A New Health System for the 21st Century* (2001) placed urgent focus on interdisciplinary team collaboration, patient-centeredness and safety for United States healthcare systems. Patients present to hospitals with complex conditions that demand a diverse team of practitioners working collaboratively for safe and appropriate treatment. Team collaboration is defined as an interpersonal process involving partnerships, coordination, cooperation, and shared decision making (Sullivan, 1998). Ineffective team collaboration has a negative impact on patient and organizational outcomes (O'Leary, Sehgal, Terrell, & Williams, 2012). In fact, one study found that communication failures between team members contributed to 91% of the adverse events reported (Sutcliffe, Lewton, & Rosenthal, 2004). Unfortunately, what is often noticed in the hospital setting is a type of parallel working between different disciplines rather than working collaboratively (Lewin & Reeves, 2011). However, with the reinvigorated importance of communication and collaboration in healthcare, several streams of research developed over the last two decades providing insight on how to break down barriers and best support team collaboration (Oandasan et al., 2006). A popular focus of inquiry is the use of training programs such as TeamSTEPPS® and Crew Resource Management (Clancy & Tornberg, 2007; Salas et al., 2008). Another line of research focuses on how psychological safety and leadership characteristics influence team collaboration formation and learning behaviors in teams (Edmondson, 2003; Nembhard & Edmondson, 2006). A third line of research explores the effect of high-performance work practices such as selection for teamwork (achieving fit between employee and job), reward systems, and team meetings on team collaboration and outcomes (Gittell et al., 2010). Research indicates that high-performance

work practices contribute to improved performance outcomes across multiple organizational settings including aviation and healthcare (Gittell, 2009; Weinberg, Avgar, Sugrue, & Cooney-Miner, 2013). In order to achieve improved performance, scholars call for redesigning work practices in order to foster optimal team collaboration and effectiveness (Buljac-Samardzic, Dekker-van Doorn, van Wijngaarden, & van Wijk, 2010). Team collaboration is an essential component to delivering high quality care and supporting patient safety (Baker, Day, & Salas, 2006). While much progress has been made on recognizing its importance and better understanding ways to improve team collaboration in the healthcare setting, there is still more work on how to optimize collaborative behaviors amongst practitioners and patients.

A number of barriers exist to achieving team collaboration in the healthcare setting including: 1) organizational structuralism, 2) power imbalances, and 3) role socialization (Orchard, Curran, & Kabene, 2005). Organizational structuralism refers to administrative policies and the practices supporting decision making within an organization. Power imbalances are well entrenched in the healthcare setting, often rooted in historically hierarchical relationships influenced by the gender and status of practitioners (Lichtenstein, Alexander, McCarthy, & Wells, 2004). Role socialization serves as a team member's orientation to an environment where attitudes and beliefs form regarding team norms. Team norms regulate member behavior and influence how individuals participate in the team's work (Shortell & Kaluzny, 2012). Often, disciplines are socialized to their roles in their education silos. Thus, medical students develop shared perceptions about how physicians are supposed to behave and nursing students develop shared perceptions about nurses. Developing a sense of shared perceptions across disciplines can be challenging due to the previous socialization processes or work practices that fail to promote interdependence or reduce proximity between team members

(Anderson & West, 1998). Individuals not socialized in a team-based work environment may exhibit counterproductive behaviors to collaboration. Undesirable behaviors include failure to speak up, raise a concern, or always deferring to a perceived higher level of authority. For example, a nurse socialized to understand their role as subservient might not fully collaborate with other disciplines. Organizational structuralism, power imbalances and role socialization play important roles in the healthcare system. When these three barriers are salient, a highly fragmented environment lacking team collaboration and quality healthcare delivery results (Nembhard et al., 2009; Ramanujam & Rousseau, 2006). However, through positive organizational change and practice redesign, it is possible to break down these barriers to support interdisciplinary team collaboration (Buljac-Samardzic et al., 2010).

When organizations and teams work to break down barriers and achieve interdisciplinary team collaboration, both practitioners and patients realize positive effects. High quality team collaboration between practitioners may lead to a reduced incidence of burnout and greater work satisfaction in healthcare practitioners which is linked to greater perceptions of quality care and job outcomes (Oandasan et al., 2006; Van Bogaert, Clarke, Roelant, Meulemans, & Van de Heyning, 2010). While there is a strong argument for improving team collaboration among practitioners, healthcare still struggles with how to best support, implement and maintain team-based practice initiatives through interdisciplinary education and practice innovations (Institute of Medicine, 2015). Further, leaders in healthcare now realize that including the patient and family as part of the team collaboration process is necessary for high quality care delivery (Batalden et al., 2016).

Team-based practice initiatives should improve team collaboration within practitioner groups as well as between practitioners and their patients. Enhancing the patient experience is

seen as an essential component to improving healthcare (Berwick, Nolan, & Whittington, 2008). Patient experience can be defined as the "sum of all interactions, shaped by an organization's culture that influences patient perceptions across the continuum of care" (Beryl Institute,2017). The patient experience is also influenced by their engagement as a co-producer in their own healthcare planning (Batalden et al., 2016). The patient experience encompasses how patients feel included in the decision-making process and their perceptions of how well their practitioner team works together. Positive practitioner experiences also lead to better patient experiences (Bodenheimer & Sinsky, 2014). For co-production of healthcare to occur, patients need to be acknowledged as members of the healthcare team and services need to be designed to support this partnership. One way to evaluate processes affecting patient experiences is to look at the locations where the majority of interactions between practitioners and patients are occurring, known as the clinical microsystem level of care.

Interdisciplinary Rounding Practices

Successful team-based, patient-centered care necessitates systems thinking to transform care delivery at the clinical microsystem level (Stein et al., 2015). Clinical microsystems, or hospital units, are a small group of practitioners caring for a specific patient population (Nelson et al., 2002). IDR is a type of team-based practice at the microsystem level. IDR involves multiple healthcare team members gathering in the same place to discuss and develop plans of care on a routine basis (O'Leary et al., 2010a). IDR is an important practice in a high-performance work environment leading to increased organizational effectiveness. Physicians, nurses, pharmacists, social workers and case managers are the typical practitioner roles participating. IDR can occur in different locations and have different procedural elements such as nurse-led vs. physician-led, whether a script is followed, and if the patient is present. According

to relational coordination theory, IDR's impact on outcomes is achieved through enhancing the interpersonal processes between the team members (Gittell, 2009). Research supports that IDR can contribute to better overall effectiveness by enhancing the relationships (team collaboration) between the members involved (Gittell et al., 2010).

Literature Review

The literature on IDR and its association with patient, practitioner, and organizational outcomes is growing but limited. A number of studies have looked at IDR and their impact on patients, practitioners, and organizations, but not all attempt to measure the interpersonal processes like team collaboration or consider how IDR's design may influence the outcomes (Bhamidipati et al., 2016; O'Leary et al., 2016).

Patient Outcomes. A number of studies found associations with IDR and decreased length of stay and other quality measures (Curley et al., 1998; O'Mahony, Mazur, Charney, Wang, & Fine, 2007; Southwick et al., 2014; Yoo et al., 2014). However, other similarly designed studies have failed to demonstrate a statistically significant relationship between IDR and length of stay (Mudge, Laracy, Richter, & Denaro, 2006; O'Leary et al., 2011). Multiple studies found a connection between IDR and increased safety (Ellrodt, Glasener, Cadorette, Kradel, & Bercury, 2007; Kim, Barnato, Angus, Fleisher, & Kahn, 2010; Mudge et al., 2006; O'Leary et al., 2011). For example, indwelling urinary catheter days and catheter-associated urinary tract infections declined on an intensive care unit after the initiation of IDR (Arora, Killol, Engell, & LaRosa, 2014). Kim et al. (2010) found an association with daily IDR and lower mortality among intensive care patients. However, after assessing current literature on a variety of interdisciplinary care interventions including IDR on hospitalized general medicine patients, Pannick et al. (2015) concluded there was little effect of the interventions on measures

such as length of stay, readmission and mortality rate.

IDR demonstrates mixed effects on patient satisfaction. Some studies show improved patient satisfaction with its implementation (Gonzalo, Chuang, Huang, & Smith, 2010; Pritts & Hiller, 2014). One study found increased patient satisfaction on hospital units implementing IDR compared to those without, however the patient was not included in the rounding discussion (Mudge et al., 2006). Other studies found no difference in overall patient satisfaction with care with IDR occurring at the bedside (O'Leary et al., 2015; Ramirez, Singh, & Williams, 2016). Landry et al. (2007) found that parents were more satisfied with IDR that included bedside discussions. Similarly, another study found that patients viewed their practitioners as more compassionate when medical teaching rounds were held at the bedside (Ramirez et al., 2016). However, Lyons et al. (2013) concluded that the content of discussions was more complete in a conference room rounding model versus a bedside setting. These findings indicate that some designs may suit practitioners and patients differently.

Practitioner Outcomes. Multiple studies found improved staff satisfaction when IDR was implemented, but findings are mixed on whether there is more improvement in satisfaction amongst physicians or nurses (Gonzalo, Kuperman, Lehman, & Haidet, 2014; Wild, Nawaz, Chan, & Katz, 2004). One study found that nurses' perceptions of teamwork were less favorable than physicians' prior to an IDR intervention. However, after IDR was introduced on the unit, the difference between nurses' and physicians' perceptions was decreased (Henkin et al., 2016). Nursing noted improved job satisfaction and communication with bedside rounds versus physician-centric, traditional teaching rounding (Gausvik, Lautar, Miller, Pallerla, & Schlaudecker, 2015). Generally, studies that assessed the relationship between IDR and team collaboration behaviors between practitioners resulted in positive findings. O'Leary et al. (2011)

found nurses rated their communication and team collaboration with hospitalists higher on a hospital unit using IDR compared to one without. Similarly, O'Leary et al., (2015) found higher ratings of communication, team collaboration and perceptions of increased patient safety amongst the interdisciplinary team after the implementation of an IDR practice. Gittell's work with relational coordination, a similar concept to team collaboration, found hospital units with IDR had higher levels of relational coordination leading to better patient outcomes in the orthopedic setting (Gittell et al., 2000). However, multiple studies speak to the established dominance of the medical profession during IDR, making nurse inclusion challenging during physician-lead rounds (Coombs & Ersser, 2004; Hill, 2003). As a means to lessen barriers to nurse inclusion, having a script may help a nurse to increase their involvement in discussion (Hill, 2003). However, it is possible that a script limits the depth of discussion, contradicting its purpose (Paradis et al., 2015).

Organizational Outcomes. Limited work has assessed the impact of IDR on the organization, but the practice has been associated with reduced cost through reduced length of stay (Curley et al., 1998; Ettner, 2006). When implemented in the pediatric setting, IDR facilitated earlier discharge times and completion of certain procedures like MRIs and EEGs. Thus, potentially having throughput effects on the organizational system (Oshimura, Downs, & Saysana, 2014). Additionally, Ettner found that it was cost effective for team members to engage in IDR after calculating cost of practitioner's time and cost of patient care (2006).

Problem Statement

Despite being sound in idea, IDR has not had ubiquitous success on hospital units due to the realities of implementation and the challenging logistical planning needed (Paradis et al., 2015; Zwarenstein et al., 2009). In principle, bringing the diverse group of healthcare

practitioners together facilitates conversations around patient-care that incorporates multiple perspectives so that the patient can receive the most appropriate treatment. However, in practice, IDR and other team-based, patient-centered care models present many logistical challenges that can be taxing on the practitioner team (Young et al., 2016). IDR may reinforce existing hierarchies and traditional medical paradigms despite best intentions (Fox & Reeves, 2015). This begs the question, what factors facilitate and hinder IDR's effectiveness in facilitating team collaboration and improved practitioner and patient experiences? The proposed study attempts to answer this question by turning to specific design features that may influence IDR's effectiveness.

One area potentially offering insight into why IDR has mixed effects is the design of the practice. As discussed earlier, IDR varies by where they occur, who leads the rounds, whether the discussion is scripted or not (Bhamidipati et al., 2016). It is possible that these design features contribute to the practice's success. Gittell's work and others connecting IDR with enhanced team collaboration processes is promising, but they only assess before-and-after intervention or compares settings using IDR and those that do not (Gittell et al., 2000; O'Leary et al., 2010, 2015). Very little work has been completed comparing different IDR practices in order to discover optimal design. Further, recent qualitative work on IDR reveals that they may fail to foster quality team collaboration in all cases. For example, Paradis et al. (2015) found that nurses on hospital units using scripted IDR felt they had a formal invitation to participate in the discussion, but they viewed their contributions as symbolic and not meaningful. However, nurses on hospital units with a more free-flowing IDR struggled to find their purpose and role in the rounding discussion. Paradis et al.'s study concluded that the observed IDR practices reinforced hierarchical behaviors between practitioners and patients rather than make progress towards a

more interdisciplinary, patient-centered model of care. Similarly, another study found that communication was one-way from physicians to nurses and other healthcare professionals during rounds. Non-physician participants infrequently contributed unless requested by physicians directly (Zwarenstein et al., 2013). Hallway rounds appear to be the most prevalently used and are comparable in terms of achieving core competencies of graduate medical education to bedside rounds, as perceived by attending physicians (Shoeb et al., 2014). However, this particular study only considered attending perceptions rather than other members in the interdisciplinary team. IDR occurring at the bedside was found to be better at facilitating nurse involvement in decision making as opposed to conference rooms, but there were still multiple barriers to nursing participation (Manias & Street, 2001).

Understanding the contextual factors supporting the success of team-based, patient-centered models of care like IDR will add knowledge on how to best design healthcare services to meet the needs of all the members of the team including the patient. The proposed study explores IDR design features and their influence on the team collaboration process and practitioner and patient experiences. To the author's knowledge, no other study has looked at multiple design features in one study for their associations with these outcomes.

Implications of Research

Nursing

The proposed area of research has important implications for the nursing profession. In an era marked by high turnover and burnout in bedside nurses, it is imperative that healthcare leaders identify how to best design hospital work practices for optimal practitioner experiences and job satisfaction. Interdisciplinary team collaboration and other closely aligned concepts (i.e., relational coordination, teamwork) are associated with greater work satisfaction (Gittell et al.,

2008; Song, Ryan, et al., 2015; Vogus, Cooil, Sitterding, & Everett, 2014). Team and work environments supporting shared values between practitioners and patients, participation in decision making and reduced complexity in workload have positive impacts on nurses' job outcomes (Lichtenstein et al., 2004; Van Bogaert, Kowalski, Weeks, Van heusden, & Clarke, 2013). Further, when nurses feel comfortable sharing ideas and raising concerns, patients experience better care (Nembhard, Yuan, Shabanova, & Cleary, 2015). Building evidence supports that the team and environmental contexts of nursing practice play important roles in keeping patients safe and satisfied (Van Bogaert, Clarke, Roelant, Meulemans, & Van de Heyning, 2010; Van Bogaert, Clarke, Willems, & Mondelaers, 2013; Van Bogaert, Kowalski, Weeks, Van heusden, & Clarke, 2013). The nursing discipline is integral to providing team-based, patient-centered care. Nurses provide valuable insight into patient care decision making given their intimate knowledge of patient care. Designing structures (i.e., IDR) that limit influence and participation in discussions may lead to lower job satisfaction and higher intent to quit (Lichtenstein et al., 2004). Managing turnover at the nursing unit level is critical to delivering high quality care (Bae, Mark, & Fried, 2010). Additionally, there are enormous financial implications to focusing on creating environments for increased team collaboration and improved practitioner experiences.

Nurse turnover costs the average United States hospital between 5.2 and 8.1 million dollars a year (National Healthcare Retention & RN Staffing Report, 2016). Burnout, sometimes referred to as emotional exhaustion, is a major contributor to turnover rates (Vogus et al., 2014). Job outcomes such as nurse turnover and burnout are issues that the United States healthcare system cannot afford to ignore given the uncertain financial environment. While the proposed dissertation study does not directly analyze associations of IDR and job outcomes, it is possible

that studying influences on practitioners' perceptions of team effectiveness will provide an initial understanding of how IDR could contribute to improved job outcomes. Future studies in this research trajectory will explore job outcomes and associations with team-based care initiatives. This proposed study will offer a starting point for understanding the underlying mechanisms for how IDR supports team collaboration, an important aspect of the nursing work environment.

Patients

In addition to the nurse role, exploration of the patient's role in engaging in care planning and decision making is warranted. IDR may be an appropriate mechanism for supporting shared decision making and increased involvement in healthcare planning, both hallmarks of patient-centered care. However, IDR often occurs away from the bedside making it difficult for patients to provide input (Gonzalo et al., 2013a; Gonzalo, Masters, Simons, & Chuang, 2009). Additionally, the literature does not fully support one design over another in how to best include patients in decision making or raise their perceptions of collaboration. The dissertation study will identify selected IDR designs that are associated with higher scores on patient experience questions related to their inclusion in the decision making process. Healthcare redesign of work practices like IDR should focus efforts on supporting effective co-productive relationships, or partnerships, between healthcare practitioners and patients (Batalden et al., 2016). Co-productive relationships are integral to the formation of interdisciplinary and lead to improved patient satisfaction (Gittell, 2002c). The results of this study will offer a starting point for understanding how patients are affected by IDR.

Healthcare Teams

While nurses are a large portion of the healthcare workforce, teamwork and collaboration has importance and positive effects across multiple disciplines. Educational, licensing and

regulatory bodies emphasize the necessity of interdisciplinary collaboration competencies across nursing, medicine, and pharmacy disciplines (Luetsch & Rowett, 2016). It is increasingly important for members of healthcare teams to provide evidence that they are achieving and progressing in interdisciplinary team collaboration competencies. The proposed study may help validate IDR as a mechanism for supporting such competencies. In addition to meeting regulatory demands, there also may be similar positive effects on job outcomes of non-nursing disciplines with improved team collaboration. As better nurse-physician relationships are associated with higher nurse satisfaction and retention, positive team dynamics are also associated with higher work satisfaction in physicians (Song, Ryan, et al., 2015; Van Bogaert, Kowalski, et al., 2013). The proposed dissertation study will shed some initial insight on how IDR practices affect unit teams. The results will be applicable to the disciplines participating in the selected IDR practices, to include, nursing, pharmacy, medicine, and social work. Future research using a more fine-grained analysis of how IDR and other team-based initiatives affect disciplines differently is needed.

Healthcare System

The dissertation proposal also has important implications for healthcare organizations aiming to improve patient experiences. In addition to workforce concerns, hospitals face increasing pressure to implement and evaluate efforts aimed at improving patient experiences and outcomes due to value-based purchasing models (Mohammed et al., 2014). Value-based purchasing rewards hospitals for meeting certain quality and care coordinating outcomes. Training helps practitioners develop effective foundational teamwork behaviors of a supportive work environment (e.g., communication, cooperation, coordination). However, if features of the organizational context and work practices impede these behaviors, then the team is not able to

function effectively despite their training (Salas, King, & Rosen, 2012). In addition to the potential cost-savings associated with improved job outcomes for practitioners, the trend towards value-based purchasing creates urgency in the healthcare system to support and sustain effective patient-centered care models (Hunter & Carlson, 2014).

The dissertation and subsequent research trajectory has implications for healthcare system redesign at the clinical microsystem (unit) level by informing best practices for patient-centered care (Batalden et al., 2016; Nelson, Batalden, & Godfrey, 2007). The conceptualization of team collaboration includes many of the important elements of patient-centered care such as partnerships, coordination, communication and shared decision making (Orchard et al., 2005). Despite the pervasive use of the term patient-centered care in the literature, there is still much to learn about the practical applications of the concept through empirical research (Constand, MacDermid, Dal Bello-Haas, & Law, 2014). Previous research on IDR has touched on team and patient outcomes separately, but has done little to address the practice's influence on team-patient partnerships and patient experiences (O'Leary et al., 2015). While only a small contribution to the science, the dissertation serves as a launching point for further discovery of how the healthcare system can continue to mitigate the barriers affecting team collaboration and practitioner and patient experiences.

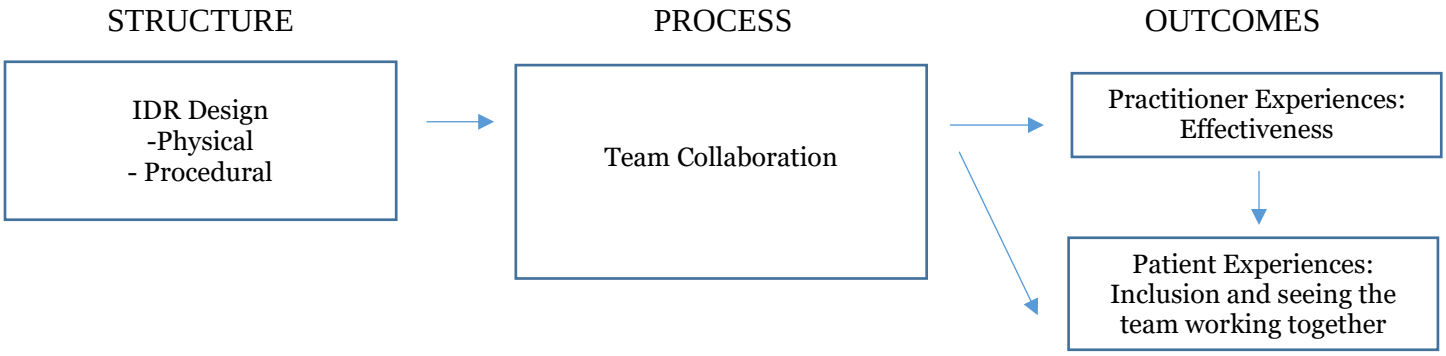
Conceptual Framework

Interdisciplinary Rounding Design Structure, Process, Outcomes Model

This dissertation study conceptualizes IDR as a structural intervention with multiple design features. Interdisciplinary rounding design features influence team collaboration (process), which in turn drives practitioner experiences (outcomes). Lastly, patient experiences

(outcomes) are influenced by the IDR design, team collaboration, and practitioner experiences. Figure 1 illustrates the relationships between the concepts studied in this dissertation.

Figure 1. Interdisciplinary Rounding Design Model of Structure, Process, & Outcome



Structure: Interdisciplinary Rounding Designs. The proposed study focuses on physical and procedural IDR designs. The location of IDR is a physical design feature. Interdisciplinary rounding discussions occur at the bedside, in the hallways, in a conference room or sometimes in two of these areas.[2] The procedural design includes whether the discussion is scripted, that is, a designation where each team member has items to address. The script can dictate the discussion or the discussion can be a more free-flowing without a script. The designated leader of the rounding discussion often falls on a physician/NP (nurse practitioner), nurse or is shared between two disciplines.[3] There is evidence that these three features influence the processes and outcomes resulting from IDR practices (Coombs & Ersser, 2004; Hill, 2003; Landry et al., 2007; Lane et al., 2013; Lyons et al., 2013; Manias & Street, 2001; Paradis et al., 2015; Zwarenstein et al., 2013). However, no one has studied all three design features together. The findings illustrate the need to better understand how the physical and procedural design features influence practitioners

[2] All IDR practices observed for this study occurring at the bedside also included discussion with practitioners only in the hallway. The combined location model will be referred to as *dual/bedside* throughout the rest of the paper. Revisions made in proposal.

and patients.

Process: Team Collaboration. Team collaboration consists of partnerships, coordination, cooperation, and shared decision making (Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Oandasan et al., 2006; Orchard et al., 2005; Sullivan, 1998; Valentine, Nembhard, & Edmondson, 2012). Interdisciplinary rounding contributes to the process of team collaboration by design. Partnerships form by developing a shared understanding of each team member's roles and responsibilities as well as an active pursuit of patient involvement (Orchard et al., 2005; Song, Chien, et al., 2015). Coordination is the ability for a team to reach mutually agreed upon goals. Cooperation develops by the openness to give and receive information and examine multiple perspectives. Shared decision making is defined as including all members' perspectives, including the patient, when planning care. It is conceptualized that if team collaboration is perceived during IDR then it will also be present during all other team interactions. Additionally, it is conceptualized that team collaboration serves as a moderator between IDR practices and practitioner and patient experiences. As team collaboration increases, the association between the structure and outcomes does as well. For the purposes of the dissertation study, two elements of team collaboration will be assessed, partnership and cooperation.

Outcomes: Practitioner Experiences. The practitioner experiences being explored are their perceptions of team effectiveness. When team members are engaged in team collaboration, they will perceive a high level of team effectiveness (Lemieux-Charles & McGuire, 2006). Perceived team effectiveness captures the subjective assessment by team members on goal achievement, job satisfaction, and quality of care delivered. In the primary care setting, having higher levels of perceived team effectiveness is associated with greater clinical work satisfaction as well as the care coordination between primary care providers (Song, Ryan, et al., 2015). If

IDR facilitates team collaboration processes that lead to higher levels of team effectiveness and job satisfaction, the subsequent outcome may be lower turnover and less burnout among practitioners (Bodenheimer & Sinsky, 2014; Van Bogaert, Clarke, et al., 2013).

Outcomes: Patient Experiences. According to the framework, when IDR facilitates greater team collaboration, the result will be improved patient experiences. Patient experiences are conceptualized as the degree to which they are included in team discussions about their care and their perceptions of the teamwork among their practitioners. Further, practitioner experiences also affect the patient experience. When nurses report greater teamwork, adequate staffing and organizational learning, there is a positive influence on the patient experience (Abrahamson, Hass, Fulton, & Ramanujam, 2016).

Competing Theories

While the dissertation focuses on the design features of the structure, there is also more knowledge to gain about the challenges associated with implementation and sustainment of practices like interdisciplinary rounding in the healthcare setting. There are competing theories that could help explores these challenges to include institutional theory, professional dominance theory, diffusion of innovation, contact theory, and systems theory. For the purposes of this proposal, the following sections will discuss two of these competing theories: 1) institutional theory and 2) professional dominance theory.

Institutional Theory. While not a new concept, interdisciplinary rounding garnered renewed interest in the last two decades thanks to the healthcare industry's focus on teamwork, communication and patient-centeredness (Institute of Medicine, 1999, 2001). Institutional theory explains the reasons that a healthcare organization chooses to adopt a practice like interdisciplinary rounding. Whereas relational coordination theory views organizational factors

influencing behavior on a contained micro-system level, institutional theory views systems as open and situated within their *organizational field* (DiMaggio & Powell, 1983). The organizational field consists of all the bodies influencing organizational work to include suppliers, competitors, consumers, and regulatory agencies. According to institutional theory, there are three pillars shaping institutions: 1) the regulative pillar, 2) normative pillar and 3) cultural-cognitive pillar (Scott, 2014). These pillars create *isomorphic forces* that push organizations within an institution to look similar to one another in order to achieve *legitimacy* (DiMaggio & Powell, 1983; Suchman, 1995). Legitimacy is the perception that an organization's actions are appropriate and desirable within a given system (Suchman, 1995).

Situated within the context of interdisciplinary rounding, one can see the regulative, normative and cultural-cognitive influences affecting the adoption and shape of the practice. Rules and laws define the regulative pillar (Scott, 2014). Under the regulative pillar, behavior changes because one *has to* in order to meet certain standards of law or regulation. One example of this is with value-based purchasing, where hospitals receive reimbursement based on their ability to meet certain quality outcomes. Value-based purchasing forced hospitals and practitioners to evaluate the ways they can engage patients under their care and improve their experiences (Greene, Hibbard, Sacks, Overton, & Parrotta, 2015). Interdisciplinary rounding initiatives at the bedside may allow the patient to see their team working together and provide input in their care. Hospital leadership may pressure units to implement interdisciplinary rounding initiatives at the bedside because of the potential financial implications attached to improved patient experiences.

Work roles, habits and norms define the normative pillar (Scott, 2014). The normative perspective captures the sense of duty and obligation practitioners feel to change behavior

(Palthe, 2014). In an era with increased emphasis on teamwork, interdisciplinary communication and patient-centered care, practitioners may feel they *ought to* engage in interdisciplinary rounding because it follows the basic spirit of these emphases. However, they may not necessarily believe in its value (Palthe, 2014).

Lastly, the cultural-cognitive pillar captures the socio-historical context and values of those within an organization (Scott, 2014). Historically, nurses served as assistants to physicians in the rounding process (Gonzalo et al., 2010). Additionally, patients often felt their opinions were not considered because rounding was used primarily for medical education and not patient input (Busby & Gilchrist, 1992). By the 1970s, nurses rarely participated in rounds with physicians in the United States with the exception of intensive care settings (Schorr, 1971). This change was partly due to the increased demands on nursing work, but also because nurses were beginning to establish their own sense of professionalism. Nurses may have rejected the practice as archaic. Today, interdisciplinary teamwork and collaboration is integrated into all health professions education (Brandt, Lutfiyya, King, & Chioreso, 2014). When done correctly, the new generation of health professionals entering the workforce is socialized to embrace and accept interdisciplinary collaboration more than previous generations. Therefore, the adoption of interdisciplinary rounding practices may also occur out of *wanting to* institute this change, not out of force or obligation (Palthe, 2014).

Institutional Theory was not selected as the main framework for this dissertation study because it does not provide a mechanism for capturing how design features influence IDR's effectiveness in supporting team collaboration and outcomes at the clinical microsystem level of care. Additionally, institutional theory is helpful when looking at changes and trends over a period of years, but there needs to be large-scale data supporting the investigation. The current

trends in IDR practices over the recent years have not been captured in larger, nationwide surveys like American Hospital Association's Annual Survey, making an institutional perspective challenging.

Professional Dominance Theory. The second competing theory discussed in this proposal is professional dominance theory. This theory focuses on how professionalism is achieved and sustained. Professionalism influences human behavior. According to Friedson (1970), *professionals* (i.e., physicians) secure autonomy and have exclusive ownership of knowledge. Friedson argued that nurses and other healthcare practitioners could not achieve professional status because of the dominance of physicians over their work. Professional dominance theory focuses on the ability of the medical profession to exert control on the organization, other healthcare practitioners and the patient (Hartley, 2002). The professional dominance mindset rejects the concept of shared goals and knowledge seen in relational coordination theory because they are threats to professionalism. Physicians maintain their dominance, in part, due to the large, powerful lobbying body of the American Medical Association (AMA) (Friedson, 1970a). The plurality of other practitioners (e.g., nurses, social workers, case managers, pharmacists, respiratory therapists) in hospitals may be a threat to physicians. However, the AMA sought to maintain control over other occupations through supervisory regulation. Additionally, Friedson argues that physicians need to maintain control over their patients as well in order to maintain their sense of professionalism. This sense of control may make physician groups reluctant to change their behaviors to accept a more collaborative approach like interdisciplinary rounding, "it is true that physicians are prone to be reluctant to change their approach…their knowledge and technique in themselves sets limits past which they cannot go without ceasing to be physicians" (Friedson, 1970b, p. 112). Despite such

focus on teamwork and collaboration throughout healthcare today, many physicians still hold onto these types of beliefs due to their socialization into their profession.

One can see where barriers arise when applying these concepts to the study of the initiation or sustainment of interdisciplinary rounding practices or other models aimed at more collaborative, patient-centered practice. Efforts to promote interdisciplinary collaboration and patient-centered care may have two effects when viewed in the context professional dominance: 1) a threat to the autonomy of physicians or 2) an opportunity for reinforcement and extension of traditional hierarchical relationships (Fox & Reeves, 2015). Ethnographic studies of collaboration in hospitals support these findings (Paradis et al., 2015; Zwarenstein et al., 2013). While there are logical connections between the study of IDR practices, team collaboration and professional dominance theory, the theory was not chosen for this study as the researcher wanted to be able to capture practitioners as a team and include patient experiences as well.

Methods

Design

This cross-sectional correlational study used a mixed methods approach to describe the association of IDR design features and team collaboration (specific aim #1); IDR design features, team collaboration and practitioner experiences (specific aim #2); and IDR design features, team collaboration, practitioner experiences and patient experiences (specific aim #3). In addition to the empirical testing of the study variables, open-ended questions were included on the web-based surveys for practitioners on hospital units with IDR to provide their own insight into the factors contributing or impeding team collaboration around IDR practices (specific aim #4). Patient experience information was extracted from routinely collected performance tracking data. Once data collection and analysis were complete, the principal investigator (PI) and her

dissertation chair decided to report the results of the quantitative and qualitative data in two separate manuscripts due to the volume of data collected and complexity of analysis. The results of both datasets are connected and interpreted together in the final chapter of this dissertation.

The rationale for choosing a mixed methods design is that neither quantitative nor qualitative methods alone has the ability to provide a comprehensive picture of complex topics like health services (Wisdom, Cavaleri, Onwuegbuzie, & Green, 2012). There are multiple historical, social and organizational influences affecting how practitioners and patients interact within the healthcare system. While randomized, controlled trials are often viewed as the gold standard in the scientific community, they cannot contextualize or uncover the nuances surrounding a complex phenomenon like interdisciplinary team collaboration (Berwick, 2005). In quantitative research, an investigator selects variables and uses numeric data to explain relationships. Validity, reliability and generalizability are the hallmarks of quantitative research. In qualitative research, one seeks to describe complexity and breadth of a given phenomenon (Curry, Nembhard, & Bradley, 2009). A mixed methods design allows the researcher to employ the strengths of both methods to address their questions (Creswell & Plano Clark, 2011). The proposed study will implement best practices for mixed methods research in the health sciences outlined by Creswell, Klassen, Plano Clark, & Clegg Smith (2006).

Sample

A convenience sample of fifteen adult hospital units from two large, academic health centers were used as the setting for this study.[4] Hospital units were targeted for the study if they

[4] This is a change from the original proposal which planned on seven control units and seven intervention units. However, due to a hospital-wide initiative to implement IDR on every unit after the defense of the proposal- the PI was unable to identify enough units to serve as control for the purposes of analysis. Thus, it was decided to compare IDR practices across 15 units. There was one non-IDR unit from that was initially recruited, but the data was dropped during analysis due to the imbalance of the data in comparison with the other units.

used IDR and had geo-located teams, thus preserving the integrity of the patient experience data as much as possible. Geo-located teams refer to physician teams that admit to a primary unit and not multiple units. If a unit did not have geo-located teams, there is a higher possibility that patients on that unit would not be exposed to the structured IDR. Each of the fifteen units identified themselves as having a structured IDR in place with the primary medical teams admitting patients to their floor. By choosing units with IDR and geo-located teams, the researcher was able to associate specific hospital units to selected IDR practices as opposed to having multiple teams with multiple designs on one floor. It must be noted, that even though there was a dominant IDR practice in place and geo-located, primary teams, units also reported off-service patients on their floor. The off-service patients were covered by non-primary medical teams and did not receive the same exposure to the structured IDR used on that unit. This was a limitation and discussed as such. Hospital units selected for this study using IDR include: coronary care, cardiology, acute care, comprehensive medicine, bone-marrow transplant and palliative care. Survey participants were recruited from physicians, nurses, social workers, pharmacists, case managers, and therapists (respiratory/physical) working on the hospital units. These roles are the most common roles found in IDR. Inclusion criteria for the survey includes: 1) reporting >75% of hours worked on identified unit over last month of work, and 2) reporting participation in IDR practices if on an IDR practice unit.

Sample Size[5]

The data had a two-level structure: individual practitioners (level 1) clustered within hospital units (level 2). Due to this clustered nature of the data, power analysis was conducted for multilevel modeling (MLM) to estimate the required sample size for the study. The most

[5] Sample size revised from original proposal to reflect having 15 hospital units.

demanding MLM model in this study is with a level-2 fixed variable (e.g., an IDR design feature) and control variables (age, gender, time in role). The model would need approximately 8 individual practitioners per unit for 15 units (a total of 120) assuming the following: a sufficient power (0.7), a statistical significance level (alpha) set at 0.1, a moderately conservative intra-class correlation coefficient (ICC) at 0.1, a moderate effect size (delta) at 0.5, and a proportion of explained variation by covariate (R2) at 0.5 (Scherbaum & Ferreter, 2009; Spybrook et al., 2013).

Recruitment

Each hospital unit had at least 30 potential practitioner participants. To maximize recruitment, a three-phase follow up sequence to maximize the response rate as outlined by Dillman was implemented (2000). The method involved: 1) a pre-notification email before the survey is emailed, 2) an email with the survey invitation and link, and 3) reminder emails sent at seven and fourteen days. The initial email was sent to raise awareness about the upcoming survey and flyers were placed in hospital unit common areas such as lounges, locker rooms, and staff mailboxes as permitted. Additionally, the PI spoke at hospital unit staff meetings to encourage completion of the survey as permitted. All the surveys remained anonymous with no identifying information. Respondents were informed of the study's purpose, PI contact information, and how data would be protected. Additionally, the initial page of the internet-based survey provided assurances that participants' completion of the survey was voluntary and they can skip any questions they do not want to answer (Fowler, 2009). The PI received approval from the Institutional Review Board at both institutions prior to initiating the study.

Measures

The following sections provide an overview of the different measures selected for the quantitative data collection phase of this study. In addition to quantitative data collection, the PI used open-ended questions for qualitative data collection from practitioners on IDR practice units. Full versions of the measures are in the appendix. Table 1 provides an overview of the selected variables for capturing each construct, the measures, and sources of data.

Table 1. Construct, Variables, Measures and Source of Data

Construct	Variables	Measure	Source
IDR Design -Physical -Procedural	*Physical*- Location *Procedural*- Use of Script Leader	Field research: IDR Design Checklist (see appendix A)	Correspondence with hospital unit nurse managers Observations on each hospital unit
Team Collaboration	Partnership Cooperation	Assessment of Interprofessional Team Collaboration Scale II (appendix C)	Healthcare practitioners
Patient Experiences	Inclusion Working Together	HCAHPS* Patient Experience Survey	Patient experience data-aggregated to hospital unit level
Practitioner Experiences	Team effectiveness	Primary Care Team Dynamics Survey (appendix D)	Healthcare practitioners
Control Variables	Practitioner Role Age Gender Time in Role	Demographic descriptive questions (appendix B)	Healthcare -practitioners
	Hospital	Hospital A vs. Hospital B	PI Recorded
*Hospital Consumer Assessment of Healthcare Providers and Systems			

Field Research: Interdisciplinary Rounding Design Features Checklist. The PI corresponded with nurse managers of each unit to verify presence or absence of the three IDR design features on each hospital unit at the beginning of the study period. Additionally, the PI

conducted a series of observations on units before, during, and at completion of the survey administration period as further verification of the design. Each design feature was coded for analysis. Additionally, each hospital unit received an identifying number serving as a cluster variable for analysis. Appendix A contains a copy of the data collection tool used during the fieldwork.

Practitioner Survey: Demographics. Practitioners completing the survey answered questions regarding basic demographic information (i.e., role, age, race/ethnicity, gender and time in role). Appendix B contains the questions asked of practitioners in the survey.[6]

Team Collaboration. While there are many measures of teamwork and collaboration related concepts in the literature, very few consider the patient's role as a team member in addition to collaborative behaviors between disciplines, deemed important considering this study's overall purpose. The Relational Coordination scale was considered initially, but would require practitioners to respond according to their relationships with each of the other disciplines separately, potentially creating a more burdensome survey (Gittell, 2000). The PI felt it was important to capture the perceptions of the overall team, rather than the strength of the relationship between each discipline considering the aims of this study. For this reason, the Assessment of Interprofessional Team Collaboration Scale (AITCS-II) was selected to measure team collaboration. The 23-item survey measures respondents' level of agreement using a 5-point Likert-style scale ranging from 1 = never to 5= always. The scale consists of three subscales: partnership (8 items), cooperation (8 items) and coordination (7 items). The total score ranges from 23 to 115. Scores can be averaged overall and by subscale to determine the team-level measure. Due to incomplete data capture, the *partnership* and *cooperation* subscales were

[6] During analysis, demographic data related to race, role, time in role and time on unit were regrouped to aid in interpretation and are reported in the results accordingly.

used for this study. Partnerships occur when there is shared decision making and joint efforts on the development and implementation of care plans by multiple healthcare practitioners and patients. Cooperation occurs when there is mutual respect between team members and that each person's role and expertise is valued (Orchard, King, Khalili, & Bezzina, 2012). An example item from the partnership subscale is: *when we are working as a team, all of the members encourage each other, patients and their families to use the knowledge and skills that each of us can bring in developing plans of care.* An example item from the cooperation subscale is "*when we are working as a team, all of my team members respect and trust each other".* The scale was initially developed and validated across multiple healthcare settings in Canada. Initial psychometric testing of a longer 47-item version of the survey resulted in appropriate levels of internal consistency with Cronbach's alpha coefficient ranging from 0.80-0.97 for the subscales and an overall reliability of 0.98 (Orchard et al., 2012). A manuscript is in progress for reporting the psychometrics for the AITCS-II version. However, in email correspondence with the developer (Orchard), she reported the psychometrics were similar between both versions. The reported psychometrics are acceptable results for a newly developed scale (Nunnally, 1976). A copy of both subscales is located in appendix C.

Practitioner Experiences: Perceptions of Team Effectiveness. Perceived team effectiveness was measured by a subscale from the Primary Care Team Dynamics Survey (Song, Chien, et al., 2015). The larger survey was previously validated in the primary care setting, but is applicable across varied settings. Items include: *The way my team members interact makes the delivery of care highly efficient* and *Working on a team like mine keeps members of my team enthusiastic and interested in their jobs.* The items on this measure are broad and applicable to multiple different healthcare settings beyond primary care. While it has not been used in the

inpatient setting before, the measure captures the components of team effectiveness of interest to the study. Items on this subscale can be aggregated to assess the overall team perceptions on the hospital unit. Refer to appendix D for the complete subscale.

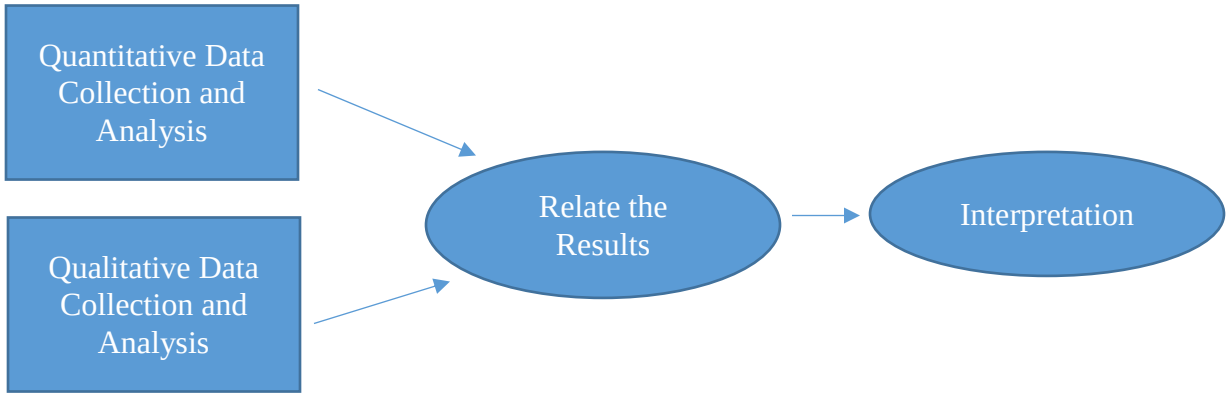
Patient Experiences: Hospital Consumer Assessment of Healthcare Practitioners and Systems (HCAHPS). Data capturing patients' experiences were obtained from routinely collected hospital unit level data. A randomized sample of patients are surveyed post-discharge from each hospital unit. Two individual survey items will be used to capture the patient experiences of interest for this proposed study: *staff effort to include you in decisions about your treatment* and how *staff worked together.* Patients are asked to rate their experiences on a five point Likert-style scale with 1= very poor and 5 = very good. Data was obtained from the most current reporting period to survey administration to ensure the studied IDR practices were in place on each unit. For both hospitals, top box scores were reported. Top box scores refer to how many patients rated their care the highest as opposed to using the mean or median scores. Patient satisfaction data is typically highly skewed. Using this approach is consistent with prior research (O'Leary et al., 2015).

Open-Ended Questions. Practitioners on IDR practice units provided additional insight regarding factors affecting IDR practices, team collaboration and their experiences. Questions about the practitioner's perceived barriers and facilitators during IDR were included. The survey questions are included in appendix E.

Data Collection

The proposed study employed a convergent parallel design for data collection. A schematic of this design is outlined in Figure 2.

Figure 2. Convergent parallel design for data collection.



Both quantitative and qualitative data were collected at the same time, analyzed separately and then the results were connected in the overall discussion section of the dissertation (Fetters, Curry, & Creswell, 2013). The qualitative data helped explain the quantitative results. This design provided a more complete understanding of the topic of interest (Creswell & Plano Clark, 2011). Survey data was collected and imported into R statistical program (version 3.4.0) for analysis. The PI used the survey application maintained by UVA's School of Nursing and used by research faculty doing survey-based research (SelectSurvey.NET). The PI followed institutional protocols for the security and protection of the survey data.

Data Analysis

Initial data screening and cleaning was performed to ensure the validity of the data. Descriptive statistics were calculated and presented to depict sample characteristics. Assumptions were tested and addressed for MLM, including no or little multicollinearity among predictors. Table 2 outlines the analytic methods by study aims for this proposal.

Table 2. Analytic Methods by Study Aims	
Specific Aims	**Analytic Methods**
1. To examine the association between selected IDR design features and team collaboration.	Multilevel Modeling Independent Variable: IDR Design Features Dependent Variable: Team Collaboration (Partnership and Cooperation) Controls: Age, Gender, Time in Role, and Hospital
2. To examine the association between selected IDR design features, team collaboration and practitioner experiences.	Multilevel Modeling Independent Variable: IDR Design Features Dependent Variable: Practitioner Experiences Moderator Variable: Team Collaboration (Partnership and Cooperation) Controls: Age, Gender, Time in Role, and Hospital
3. To examine the association between selected IDR design features, team collaboration, practitioner experiences and patient experiences.	Descriptive Statistics- mean/median for continuous variables and frequency/percentages for discrete variables Comparison analyses: ANOVA- comparing patient experience across IDR design features Pearson correlation coefficient- team collaboration and patient experience team effectiveness and patient experience
4. To explore healthcare practitioners' perceptions of factors affecting IDR practices, team collaboration and concomitant outcomes.	Directed Content Analysis Approach

For specific aim #1, MLM was used to examine the association between IDR design features (level-2, fixed-effect, independent variable) and the two elements of team collaboration, partnership and cooperation (level-1, dependent variable). Each of the three design features was included in a separate model along with the control variables (level 1: age, gender, and time in role, level 2: hospital) to assess their association with both elements of team collaboration. While the hospital is conceptually a level-3 covariate, with only two hospitals in this small sample, it was included as a fixed effect, level-2 covariate. Only control variables whose association with

the dependent variable was significant enough (p-value < 0.25) were selected for the MLM to achieve a parsimonious model. Following this, all three design features were added into one model to determine the most significant feature. For specific aim #2, the association between selected IDR design features, the two elements of team collaboration and practitioner experiences was examined under the same MLM framework. Specifically, the association between each IDR feature and practitioner experiences (level-1, dependent variable) was evaluated while both elements of team collaboration were modeled as moderators with significant level-1,-2 control variables included. For specific aim #3, the association between IDR design features, elements of team collaboration, practitioner experiences and patient experiences were described. Specifically, three separate associations were explored: 1) IDR design features and patient experiences, 2) team collaboration and patient experiences, and 3) practitioner experiences and patient experiences. Because the data for patient experiences was collected as aggregated data at the hospital unit level, statistical appropriateness of aggregating team collaboration and practitioner experience scores to the unit level were assessed by calculating the within-group interrater reliability, intra-class correlation (ICC1) and the reliability of the unit mean (ICC2) (James, Demaree, & Wolf, 1984; Klein & Kozlowski, 2000). The within-group interrater reliability index, r_{wg}, "assesses the extent of consensus, agreement, or within-unit variability within a single unit for single measure, (Klein & Kozlowski, 2000, p. 222). An r_{wg} value of 0.7 is generally accepted as sufficient justification for moving from a lower level to a higher level for analysis (Klein & Kozlowski, 2000). The ICC1 provides information on the interchangeability of respondents, that is, how much does one respondent speak for the rest in their group. ICC1 scores can be interpreted as to what extent an individual's response can be due to group membership. For example, an ICC1 of 0.25 indicates that 25% of the individual-

level variance can be attributed to group membership. An ICC1 score greater than 0 indicates that multilevel modeling is an appropriate analysis method (Tofighi & Thoemmes, 2014). Lastly, ICC2 speaks to the reliability of the group means. An acceptable score is generally considered to be 0.7 or above (Klein & Kozlowski, 2000).

Due to the limited number of clusters (i.e., hospital units), only descriptive statistics (i.e., mean (SD) or median (IQR) for continuous variables and frequency and percentage for discrete variables) were initially calculated and compared to explore the associations. After determining that the data meet the assumptions for further inferential testing, analysis of variance was used to compare patient experiences across variations in IDR design features and Pearson correlation assessed whether there was a linear association between both team collaboration and team effectiveness with patient experiences. Specific aim #4 was explored using the qualitative data from practitioners' responses to the open-ended questions on the surveys. A directed content analysis approach allowed the PI to validate or expand on the conceptual framework (Hsieh & Shannon, 2005). An initial reading by the PI elicited first impressions and thoughts of the responses. Following this, the PI used a constant comparative approach using line-by-line coding by hand, following by the identification of categories (Curry et al., 2009). Once the PI identified initial codes and categories, she member-checked with mentors to reach a final set of categories and developed a final set of themes with representative quotations. Methods to insure rigor in the qualitative data analysis include bracketing and reflecting throughout the process, member-checks and theme development and making all data available to committee members as needed. The themes were connected to the trends discovered in the quantitative data providing a more complete picture of facilitators and barriers to successful IDR practices.

Limitations and Strategies to Overcome

The small sample size limited the testing of the whole conceptual structure-process-outcome model within a comprehensive statistical framework such as multilevel structural equation modeling. However, the results will reveal important trends that could be further explored in a larger study with a more targeted approach in the future. Another limitation is that there was no accounting for patients' personal preferences in how much they want to be involved in treatment planning. It is possible that some patients may not find this to be a positive approach (Mudge et al., 2006). Further research will be needed to address patient preferences in the inpatient setting around shared decision-making and engagement in care planning. The researcher chose previously collected patient experience data as opposed to conducting a primary survey with patients to reduce patient burden. Lastly, the study does not specifically account for different role preferences regarding IDR design. Nonetheless, this study provides new knowledge regarding the influence of design features on team collaboration and practitioner and patient experiences, furthering the mission for improved healthcare quality in United States hospitals.

References

Abrahamson, K., Hass, Z., Fulton, B., & Ramanujam, R. (2016). The relationship between nurse-reported safety culture and the patient experience. *Journal of Nursing Administration*, *46*(12), 662–668. https://doi.org/10.1097/NNA.0000000000000423

Anderson, N., & West, M. (1998). Measuring climate for work group innovation: Development and validation of the team climate inventory. *Journal of Organizational Behavior*, *19*(June 1996), 235–258. https://doi.org/10.1002/(SICI)1099-1379(199805)19:3<235::AID-JOB837>3.0.CO;2-C

Arora, N., Killol, P., Engell, C., & LaRosa, J. (2014). The effect of interdisicplinary team rounds on urinary catheter and central venous catheter days and rates of infection. *American Journal of Medical Quality*, *29*(4), 329–334.

Bae, S. H., Mark, B., & Fried, B. (2010). Impact of nursing unit turnover on patient outcomes in hospitals. *Journal of Nursing Scholarship*, *42*(1), 40–49. https://doi.org/10.1111/j.1547-5069.2009.01319.x

Baker, D. P., Day, R., & Salas, E. (2006). Teamwork as an essential component of high-reliability organizations. *Health Services Research*, *41*(4 II), 1576–1598. https://doi.org/10.1111/j.1475-6773.2006.00566.x

Batalden, M., Batalden, P., Margolis, P., Seid, M., Armstrong, G., Opipari-Arrigan, L., & Hartung, H. (2016). Coproduction of healthcare service. *BMJ Quality and Safety*, *25*, 509–517. https://doi.org/10.1136/bmjqs-2015-004315

Berwick, D. M. (2005). The John Eisenberg Lecture: Health services research as a citizen in improvement. *Health Services Research*, *40*(2), 317–336. https://doi.org/10.1111/j.1475-6773.2005.0n359.x

Berwick, D. M., Nolan, T. W., & Whittington, J. (2008). The triple aim: Care, health, and cost. *Health Affairs*, *27*(3), 759–769. https://doi.org/10.1377/hlthaff.27.3.759

Bhamidipati, V. S., Elliott, D. J., Justice, E. M., Belleh, E., Sonnad, S. S., & Robinson, E. J. (2016). Structure and outcomes of interdisciplinary rounds in hospitalized medicine patients: A systematic review and suggested taxonomy. *Journal of Hospital Medicine*, *11*(7), 513–523. https://doi.org/10.1002/jhm.2575

Bodenheimer, T., & Sinsky, C. (2014). From triple to quadruple aim: Care of the patient requires care of the provider. *Annals of Family Medicine*, *12*(+), 573–576. https://doi.org/10.1370/afm.1713.Center

Brandt, B., Lutfiyya, M. N., King, J. A., & Chioreso, C. (2014). A scoping review of interprofessional collaborative practice and education using the lens of the Triple Aim. *Journal of Interprofessional Care*, *28*(5), 393–399. https://doi.org/10.3109/13561820.2014.906391

Buljac-Samardzic, M., Dekker-van Doorn, C. M., van Wijngaarden, J. D. H., & van Wijk, K. P. (2010). Interventions to improve team effectiveness: A systematic review. *Health Policy*, *94*(3), 183–195. https://doi.org/10.1016/j.healthpol.2009.09.015

Busby, A., & Gilchrist, B. (1992). The role of the nurse in the medical ward round. *Journal of Advanced Nursing*, *17*(3), 339–346. https://doi.org/10.1111/j.1365-2648.1992.tb01912.x

Clancy, C. M., & Tornberg, D. N. (2007). TeamSTEPPS: Assuring optimal teamwork in clinical settings. *American Journal of Medical Quality*, *22*(3), 214–217. https://doi.org/10.1177/1062860607300616

Constand, M. K., MacDermid, J. C., Dal Bello-Haas, V., & Law, M. (2014). Scoping review of patient-centered care approaches in healthcare. *BMC Health Services Research*, *14*(1), 271.

https://doi.org/10.1186/1472-6963-14-271

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. https://doi.org/10.1111/j.1365-2648.2004.02984.x

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd editio). Thousand Oaks, CA: SAGE Publications.

Curley, C., McEachern, J. E., & Speroff, T. (1998). A firm trial of interdisciplinary rounds on the inpatient medical wards: An intervention designed using continuous quality improvement. *Medical Care*, *36*(8).

Curry, L. A., Nembhard, I. M., & Bradley, E. H. (2009). Qualitative and mixed methods provide unique contributions to outcomes research. *Circulation*, *119*(10), 1442–1452. https://doi.org/10.1161/CIRCULATIONAHA.107.742775

Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method*. New York, NY: Wiley.

Edmondson, A. C. (2003). Speaking up in the operating room: How team leaders promote learning in interdisciplinary action teams. *Journal of Management Studies*, *40*(6), 1419–1452. https://doi.org/10.1111/1467-6486.00386

Ellrodt, G., Glasener, R., Cadorette, B., Kradel, K., & Bercury, C. (2007). Multidisciplinary rounds: An implementation system for sustained improvement in the American Heart Association's Get With the Guidelines Program. *Critical Pathways in Cardiology*, *6*(3), 106–116. https://doi.org/10.1097/HPC.0b013e318073bd3c

Ettner, S. L. (2006). An alternative approach to reducing the costs of patient care? A controlled trial of the multi-disciplinary doctor-nurse practitioner (MDNP) model. *Medical Decision*

Making, *26*(1), 9–17. https://doi.org/10.1177/0272989X05284107

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs - Principles and practices. *Health Services Research*, *48*(6 PART2), 2134–2156. https://doi.org/10.1111/1475-6773.12117

Fowler, F. J. (2009). *Survey Research Methods* (4th ed.). Thousand Oaks, CA: Sage publications.

Fox, A., & Reeves, S. (2015). Interprofessional collaborative patient-centred care: A critical exploration of two related discourses. *Journal of Interprofessional Care*, *29*(2), 113–118. https://doi.org/10.3109/13561820.2014.954284

Freidson, E. (1970). *Profession of medicine: A study of the sociology of applied knowledge*. New York, NY: Harper & Row Publishers.

Gausvik, C., Lautar, A., Miller, L., Pallerla, H., & Schlaudecker, J. (2015). Structured nursing communication on interdisciplinary acute care teams improves perceptions of safety, efficiency, understanding of care plan and teamwork as well as job satisfaction. *Journal of Multidisciplinary Healthcare*, *8*, 33–7. https://doi.org/10.2147/JMDH.S72623

Gittell, J. H. (2000). Organizing work to support relational coordination. *The International Journal of Human Resource Management*, *11*(3), 517–539. https://doi.org/10.1080/095851900339747

Gittell, J. H. (2002). Service providers and their impact on customers. *Journal of Service Research*, *4*(4), 299–311.

Gittell, J. H. (2009). *High performance healthcare: Using the power of relationships to achieve quality, efficiency and resilience*. McGraw Hill Professional.

Gittell, J. H., Fairfield, K. M., Bierbaum, B., & Head, W. (2000). Impact of relational coordination on quality of care, postoperative pain and functioning, and length of stay: A

nine-hospital study of surgical patients. *Medical Care*, *38*(8), 807–819.

Gittell, J. H., Seidner, R., & Wimbush, J. (2010). A relational model of how high-performance work systems work. *Organization Science*, *21*(2), 490–506. https://doi.org/10.1287/orsc.1090.0446

Gittell, J. H., Weinberg, D., Pfefferle, S., & Bishop, C. (2008). Impact of relational coordination on job satisfaction and quality outcomes: A study of nursing homes. *Human Resource Management Journal*, *18*(2), 154–170. https://doi.org/10.1111/j.1748-8583.2007.00063.x

Gonzalo, J. D., Chuang, C. H., Huang, G., & Smith, C. (2010). The return of bedside rounds: An educational intervention. *Journal of General Internal Medicine*, *25*(8), 792–798. https://doi.org/10.1007/s11606-010-1344-7

Gonzalo, J. D., Heist, B. S., Duffy, B. L., Dyrbye, L., Fagan, M. J., Ferenchick, G., … Elnicki, D. M. (2013). The art of bedside rounds: A multi-center qualitative study of strategies used by experienced bedside teachers. *Journal of General Internal Medicine*, *28*(3), 412–420. https://doi.org/10.1007/s11606-012-2259-2

Gonzalo, J. D., Kuperman, E., Lehman, E., & Haidet, P. (2014). Bedside interprofessional rounds: Perceptions of benefits and barriers by internal medicine nursing staff, attending physicians, and housestaff physicians. *Journal of Hospital Medicine*, *9*(10), 646–651. https://doi.org/10.1002/jhm.2245

Gonzalo, J. D., Masters, P. A., Simons, R. J., & Chuang, C. H. (2009). Attending rounds and bedside case presentations: Medical student and medicine resident experiences and attitudes. *Teaching and Learning in Medicine*, *21*(2), 105–10. https://doi.org/10.1080/10401330902791156

Greene, J., Hibbard, J. H., Sacks, R., Overton, V., & Parrotta, C. D. (2015). When patient

activation levels change, health outcomes and costs change, too. *Health Affairs*, *34*(3), 431–437. https://doi.org/10.1377/hlthaff.2014.0452

Hartley, H. (2002). The system of alignments challenging physician professional dominance: An elaborated theory of countervailing powers. *Sociology of Health and Illness*, *24*(2), 178–207. https://doi.org/10.1111/1467-9566.00290

Henkin, S., Chon, T. Y., Christopherson, M. L., Halvorsen, A. J., Worden, L. M., & Ratelle, J. T. (2016). Improving nurse-physician teamwork through interprofessional bedside rounding. *Journal of Multidisciplinary Healthcare*, *9*, 201–205. https://doi.org/10.2147/JMDH.S106644

Hill, K. (2003). The sound of silence--nurses' non-verbal interaction within the ward round. *Nursing in Critical Care*, *8*(6), 231–9. https://doi.org/10.1111/j.1362-1017.2003.00038.x

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277–1288. https://doi.org/10.1177/1049732305276687

Hunter, R., & Carlson, E. (2014). Finding the fit: Patient-centered care. *Nursing Management*, *45*(1), 39–43. https://doi.org/10.1097/01.NUMA.0000440632.18272.75

Ilgen, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. (2005). Teams in organizations: from input-process-output models to IMOI models. *Annual Review of Psychology*, *56*, 517–43. https://doi.org/10.1146/annurev.psych.56.091103.070250

Institute of Medicine. (2015). Measuring the impact of interprofessional education on collaborative practice and patient outcomes. *The National Academies Press*. https://doi.org/10.3109/13561820.2015.1111052

Institute of Medicine. (1999). To err is human: Building a safer health system. Washington, DC:

National Academy Press.

Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC.

James, L. R., Demaree, R. G., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology*, *69*(1), 85–98.

Kim, M. M., Barnato, A. A., Angus, D. D., Fleisher, L. L., & Kahn, J. J. (2010). The effect of multidisciplinary care teams on intensive care unit mortality. *Archives Internal Med*, *170*(4), 369–376.

Klein, K. J., & Kozlowski, S. W. J. (2000). From micro to meso: Critical steps in conceptualizing and conducting multilevel research. *Organizational Research Methods*, *3*(3), 211–236. https://doi.org/10.1177/109442810033001

Landry, M.-A., Lafrenaye, S., Roy, M.-C., & Cyr, C. (2007). A randomized, controlled trial of bedside versus conference-room case presentation in a pediatric intensive care unit. *Pediatrics*, *120*(2), 275–280. https://doi.org/10.1542/peds.2007-0107

Lane, D., Ferri, M., Lemaire, J., McLaughlin, K., & Stelfox, H. T. (2013). A systematic review of evidence-informed practices for patient care rounds in the ICU. *Critical Care Medicine*, *41*(8), 2015–29. https://doi.org/10.1097/CCM.0b013e31828a435f

Lemieux-Charles, L., & McGuire, W. L. (2006). What do we know about health care team effectiveness? A review of the literature. *Medical Care Research and Review*, *63*(3), 263–300. https://doi.org/10.1177/1077558706287003

Lewin, S., & Reeves, S. (2011). Enacting “team” and “teamwork”: Using Goffman’s theory of impression management to illuminate interprofessional practice on hospital wards. *Social Science and Medicine*, *72*(10), 1595–1602. https://doi.org/10.1016/j.socscimed.2011.03.037

Lichtenstein, R., Alexander, J. A., McCarthy, J. F., & Wells, R. (2004). Status differences in cross-functional teams: Effects on individual member participation, job satisfaction, and intent to quit. *Journal of Health and Social Behavior*, *45*(3), 322–335. https://doi.org/10.1177/002214650404500306

Luetsch, K., & Rowett, D. (2016). Developing interprofessional communication skills for pharmacists to improve their ability to collaborate with other professions. *Journal of Interprofessional Care*, *30*(4), 458–65. https://doi.org/10.3109/13561820.2016.1154021

Lyons, K. J., Giordano, C., Speakman, E., Isenberg, G., Antony, R., Hanson-Zalot, M., … Papastrat, K. (2013). Jefferson interprofessional clinical rounding project: An innovative approach to patient care. *Journal of Allied Health*, *42*(4), 197–201.

Manias, E., & Street, A. (2001). Nurse-doctor interactions during critical care ward rounds. *Journal of Clinical Nursing*, *10*(4), 442–50. https://doi.org/10.1046/j.1365-2702.2001.00504.x

Mohammed, K., Nolan, M. B., Rajjo, T., Shah, N. D., Prokop, L. J., Varkey, P., & Murad, M. H. (2014). Creating a patient-centered health care delivery system: A systematic review of health care quality from the patient perspective. *American Journal of Medical Quality*, 1–10. https://doi.org/10.1177/1062860614545124

Mudge, A., Laracy, S., Richter, K., & Denaro, C. (2006). Controlled trial of multidisciplinary care teams for acutely ill medical inpatients: Enhanced multidisciplinary care. *Internal Medicine Journal*, *36*(9), 558–563. https://doi.org/10.1111/j.1445-5994.2006.01135.x

Nelson, E. C., Batalden, P. B., & Godfrey, M. M. (2007). *Quality by design: A clinical microsystems approach*. San Francisco, CA: Jossey-Bass.

Nelson, E. C., Batalden, P. B., Huber, T. P., Mohr, J. J., Godfrey, M. M., Headerick, L. A., &

Wasson, J. H. (2002). Microsystems in health care: Part 1. learning from high performing front-line clinical units. *The Joint Commission*, 472–493.

Nembhard, I. M., Alexander, J. A., Hoff, T. J., & Ramanujam, R. (2009). Why does the quality of health care continue to lag? Insights from management research. *Academy of Management Perspectives*, *23*(1), 24–42. https://doi.org/10.5465/AMP.2009.37008001

Nembhard, I. M., & Edmondson, A. C. (2006). Making it safe: The effects of leader inclusiveness and professional status on psychological safety and improvement efforts in health care teams. *Journal of Organizational Behavior*, *27*, 941–966.

Nembhard, I. M., Yuan, C. T., Shabanova, V., & Cleary, P. D. (2015). The relationship between voice climate and patients' experience of timely care in primary care clinics. *Health Care Management Review*, *40*(2), 104–115. https://doi.org/10.1097/HMR.0000000000000017

Nunnally, J. C. (1976). *Psychometric Testing 2nd edition*. New York, NY: McGraw Hill Professional.

O'Leary, K. J., Buck, R., HM, F., Haviley, C., ME, S., MP, L., … Wayne, D. B. (2011). Structured interdisciplinary rounds in a medical teaching unit: improving patient safety. *Archives of Internal Medicine*, *171*(7), 678–684. https://doi.org/10.1001/archinternmed.2011.128

O'Leary, K. J., Creden, A. J., Slade, M. E., Landler, M. P., Kulkarni, N., Lee, J., … Williams, M. V. (2015). Implementation of unit-based interventions to improve teamwork and patient safety on a medical service. *American Journal of Medical Quality*, *30*(5), 409–416. https://doi.org/10.1177/1062860614538093

O'Leary, K. J., Haviley, C., Slade, M. E., Shah, H. M., Lee, J., & Williams, M. V. (2011). Improving teamwork: impact of structured interdisciplinary rounds on a hospitalist unit.

Journal of Hospital Medicine, *6*(2), 88–93. https://doi.org/10.1002/jhm.714

O'Leary, K. J., Johnson, J. K., & Auerbach, A. D. (2016). Do interdisciplinary rounds improve patient outcomes? Only if they improve teamwork. *Journal of Hospital Medicine, 11*(7), 524–525. https://doi.org/10.1002/jhm.2587

O'Leary, K. J., Killarney, A., Hansen, L. O., Jones, S., Malladi, M., Marks, K., & M Shah, H. (2015). Effect of patient-centred bedside rounds on hospitalised patients' decision control, activation and satisfaction with care. *BMJ Quality and Safety*, *0*, 1–8. https://doi.org/10.1136/bmjqs-2015-004561

O'Leary, K. J., Sehgal, N. L., Terrell, G., & Williams, M. V. (2012). Interdisciplinary teamwork in hospitals: A review and practical recommendations for improvement. *Journal of Hospital Medicine*, *7*(1), 48–54. https://doi.org/10.1002/jhm.970

O'Leary, K. J., Thompson, J. A., Landler, M. P., Kulkarni, N., Haviley, C., Hahn, K., … Williams, M. V. (2010). Patterns of nurse-physician communication and agreement on the plan of care. *Quality and Safety in Health Care, 19*(3), 195–199. https://doi.org/10.1136/qshc.2008.030221

O'Leary, K. J., Wayne, D. B., Haviley, C., Slade, M. E., Lee, J., & Williams, M. V. (2010). Improving teamwork: Impact of structured interdisciplinary rounds on a medical teaching unit. *Journal of Hospital Medicine, 5*(8), 55–56. https://doi.org/10.1007/s11606-010-1345-6

O'Mahony, S., Mazur, E., Charney, P., Wang, Y., & Fine, J. (2007). Use of multidisciplinary rounds to simultaneously improve quality outcomes, enhance resident education, and shorten length of stay. *Journal of General Internal Medicine*, *22*(8), 1073–1079. https://doi.org/10.1007/s11606-007-0225-1

Oandasan, I., Baker, G. R., Barker, K., Bosco, C., D'Amour, D., Jones, L., … Way, D. (2006).

Teamwork in healthcare: Promoting effective teamwork in healthcare in Canada. *Canadian Health Services Research Foundation*, 9–25. https://doi.org/10.1017/S0963180100004394

Orchard, C., Curran, V., & Kabene, S. (2005). Creating a Culture for Interdisciplinary Collaborative Professional Practice. *Medical Education Online*, *10*(11), 1–13. https://doi.org/10.3402/meo.v10i0.4387

Orchard, C., King, G., Khalili, H., & Bezzina, M. B. (2012). Assessment of interprofessional team collaboration scale (AITCS): Development and testing of the instrument. *Journal of Continuing Education in the Health Professionals*, *32*(1), 58–67. https://doi.org/10.1002/chp

Oshimura, J. M., Downs, S. M., & Saysana, M. (2014). Family-centered rounding: Can it impact the time of discharge and time of completion of studies at an academic children's hospital? *Hospital Pediatrics*. https://doi.org/10.1542/hpeds.2013-0085

Palthe, J. (2014). Regulative, normative, and cognitive elements of organizations: Implications for managing change. *Management and Organizational Studies*, *1*(2), 59–66. https://doi.org/10.5430/mos.v1n2p59

Pannick, S., Davis, R., Ashrafian, H., Byrne, B. E., Beveridge, I., Athanasiou, T., … Sevdalis, N. (2015). Effects of interdisciplinary team care interventions on general medical wards: A systematic review. *JAMA Internal Medicine*, *175*(8), 1288–1298. https://doi.org/10.1001/jamainternmed.2015.2421

Paradis, E., Leslie, M., & Gropper, M. A. (2015). Interprofessional rhetoric and operational realities: An ethnographic study of rounds in four intensive care units. *Advances in Health Sciences Education*, *21*(4), 1–14. https://doi.org/10.1007/s10459-015-9662-5

Pritts, K. E., & Hiller, L. G. (2014). Implemention of physician and nurse patient rounding on a

42-bed medical unit. *MedSurg Nursing*, *23*(6), 408–413.

Ramanujam, R., & Rousseau, D. M. (2006). The challenges are organizational not just clinical. *Journal of Organizational Behavior*, *27*(7), 811–827. https://doi.org/10.1002/job.411

Ramirez, J., Singh, J., & Williams, A. A. (2016). Patient satisfaction with bedside teaching rounds compared with nonbedside rounds. *Southern Medical Journal*, *109*(2), 112–115. https://doi.org/10.14423/SMJ.0000000000000419

Salas, E., Diazgranados, D., Klein, C., Burke, C. S., Stagl, K. C., Goodwin, G. F., & Halpin, S. M. (2008). Does team training improve team performance? *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *50*(6), 903–933. https://doi.org/10.1518/001872008X375009

Salas, E., King, H. B., & Rosen, M. A. (2012). Improving teamwork and safety: Toward a practical systems approach, a commentary on Deneckere et al. *Social Science and Medicine*, *75*, 986–989. https://doi.org/10.1016/j.socscimed.2012.02.055

Scherbaum, C. A., & Ferreter, J. M. (2009). Estimating statistical power and required sample sizes for organizational research using multilevel modeling. *Organizational Research Methods*, *12*(2), 347–367.

Schorr, T. (1971). Roles and rounds. *American Journal of Nursing*, *71*(8), 1529.

Shoeb, M., Khanna, R., Fang, M., Sharpe, B., Finn, K., Ranji, S., & Monash, B. (2014). Internal medicine rounding practices and the accreditation council for graduate medical education core competencies. *Journal of Hospital Medicine*, *9*(4), 239–243. https://doi.org/10.1002/jhm.2164

Shortell, S. M., & Kaluzny, A. D. (2012). *Health care management: Organization design and behavior* (Sixth Edit). Clifton Park, NY: Delmar Cengage Learning.

Song, H., Chien, A. T., Fisher, J., Martin, J., Peters, A. S., Hacker, K., … Singer, S. J. (2015). Development and validation of the primary care team dynamics survey. *Health Services Research*, *50*(3), 897–921. https://doi.org/10.1111/1475-6773.12257

Song, H., Ryan, M., Tendulkar, S., Fisher, J., Martin, J., Peters, A. S., … Singer, S. J. (2015). Team dynamics, clinical work satisfaction, and patient care coordination between primary care providers. *Health Care Management Review*, *0*(0), 1. https://doi.org/10.1097/HMR.0000000000000091

Southwick, F., Lewis, M., Treloar, D., Cherabuddi, K., Radhakrishnan, N., Leverence, R., … Cottler, L. (2014). Applying athletic principles to medical rounds to improve teaching and patient care. *Academic Medicine : Journal of the Association of American Medical Colleges*, *89*(7), 1018–1023. https://doi.org/10.1097/ACM.0000000000000278

Spybrook, J., Bloom, H., Congdon, R., Hill, C., Liu, X., Martinez, A., & Raudenbush, S. (2013). Optimal Design Plus Empirical Evidence.

Stein, J., Payne, C., Methvin, A., Bonsall, J. M., Chadwick, L., Clark, D., … Dressler, D. D. (2015). Reorganizing a hospital ward as an accountable care unit. *Journal of Hospital Medicine*, *10*(1), 36–40. https://doi.org/10.1002/jhm.2284

Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of Management Review*, *20*(3), 571–610. https://doi.org/10.5465/AMR.1995.9508080331

Sullivan, T. J. (1998). *Collaboration: A health care imperative*. New York, NY: McGraw-Hill.

Sutcliffe, K. M., Lewton, E., & Rosenthal, M. M. (2004). Communication failures: An insidious contributor to medical mishaps. *Academic Medicine*, *79*(2), 186–194.

The Beryl Institute: Improving the patient experience. (2017).

Tofighi, D., & Thoemmes, F. (2014). Single-level and multilevel mediation analysis. *Journal of*

Early Adolescence, *34*(1), 93–119. https://doi.org/10.1177/0272431613511331

Valentine, M. A., Nembhard, I. M., & Edmondson, A. C. (2012). Measuring teamwork in health care settings: A review of survey instruments. *Medical Care*, *53*(4), 16–30. https://doi.org/10.1097/MLR.0b013e31827feef6

Van Bogaert, P., Clarke, S., Roelant, E., Meulemans, H., & Van de Heyning, P. (2010). Impacts of unit-level nurse practice environment and burnout on nurse-reported outcomes: A multilevel modelling approach. *Journal of Clinical Nursing*, *19*(11–12), 1664–1674. https://doi.org/10.1111/j.1365-2702.2009.03128.x

Van Bogaert, P., Clarke, S., Willems, R., & Mondelaers, M. (2013). Nurse practice environment, workload, burnout, job outcomes, and quality of care in psychiatric hospitals: A structural equation model approach. *Journal of Advanced Nursing*, *69*(7), 1515–1524. https://doi.org/10.1111/jan.12010

Van Bogaert, P., Kowalski, C., Weeks, S. M., Van heusden, D., & Clarke, S. P. (2013). The relationship between nurse practice environment, nurse work characteristics, burnout and job outcome and quality of nursing care: A cross-sectional survey. *International Journal of Nursing Studies*, *50*(12), 1667–1677. https://doi.org/10.1016/j.ijnurstu.2013.05.010

Vogus, T. J., Cooil, B., Sitterding, M., & Everett, L. Q. (2014). Safety organizing, emotional exhaustion, and turnover in hospital nursing units. *Medical Care*, *52*(10), 870–876. https://doi.org/10.1097/mlr.0000000000000169

Weinberg, D. B., Avgar, A. C., Sugrue, N. M., & Cooney-Miner, D. (2013). The importance of a high-performance work environment in hospitals. *Health Services Research*, *48*(1), 319–332. https://doi.org/10.1111/j.1475-6773.2012.01438.x

Wild, D., Nawaz, H., Chan, W., & Katz, D. L. (2004). Effects of interdisciplinary rounds on

length of stay in a telemetry unit. *Journal of Public Health*, *10*(1), 63–9. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/15018343

Wisdom, J. P., Cavaleri, M. A., Onwuegbuzie, A. J., & Green, C. A. (2012). Methodological reporting in qualitative, quantitative, and mixed methods health services research articles. *Health Services Research*, *47*(2), 721–745. https://doi.org/10.1111/j.1475-6773.2011.01344.x

Yoo, J. W., Kim, S., Seol, H., Kim, S. J., Yang, J. M., Ryu, W. S., … Nakagawa, S. (2014). Effects of hospitalist-directed interdisciplinary medicine floor service on hospital outcomes for seniors with acute medical illness. *Geriatrics and Gerontology International*, *14*(1), 71–77. https://doi.org/10.1111/ggi.12056

Young, E., Paulk, J., Beck, J., Anderson, M., Burck, M., Jobman, L., & Stickrath, C. (2016). Impact of altered medication administration time on interdisciplinary bedside rounds on academic medical ward. *Journal of Nursing Care Quality*, *0*(0), 1. https://doi.org/10.1097/NCQ.0000000000000233

Zwarenstein, M., Goldman, J., & Reeves, S. (2009). Interprofessional collaboration: Effects of practice-based interventions on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews*, (3), CD000072. https://doi.org/10.1002/14651858.CD000072.pub2

Zwarenstein, M., Rice, K., Gotlib-Conn, L., Kenaszchuk, C., & Reeves, S. (2013). Disengaged: A qualitative study of communication and collaboration between physicians and other professions on general internal medicine wards. *BMC Health Services Research*, *13*. Retrieved from http://www.biomedcentral.com/1472-6963/13/494

Chapter 3. Manuscript #1 Literature Review

Interdisciplinary Rounding Practices and Associations with Teamwork, Collaboration and Patient Experiences: A Systematic Review

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Abstract
Interdisciplinary rounding practices are increasingly popular interventions for supporting teamwork and collaboration in the hospital setting. To date, research on interdisciplinary rounding practices demonstrates mixed results for their direct benefits on patient care. Assessing their associations on teamwork and collaboration may reveal important insights into how interdisciplinary rounding practices impact healthcare delivery. A systematic review was conducted using PubMed and CINAHL databases exploring associations of interdisciplinary rounding practices with teamwork, collaboration, and patient experience. Nineteen articles met the criteria for final review. Interdisciplinary rounding practices are generally positive for practitioners overall, but there is significant heterogeneity in evaluation methods and a lack of rigor in research designs. The influence of interdisciplinary rounding practices on patient experience is mixed. Current research raises important questions about whether all types of interdisciplinary rounds achieve their intended goals. Scholarly work related to interdisciplinary rounding practices is ripe for collaboration between clinicians, researchers and patients. Future work should focus on increased rigor in research design and evaluation of how various IDR practices affect practitioners and patients differently. Systematic design and evaluation of interdisciplinary rounding is necessary to improve the science and identify best practices. Nursing could play pivotal roles in redesign of inpatient rounding practices.

Keywords: *Interdisciplinary rounding, teamwork, collaboration, patient experience*

Interdisciplinary Rounding Practices and Associations with Teamwork, Collaboration and Patient Experiences: A Systematic Review

For the first two decades in the 21st century, the healthcare industry has emphasized the importance of teamwork and collaboration. From the Institute of Medicine reports to the emphasis on the Triple Aim, practitioners from all disciplines and settings are urged to evaluate and demonstrate how they work in teams. Optimizing teamwork is meant to improve patient outcomes. However, despite the emphasis on interdisciplinary practice, there is still a dearth of reproducible interventions backed by strong evidence (Institute of Medicine, 2015.; Reeves et al., 2016; Zwarenstein, Goldman, & Reeves, 2009). Interventions aimed to improve interdisciplinary practice are difficult to research with the rigor expected in the scientific community. This difficulty is partly due to the extremely dynamic qualities of healthcare settings and the people working within them.

A widely used intervention in the area of teamwork and collaboration is interdisciplinary rounding. Interdisciplinary rounding has resurged in popularity as an intervention used to enhance teamwork, collaboration and patient experiences on adult inpatient hospital units (Gonzalo et al., 2010; Stein et al., 2015). Interdisciplinary rounding (IDR) is when two or more disciplines meet to discuss the plan of care for a patient. Quality improvement bodies like the Institute for Healthcare Improvement increasingly advocate for the practice as supporting effective teamwork, collaboration and improved experiences amongst patients in the hospital setting (Institute for Healthcare Improvement, 2015). The ultimate goal of IDR is improved patient outcomes by sharing information amongst practitioners (i.e., physicians, nurses, social workers, pharmacists, etc.) and patients. However, current literature presents conflicting results for how IDR is best operationalized and what effect it has on patients and practitioners. Additionally, the logistical challenges associated with gathering multiple disciplines together

oftentimes create a burden for practitioners. It is important to understand the benefits of IDR and identify best practices so that they may be operated as efficiently and effectively as possible.

Evidence of mixed outcomes in the current literature present challenges for drawing generalizations about how IDR impacts practitioners and patients. A 2016 systematic review found links between IDR and reduced length of stay and improved staff satisfaction, but no evidence for a connection with patient safety or satisfaction (Bhamidipati et al., 2016). Another literature review notes positive impacts of IDR on a variety of patient, process and financial outcomes, but found significant heterogeneity in the variables studied (Ashcraft et al., 2016). Lastly, a systematic review found that interdisciplinary team care interventions, such as IDR, have little effect on outcomes related to quality healthcare (Pannick et al., 2015). These conflicting results indicate there is much more to be learned about IDR.

The science around IDR is young and oftentimes lacks rigor due to the complexity of studying practices in real time. Much of the extant literature derives from single-site, quality improvement studies looking at pre-post results or comparing an intervention unit with a control unit. While these smaller studies are important for their contributions to scholarship, conclusions drawn often lack transferability. Another limitation of much of the current literature is the failure to root studies within a theoretical framework (Ashcraft et al., 2016; O'Leary et al., 2016). Many recent studies focused on IDR and its associations with patient outcomes directly (Arora et al., 2014; Curley et al., 1998; Kim et al., 2010; Yoo et al., 2014). Challenges arise with attributing the changes in patient outcomes directly with changes or introductions of IDR practices (O'Leary et al., 2016). Without theoretical guidance, O'Leary (2016) notes the difficulty in establishing a causal pathway between IDR and patient outcomes due to the complexity of hospital settings and multiple influencing factors. However, it is widely accepted that improved

teamwork and collaboration amongst practitioners leads to improved outcomes for patients (World Health Organization, 2010; Zwarenstein, Goldman, & Reeves, 2009). Therefore, scholars must first establish how IDR affects outcomes related to teamwork and collaboration because they are the likely links to improved patient outcomes (O'Leary et al., 2016).

Taking a step back, this systematic review narrows the focus of earlier work by exploring IDR's association with teamwork, collaboration between and among team members, and patient experience. Patient experience was included as an outcome to better assess the association of IDR as it relates to and incorporates the satisfaction and participation of patients and their families. Involving patients in conversations about their healthcare is an important step in evolving the healthcare system (Chu et al., 2016). By focusing on outcomes related to teamwork, collaboration and patient experience, we draw new conclusions about the current state of the science on IDR practices and where future research may be needed.

Methods

The systematic review of the literature identified studies evaluating connections between interdisciplinary rounding practices on teamwork, collaboration, team effectiveness and patient experiences. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used to help guide this paper (Moher, Liberati, Tetzlaff, & Altman, 2009).

Data Sources and Searches

The databases used to search the literature were PubMed/MEDLINE and CINAHL. After consultation with a health sciences librarian, two separate search strings in each database were used to identify appropriate studies. The following search strings were used in PubMed/MEDLINE and CINAHL respectively to capture studies on interdisciplinary rounding practices and outcomes related to teamwork and collaboration:

(((((((("interdisciplinary") OR "inter disciplinary" OR "inter professional") OR "interprofessional" OR "multidisciplinary") OR "multi disciplinary")) OR ((((("healthcare team") OR "health care team") OR "healthcare teams") OR "health care teams")) OR "Patient Care Team"[Mesh:NoExp]))) AND ((((("Teaching Rounds"[Mesh]) OR (((((("round") OR "rounds") OR "rounding")) OR "morning report"))) AND (((((("team work") OR "teamwork") OR "collaboration") OR "collaborations") OR "effectiveness")).

and

((("interdisciplinary" OR "inter disciplinary" OR "inter professional") OR "interprofessional" OR "multidisciplinary" OR "multi disciplinary") OR (MH "Multidisciplinary Care Team")) AND (MH "Patient Rounds")) AND ("effectiveness" OR ((MH "Teamwork") OR (MH "Collaboration") OR (MH "Interprofessional Relations+"))).

Effectiveness was included in the search string to capture any additional outcomes that may be of interest such as practitioner satisfaction or views of patient safety. For capturing literature on interdisciplinary rounding and outcomes related to patient experiences, the following search strings were used in PubMed/MEDLINE and CINAHL respectively:

(((((((("patient satisfaction"[Title/Abstract]) OR "patient preference") OR "patient preferences")) OR "Patient Satisfaction"[Mesh]) OR (("patient experience") OR "patient experiences"))) AND (("Teaching Rounds"[Mesh]) OR (((((("round") OR "rounds") OR "rounding")) OR "morning report"))) AND (((((((("interdisciplinary") OR "inter disciplinary") OR "inter professional") OR "interprofessional") OR "multidisciplinary") OR "multi disciplinary")) OR ((((("healthcare team") OR "health care team") OR "healthcare teams") OR "health care teams")) OR "Patient Care Team"[Mesh:NoExp]))

and

("interdisciplinary" OR "inter disciplinary" OR "inter professional") OR ("interprofessional" OR "multidisciplinary" OR "multi disciplinary") OR (MH "Multidisciplinary Care Team") AND (MH "Patient Rounds") AND "Patient Experience" OR "Patient Experiences".

Inclusion and Exclusion Criteria

To meet the inclusion criteria, articles had to be peer-reviewed, primary literature published within the last 10 years (2007- March 2018) and written in English. The search was limited to the last 10 years to focus on the most current literature available. Included studies needed to have outcomes related to either teamwork, collaboration, team effectiveness or patient experience in association with a described interdisciplinary rounding practice. Clinical setting

was also a consideration in selecting studies. Those studies taking place in an adult, hospital setting met the inclusion criteria. Studies related to outpatient, pediatrics, or obstetrics were excluded.

Results

Data Extraction, Synthesis, and Analysis

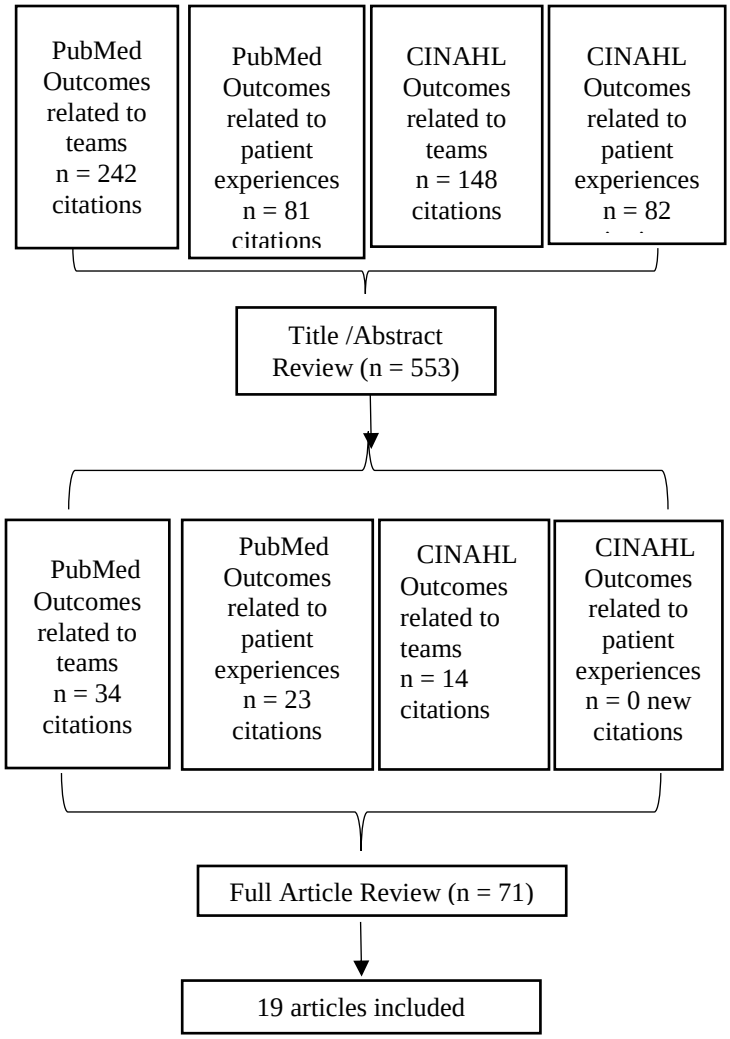
Figure 1 diagrams the flow of how the final nineteen articles were selected for this systematic review. After applying a 10-year limit (2007-2018), narrowing to English speaking and peer-reviewed work, the initial search yielded 242 citations from PubMed/MEDLINE and 148 citations from CINAHL for articles related to interdisciplinary rounding and teamwork, collaboration or effectiveness. Eighty-one citations from PubMed/MEDLINE and 82 citations from CINAHL were found relating interdisciplinary rounding and patient experiences. In total, 553 titles and abstracts were reviewed for inclusion in a full article review. After review and removal of duplicate studies, 71 articles were considered in their entirety for the final review. Articles were excluded at this point if they did not describe the interdisciplinary rounding practice or it was determined they did not fully meet the inclusion criteria. Once completed, 19 articles were chosen for the final review.

Data collection from the studies chosen for final review involved analyzing each article to establish the purpose of the study, structure of the interdisciplinary rounding practice studied, sample characteristics, study design, outcome measures, limitations and conclusions. **Table 1** organizes the data providing a summary for each study. Following this, the data were synthesized according to outcomes related to either teamwork/collaboration or patient experiences. Additionally, studies were grouped by the characteristics of the interdisciplinary rounding practice described for analysis and synthesis. The following section will review these results.

Types of Studies and Settings

All of the studies selected for this review were single- hospital studies predominantly occurring on one or two units. Using PRISMA's strength of evidence criteria, the results can be considered low with mostly Level II and Level III studies (Moher et al., 2009). Study designs included exploratory qualitative work, quality improvement initiatives with pre-/post- survey designs and quasi-experimental comparison studies. Two studies out of the 19 used qualitative data to show how practitioners perceive effective communication and collaboration during interdisciplinary rounding practices (Paradis et al., 2015; Verhaegh et al., 2017). Four other studies used a mixed-methods approach with qualitative data obtained from observations and open-ended questions to practitioners on surveys (Beaird et al., 2017; Gausvik, Lautar, Miller, Pallerla, & Schlaudecker, 2015; Shaughnessy & Jackson, 2015; Urisman, Garcia, & Harris, 2018). Eight articles described small pilot work or quality improvement initiatives for introducing or enhancing an interdisciplinary rounding practice (Henkin et al., 2016; Malec, Mork, Hoffman, & Carlson, 2017; Menefee, 2014; Pritts & Hiller, 2014; Sharma & Klocke, 2014; Shaughnessy & Jackson, 2015; Urisman et al., 2018; Young et al., 2016).

Figure 1. Search Strategy



The quality improvement studies predominantly used pre-/post- survey designs to collect the data. Half of studies (9) compared one interdisciplinary rounding practice with another or others on the same unit or different units within the same hospital (Beaird et al., 2017; Cornell, Townsend Gervis, Yates, & Vardaman, 2014; Dunn et al., 2017; Gausvik et al., 2015; Gonzalo, Kuperman, Lehman, & Haidet, 2014; Luthy et al., 2017; O'Leary et al., 2011, 2015; Southwick et al., 2014).

Practitioner Outcomes

The majority of the studies reviewed focused on healthcare practitioners. Fourteen out of 19 studies included outcomes related to teamwork, collaboration and other practitioner experiences. Eleven quantitative data-based studies demonstrated positive results for practitioners. Table 1 provides an overview of the outcomes related to practitioners and results found in the review. Most studies surveyed at least two disciplines, typically nursing and medicine.

Table 1. Associations between Interdisciplinary Rounding Practices and Outcomes Related to Teams		
Outcomes related to practitioners	**Results**	**Study**
Teamwork/Safety	Improved	Gausvik, 2015
Perceptions of Collaboration	Improved	Malec et al., 2017
Patient Safety Climate	Improved	Dunn, 2017
Teamwork/Safety Attitudes	Improved	Henkin, 2016
Teamwork	Improved	O'Leary, 2011
Teamwork	Improved	Gonzalo, 2014
Nurse participation	Improved	Shaugnessy & Jackson, 2015
Nurse satisfaction	Improved	Sharma & Klocke, 2014
Teamwork Climate	Improved	Young et al., 2016
Physician Satisfaction	Improved	Southwick et al., 2014
Teamwork	Improved	Urisman et al., 2015

A number of studies explored how practitioners viewed patient care and safety in the context of a newly introduced or restructured interdisciplinary rounding practice. Gausvik (2015) found that practitioners using a structured bedside interdisciplinary rounding practice demonstrated higher agreement in areas related to teamwork, understanding of plan, addressing fears and worries, team communication, efficiency, safety and job satisfaction than a control unit using physician-centric rounding. Similarly, Malec et al., (2017) found improvements in nurses and other care practitioners' (physicians, nurse practitioners, and physician assistants) perceptions of collaboration and satisfaction about decision-making during care team visits after the implementation of an interdisciplinary bedside rounding practice. Dunn (2017) noted improved scores for patient safety climate and the efficiency of rounds by both nurses and physicians when comparing a bedside interdisciplinary rounding model versus a conference room. Henkin (2016) found significant differences between the nurses' and physicians' responses to survey items related to teamwork *before* the implementation of a bedside interdisciplinary rounding practice, but only one item remained significantly different post intervention. The item: *in this clinical area, it is not difficult to speak up if I perceive a problem with patient care,* was agreed upon by 99% of attending physicians, 79% of residents and only 64% of nurses (p=.02). O'Leary et al. also studied teamwork climate in their 2011 study. Slightly

different from Henkin's study, O'Leary et al.'s study found more improvement in nurses' ratings of teamwork and safety climate than physicians when comparing a structured interdisciplinary rounding practice on one unit versus a control unit.

Nursing-specific outcomes. Multiple articles explored how interdisciplinary rounding practices influence nursing staff. While positive overall for both groups, Gonzalo et al.'s study found nurses as more favorable towards bedside interdisciplinary rounding practices than physicians as a means to improve communication, clinical awareness, teamwork and coordination (2014). Similarly, nurses felt they had more opportunity to participate in the rounding practice with the introduction of a checklist and structured procedure in a study aimed at improving patient safety on a cardiothoracic critical care unit (Shaughnessy & Jackson, 2015). Additionally, nurses demonstrated statistically significant improvement in their satisfaction with inpatient rounding, feeling valued as a healthcare team member, communication and a positive effect on workflow after a structured interdisciplinary rounding practice was implemented (Sharma & Klocke, 2014). It appears that restructuring of interdisciplinary rounding practices is done so with the goal of getting nurses more involved in the discussion. Young et al., (2016) studied practitioners' perceptions after altering medication administration times on interdisciplinary bedside rounds. Nurses and physicians agreed that the new practice was improved as now nurses were able to participate more consistently. Young et al.'s study saw improvements in teamwork climate, workload, job satisfaction, impact on attending rounds and overall satisfaction (Young et al., 2016).

Not all studies surveyed practitioners equally despite studying an interdisciplinary rounding practice. For example, Urisman (2018) used a different survey tool for nurses than for physicians, Southwick (2014) only surveyed physicians and medical students, Verhaegh (2017)

did not include other members such as pharmacy and social work in their focus groups, and Sharma and Klocke (2014) only surveyed nurses. These variations create challenges for generalizing results to the overall interdisciplinary team.

Survey Tools. Multiple tools were used to gather data related to practitioners' experiences including focus groups, study-specific surveys, and other previously tested instruments. Two studies (Henkin, 2016; O'Leary, 2011) used the Safety Attitudes Questionnaire (SAQ). The SAQ was previously tested for its psychometric properties and reliability for assessing attitudes related to patient safety (Sexton et al., 2006). Eight of the 11 studies reporting outcomes related to practitioners used study-specific survey tools to measure aspects of teamwork, collaboration and practitioner experiences.

Patient Experiences

The studies reviewed indicate that practitioners generally have positive experiences with interdisciplinary rounding practices. However, patient satisfaction related to interdisciplinary rounds does not seem as ubiquitously studied or positive. Table 2 illustrates a summary of the results. Nine of the 19 articles met criteria for review included outcomes related to patient experiences. Five studies found improvements in patient satisfaction or their perceptions of teamwork (Beaird et al., 2017; Dunn et al., 2017; Luthy et al., 2017; Menefee, 2014; Pritts & Hiller, 2014). Beaird et al. (2017) found patients exposed to a structured bedside interdisciplinary rounding practice rated their care practitioners as having higher teamwork than those exposed to a traditional, physician-centric model. Two studies compared a bedside model versus a hallway or conference room model for interdisciplinary rounding practices. Dunn et al. (2017) compared bedside rounds versus a conference room model and found only one item on the widely used Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey was

higher with bedside rounding. Luthy et al. (2017) found patients in the bedside rounding group saw improved coordination and involvement of family and discharge when compared to a hallway practice. Interestingly, the same study also found a decrease in patients' trust of nurses and less likelihood to recommend the institution with a bedside model versus a hallway practice (Luthy et al., 2017). Pritts & Hiller (2014) saw a five percentage point increase in how patients answered the question *how staff worked together to care for them* on the HCAHPS after a new nurse-physician rounding practice was implemented. Menefee (2014) also saw improvements in patient satisfaction on the HCAHPS survey after the introduction of a structured interdisciplinary rounding practice.

Table 2. Associations between Interdisciplinary Rounding Practices and Patient Experience

Outcomes related to patients	Results	Study
Patient Satisfaction	Improved	Dunn et al., 2017
Patient Satisfaction/Trust in Nurses and likelihood to recommend hospital	Improved/ Decreased	Luthy et al., 2017
Patient Satisfaction	Improved	Pritts & Hiller, 2014
Patient Satisfaction	Improved	Menefee, 2014
Perceptions of Teamwork	Improved	Beaird et al., 2017
Patient Satisfaction	Equivocal	Cornell et al., 2014
Patient Satisfaction	Equivocal	Vardaman & Yates, 2014
Patient Satisfaction	Equivocal	Malec et al., 2017
Patient Satisfaction, Activation, Shared Decision Making	Equivocal	O'Leary et al., 2015

Three studies found no change in patient satisfaction with the implementation of a structured rounding practice (Cornell, Townsend-Gervis, Vardaman, & Yates, 2014; Malec et al., 2017; O'Leary et al., 2015). Cornell et al. (2014) introduced a mobile interdisciplinary rounding practice in the hall using a structured script for nurses, but did not see any changes in HCAHPS scores. Malec et al. (2017) introduced a bedside model with a script for team members as part of a quality improvement project, but also did not find any improvement in patient satisfaction despite improvement in practitioners' ratings of collaboration. Lastly, O'Leary et al. (2015) introduced a nurse-physician bedside rounding model but found no differences in patient

activation, shared-decision making or satisfaction with care when compared to another non-bedside interdisciplinary model.

Interdisciplinary Rounding Designs

There was no standard procedure for how IDR is designed noted in the literature. Studies included in this review described a wide range of rounding models. However, fourteen of the 19 studies evaluated a bedside rounding model intervention. Three of the 19 studies evaluated a conference room or hallway model. Some models included just a physician and nurse at the bedside while others included other disciplines such as a case manager and social worker.

Discussion

Implications for Research

The results of this systematic review point towards the infancy and challenges associated with implementation science research. Hospital units are dynamic microsystems with multiple factors influencing practitioners and patient care, which makes studying them challenging. However, the results have important implications for future research. While half of the studies had control and intervention arms to their research, limitations existed that may skew results. For example, Dunn (2017), Southwick (2014), and Beaird (2017) conducted their studies with the control teams rounding on the same unit as the intervention group. Thus, effects of the intervening interdisciplinary rounding practice could have affected staff nurses interacting with both teams or influenced their interactions with patients. Future researchers should carefully consider this limitation when designing their projects. Additionally, multiple papers noted a limitation regarding the fidelity of the interdisciplinary rounding practice. It is possible that not all of the intervention rounding practices remained faithful to their originally intended structure. This limitation could be addressed with study designs that take the fidelity of the practice into

account. Ensuring multiple observations over a period of time or an interrupted time-series design may help mitigate this limitation. Lastly, while some studies spanned multiple units, all of the 19 studies selected took place in a single hospital, thus limiting transferability across systems. It will be important for future studies to include multiple units and hospitals for better understanding of how interdisciplinary rounding practices influence practitioner and patient outcomes on a more generalizable level.

The results from this review may inform future work related to practitioner outcomes such as satisfaction and engagement in care planning. The positive impact of interdisciplinary rounding practices on nursing staff stood out in the literature. Future work may want to look at how implementing IDR upstream may impact downstream effects such as job retention and turnover. While it is methodologically challenging to tie patient outcomes directly to the design of interdisciplinary rounding practices, researchers may be able to discover important effects of rounding practices on practitioners that have also demonstrated influence on patient care.

Many studies reported limitations regarding the generalizability of their results due to the study design being a single site study or having small sample sizes. Additionally, the heterogeneity of measurement tools, even within studies, makes it challenging to generalize results. In order to advance the science, future researchers should select valid and reliable tools for measuring the variables of interest. The results also pointed towards the heterogeneity in rounding styles present in hospitals. While there are some guidelines for best practices in the literature, the healthcare community does not have empirical evidence to support one set way of performing rounds (Institute for Healthcare Improvement, 2015; Lane et al., 2013).

Bedside rounding is a popular focus in the literature. The impetus for bedside rounding stems from many different stakeholders. Value-based purchasing reimbursement models place

increased pressure on hospitals to demonstrate improved patient satisfaction (Mohammed et al., 2014). Other regulatory pressures call for demonstrating collaborative care practices. However, Malec et al. notes that "gathering interdisciplinary team members around a patient's bed does not, however, guarantee effective team communication and care coordination" (Malec et al., 2017, p. 1). Paradis et al.'s (2015) qualitative work raises important questions on whether all interdisciplinary models of rounds are equally valuable? Design features such as location, use of script and leadership role may influence participation and collaboration. Presently, there appears no clear connection between any specific design features and the outcomes of the rounds. Future research should explore design features in more detail to identify associated variances in rounding model designs on practitioners and patients. Additionally, the design of rounding practices should continue to be explicitly detailed in dissemination of any results for ease of reproducible results (Bhamidipati et al., 2016).

Implications for Practice

This systematic review has implications for practice as well as research. The results indicate that employing IDR practices can be beneficial, but there is no clear direction on designs that may be superior. It appears that units design their practice in an idiosyncratic fashion--doing what they determine best suits their patients, team and environment. However, it is important to recognize that divergent designs of rounding practices may influence patients and practitioners in different ways. As mentioned previously, the fidelity of IDR is called into question in numerous studies (Dunn et al., 2017; Southwick et al., 2014). When a unit decides to employ a structured rounding practice, it is important that it is sustainable and easily replicated each day in order to achieve the practice's original intent. Unit leadership may consider the sustainability of their rounding practices and initiate routine quality audits to ensure that the team remains true to the

original structure or that adjustments are data-driven.

Implications for Innovation

In light of the variations in designs and challenges with fidelity of inpatient rounding practices, it may be important for hospital and unit leadership to employ strategies beyond traditional quality improvement methodologies for designing IDR. The process known as design thinking is a promising process for creating innovative, user-centered solutions (Roberts, Fisher, Trowbridge, & Bent, 2016). Research demonstrates that there is a lack in competence related to innovation amongst nurse leaders despite their well-positioned standing in health care delivery (White, Pillay, & Huang, 2016). It is important for nurse leaders to hone their skills in innovative processes like design thinking in order to lead change and take part in healthcare redesign. As IDR seemingly has a significant impact on bedside nursing's day-to-day work, it is appropriate for them to be critical players in design efforts.

Conclusion

This systematic review assessed the trends in the literature associating IDR with teamwork, collaboration and patient experience. Overall, IDR is associated with positive results for both practitioners and patients in terms of increasing teamwork and satisfaction. However, there is still much to be learned regarding best practice designs and how practitioners and patients perceive the benefits in different ways. Designing studies that control for the multiple influences is challenging. Scholarly work related to IDR is a prime opportunity for clinicians, researchers, and patients across multiple disciplines to collaborate.

References

Arora, N., Killol, P., Engell, C., & LaRosa, J. (2014). The effect of interdisicplinary team rounds on urinary catheter and central venous catheter days and rates of infection. *American Journal of Medical Quality*, *29*(4), 329–334.

Ashcraft, S., Bordelon, C., Fells, S., George, V., Thombley, K., & Shirey, M. R. (2016). Interprofessional clinical rounding: Effects on processes and outcomes of care. *Journal for Healthcare Quality*, *39*(2), 1–10. https://doi.org/10.1097/JHQ.0000000000000039

Beaird, G., Dent, J. M. J. M., Keim-Malpass, J., Jian Muller, A. G., Nelson, N., Brashers, V., … Brashers, V. (2017). Perceptions of teamwork in the interprofessional bedside rounding process. *Journal for Healthcare Quality :*, *39*(2), 95–106. https://doi.org/10.1097/JHQ.0000000000000068

Beaird, G., Dent, J. M., Keim-Malpass, J., Jian Muller, A. G., Nelson, N., & Brashers, V. (2017). Perceptions of teamwork in the interprofessional bedside rounding process. *Journal for Healthcare Quality*, *39*(2). https://doi.org/10.1097/JHQ.0000000000000068

Bhamidipati, V. S., Elliott, D. J., Justice, E. M., Belleh, E., Sonnad, S. S., & Robinson, E. J. (2016). Structure and outcomes of interdisciplinary rounds in hospitalized medicine patients: A systematic review and suggested taxonomy. *Journal of Hospital Medicine*, *11*(7), 513–523. https://doi.org/10.1002/jhm.2575

Chu, L. F., Utengen, A., Kadry, B., Kucharski, S. E., Campos, H., Crockett, J., … Clauson, K. A. (2016). “Nothing about us without us”—patient partnership in medical conferences. *British Medical Journal*, *354*(September), 6–11. https://doi.org/10.1136/bmj.i3883

Cornell, P., Townsend-Gervis, M., Vardaman, J. M., & Yates, L. (2014). Improving situation awareness and patient outcomes through interdisciplinary rounding and structured

communication. *The Journal of Nursing Administration*, *44*(3), 164–169. https://doi.org/10.1097/NNA.0000000000000045

Cornell, P., Townsend Gervis, M., Yates, L., & Vardaman, J. M. (2014). Impact of SBAR on Nurse Shift Reports and Staff Rounding. *MEDSURG Nursing*, *23*(5), 334–342. Retrieved from http://proxy.library.vcu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,url,cookie,uid&db=ccm&AN=103907444&site=ehost-live&scope=site

Curley, C., McEachern, J. E., & Speroff, T. (1998). A firm trial of interdisciplinary rounds on the inpatient medical wards: An intervention designed using continuous quality improvement. *Medical Care*, *36*(8).

Dunn, A. S., Reyna, M., Radbill, B., Parides, M., Colgan, C., Osio, T., … Kaplan, H. (2017). The impact of bedside interdisciplinary rounds on length of stay and complications. *Journal of Hospital Medicine*, *12*(03), 137–142. https://doi.org/10.12788/jhm.2695

Gausvik, C., Lautar, A., Miller, L., Pallerla, H., & Schlaudecker, J. (2015). Structured nursing communication on interdisciplinary acute care teams improves perceptions of safety, efficiency, understanding of care plan and teamwork as well as job satisfaction. *Journal of Multidisciplinary Healthcare*, *8*, 33–7. https://doi.org/10.2147/JMDH.S72623

Gonzalo, J. D., Chuang, C. H., Huang, G., & Smith, C. (2010). The return of bedside rounds: An educational intervention. *Journal of General Internal Medicine*, *25*(8), 792–798. https://doi.org/10.1007/s11606-010-1344-7

Gonzalo, J. D., Kuperman, E., Lehman, E., & Haidet, P. (2014). Bedside interprofessional rounds: Perceptions of benefits and barriers by internal medicine nursing staff, attending physicians, and housestaff physicians. *Journal of Hospital Medicine*, *9*(10), 646–651.

https://doi.org/10.1002/jhm.2245

Henkin, S., Chon, T. Y., Christopherson, M. L., Halvorsen, A. J., Worden, L. M., & Ratelle, J. T. (2016). Improving nurse-physician teamwork through interprofessional bedside rounding. *Journal of Multidisciplinary Healthcare*, *9*, 201–205. https://doi.org/10.2147/JMDH.S106644

Institute for Healthcare Improvement. (2015). How-to guide: Multidisciplinary rounds, (February).

Institute of Medicine. (2015). Measuring the impact of interprofessional education on collaborative practice and patient outcomes. *The National Academies Press*. https://doi.org/10.3109/13561820.2015.1111052

Kim, M. M., Barnato, A. A., Angus, D. D., Fleisher, L. L., & Kahn, J. J. (2010). The effect of multidisciplinary care teams on intensive care unit mortality. *Archives Internal Med*, *170*(4), 369–376.

Lane, D., Ferri, M., Lemaire, J., McLaughlin, K., & Stelfox, H. T. (2013). A systematic review of evidence-informed practices for patient care rounds in the ICU. *Critical Care Medicine*, *41*(8), 2015–29. https://doi.org/10.1097/CCM.0b013e31828a435f

Luthy, C., Francis Gerstel, P., Pugliesi, A., Piguet, V., Allaz, A.-F., & Cedraschi, C. (2017). Bedside or not bedside: Evaluation of patient satisfaction in intensive medical rehabilitation wards. *PloS One*, *12*(2), e0170474. https://doi.org/10.1371/journal.pone.0170474

Malec, A., Mork, A., Hoffman, R., & Carlson, E. (2017). The care team visit: Approaching interdisciplinary rounds with renewed focus. *Journal of Nursing Care Quality*. https://doi.org/10.1097/NCQ.0000000000000279

Menefee, K. S. (2014). The Menefee model for patient-focused interdisciplinary team

collaboration. *The Journal of Nursing Administration*, *44*(11), 598–605. https://doi.org/10.1097/NNA.0000000000000132

Mohammed, K., Nolan, M. B., Rajjo, T., Shah, N. D., Prokop, L. J., Varkey, P., & Murad, M. H. (2014). Creating a patient-centered health care delivery system: A systematic review of health care quality from the patient perspective. *American Journal of Medical Quality*, 1–10. https://doi.org/10.1177/1062860614545124

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. (2009). Preferred reporting items for systematic reviews and Meta-analyses: The PRISMA statement. *PLoS ONE*, *6*(7), e1000097.

O'Leary, K. J., Haviley, C., Slade, M. E., Shah, H. M., Lee, J., & Williams, M. V. (2011). Improving teamwork: impact of structured interdisciplinary rounds on a hospitalist unit. *Journal of Hospital Medicine*, *6*(2), 88–93. https://doi.org/10.1002/jhm.714

O'Leary, K. J., Johnson, J. K., & Auerbach, A. D. (2016). Do interdisciplinary rounds improve patient outcomes? Only if they improve teamwork. *Journal of Hospital Medicine, 11*(7), 524–525. https://doi.org/10.1002/jhm.2587

O'Leary, K. J., Killarney, A., Hansen, L. O., Jones, S., Malladi, M., Marks, K., & M Shah, H. (2015). Effect of patient-centred bedside rounds on hospitalised patients' decision control, activation and satisfaction with care. *BMJ Quality and Safety, 0*, 1–8. https://doi.org/10.1136/bmjqs-2015-004561

Pannick, S., Davis, R., Ashrafian, H., Byrne, B. E., Beveridge, I., Athanasiou, T., … Sevdalis, N. (2015). Effects of interdisciplinary team care interventions on general medical wards: A systematic review. *JAMA Internal Medicine, 175*(8), 1288–1298. https://doi.org/10.1001/jamainternmed.2015.2421

Paradis, E., Leslie, M., & Gropper, M. A. (2015). Interprofessional rhetoric and operational realities: An ethnographic study of rounds in four intensive care units. *Advances in Health Sciences Education*, *21*(4), 1–14. https://doi.org/10.1007/s10459-015-9662-5

Pritts, K. E., & Hiller, L. G. (2014). Implemention of physician and nurse patient rounding on a 42-bed medical unit. *MedSurg Nursing*, *23*(6), 408–413.

Reeves, S., Fletcher, S., Barr, H., Birch, I., Boet, S., Mcfadyen, A., … Beme, A. (2016). A BEME systematic review of the effects of interprofessional education: BEME Guide No . 39 A BEME systematic review of the effects of interprofessional education : *Medical Teacher*, *38*(7), 656–668. https://doi.org/10.3109/0142159X.2016.1173663

Roberts, J. P., Fisher, T. R., Trowbridge, M. J., & Bent, C. (2016). A design thinking framework for healthcare management and innovation. *Healthcare*, *4*(1), 11–14. https://doi.org/10.1016/j.hjdsi.2015.12.002

Sexton, J. B., Helmreich, R. L., Neilands, T. B., Rowan, K., Vella, K., Boyden, J., … Thomas, E. J. (2006). The Safety attitudes questionnaire: Psychometric properties, benchmarking data, and emerging research. *BMC Health Services Research*, *6*, 1–10. https://doi.org/10.1186/1472-6963-6-44

Sharma, S., Peters, M. J., & Group, P. N. R. A. (2013). "Safety by DEFAULT": introduction and impact of a paediatric ward round checklist. *Crit Care*, *17*(5). https://doi.org/10.1186/cc13055

Sharma, U., & Klocke, D. (2014). Attitudes of nursing staff toward interprofessional in-patient-centered rounding. *J Interprof Care*, *28*(5), 1356–1820. https://doi.org/10.3109/13561820.2014.907558

Shaughnessy, L., & Jackson, J. (2015). Introduction of a new ward round approach in a

cardiothoracic critical care unit. *Nursing in Critical Care*, *20*(4), 210–218. https://doi.org/10.1111/nicc.12149

Southwick, F., Lewis, M., Treloar, D., Cherabuddi, K., Radhakrishnan, N., Leverence, R., … Cottler, L. (2014). Applying athletic principles to medical rounds to improve teaching and patient care. *Academic Medicine : Journal of the Association of American Medical Colleges*, *89*(7), 1018–1023. https://doi.org/10.1097/ACM.0000000000000278

Stein, J., Payne, C., Methvin, A., Bonsall, J. M., Chadwick, L., Clark, D., … Dressler, D. D. (2015). Reorganizing a hospital ward as an accountable care unit. *Journal of Hospital Medicine*, *10*(1), 36–40. https://doi.org/10.1002/jhm.2284

Urisman, T., Garcia, A., & Harris, H. W. (2018). Impact of surgical intensive care unit interdisciplinary rounds on interprofessional collaboration and quality of care: Mixed qualitative–quantitative study. *Intensive and Critical Care Nursing*, *44*, 18–23. https://doi.org/10.1016/j.iccn.2017.07.001

Verhaegh, K. J., Seller-Boersma, A., Simons, R., Steenbruggen, J., Geerlings, S. E., de Rooij, S. E., & Buurman, B. M. (2017). An exploratory study of healthcare professionals' perceptions of interprofessional communication and collaboration. *Journal of Interprofessional Care*, *31*(3), 397–400. https://doi.org/10.1080/13561820.2017.1289158

White, K. R., Pillay, R., & Huang, X. (2016). Nurse leaders and the innovation competence gap. *Nursing Outlook*, *64*(3), 255–261. https://doi.org/10.1016/j.outlook.2015.12.007

World Health Organization. (n.d.). *Framework for action on interprofessional education and collaborative practice. 2010*.

Yoo, J. W., Kim, S., Seol, H., Kim, S. J., Yang, J. M., Ryu, W. S., … Nakagawa, S. (2014). Effects of hospitalist-directed interdisciplinary medicine floor service on hospital outcomes

for seniors with acute medical illness. *Geriatrics and Gerontology International*, *14*(1), 71–77. https://doi.org/10.1111/ggi.12056

Young, E., Paulk, J., Beck, J., Anderson, M., Burck, M., Jobman, L., & Stickrath, C. (2016). Impact of altered medication administration time on interdisciplinary bedside rounds on academic medical ward. *Journal of Nursing Care Quality*, *00*(00), 1. https://doi.org/10.1097/NCQ.0000000000000233

Zwarenstein, M., Goldman, J., & Reeves, S. (2009). Interprofessional collaboration: Effects of practice-based interventions on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews*, (3), CD000072. https://doi.org/10.1002/14651858.CD000072.pub2

Author/Year/Title /Journal	**Purpose/ Aims**	**Sample**	**Rounds Design**	**Research Design/Theoretical Approach**	**Outcome Measures**	**Results and Conclusions**	**Study Limitations**	**Implications/Future Research**
Beaird, Dent, Keim-Malpass, Muller, Nelson, Brashers, 2017, Perceptions of teamwork in the interdisciplinary bedside rounding process, *Journal for Healthcare Quality*. (Genevieve Beaird et al., 2017)	Compared patient perceptions of teamwork for those receiving exposure to a structured bedside rounding practice and those that did not	Academic medical center, acute cardiology inpatient units, *n*=63 patients	Compared traditional physician-centric with structured model involving attending, fellows, residents, interns, nurse, social worker, pharmacists, case manager and clinical coordinator, hallway and bedside discussions.	Cross-sectional descriptive study with patient surveys and on unit observations	Patient Insights and Views on Teamwork Survey and qualitative observations coded with a priori themes.	Patients receiving the structured rounding process had higher perceptions of teamwork than those receiving traditional rounding	Single unit study	Patients may have unique insights into teamwork qualities
Cornell et al., 2014, Improving situation awareness and patient outcomes	Explored impact of IDR and SBAR on communication and patient	3 medical-surgical units, organized by charge nurse, staff nurses	Team members: staff nurse, charge nurse, pharmacist, dietitian, case	Observational study, survey data	Staff situation awareness (patient review time), Patient satisfaction	Patient review times decreased with mobile conference, increased	Difficult to measure situation awareness. Number of different factors	SBAR is an effective tool with proper training. IDR is effective at reducing communication

through interdisciplinary rounding and structured communication, *Journal of Nursing Administration* (Cornell, Townsend-Gervis, et al., 2014)	satisfaction	presented patients, baseline in conference room to mobile case conference on units	manager, and other when appropriate		indices on nurse communication (HCAHPS), length of stay	consistency in mobile, no significant difference in HCAHPS questions, no improvement in length of stay across 3 units	affecting LOS, patient satisfaction. SBAR training limited to nurses	barriers when used regularly. Mobile conference easily distracted
Dunn et al., 2017, The impact of bedside interdisciplinary rounds on length of stay and complications. *Journal of Hospital Medicine*. (Dunn et al., 2017)	Comparing a bedside IDR model versus a conference room model on patient outcomes and perceptions of patient safety on a hospital unit.	Non-teaching hospital unit at an academic medical center; study took place over a year	Intervention-Bedside model with script attended by hospitalist, staff nurse, medical director, nurse manager, social worker and case manager. Control unit did not follow a script.	Controlled trial	Primary outcomes included clinical deterioration and length of stay. Secondary outcomes included patient satisfaction (HCAHPS) and perceptions of patient safety (AHRQ Patient Safety Culture Survey)	Primary outcomes not significantly different. One HCAHPS question higher with bedside rounding group. Her scores for teamwork, overall perception of patient safety and patient safety after the intervention was	Potential for underpowered to find small differences between groups, potential that bedside IDR provides clinically significant benefit- but not statistically. Patients were not randomized. Effects from intervention may have impacted whole unit.	Suggests looking to larger, more comprehensive changes to inpatient models to include bedside IDR, geographic co-horting of teams and co-leadership and the impact on patient outcomes.

						implemented.	No data on the effectiveness of the communication or fidelity to processes.	
Gausvik et al., 2015, Structured nursing communication on interdisciplinary acute care teams improves perceptions of safety, efficiency, understanding of care plan and teamwork as well as job satisfaction, *Journal of Multidisciplinary Care*, (Gausvik et al., 2015)	Measure perceptions of teamwork, communication, understanding of the plan for the day, safety, efficiency and job satisfaction	555-bed metropolitan community hospital, acute care for elderly unit, Surveyed 24 nurses, therapists, patient care assistants and social workers on a unit, 38 staff members on different units with physician centric rounds	SIBR-Emory model, Nurse practitioner, geriatrician, social worker, nurses, physical and occupational therapists and patient care assistants	Mixed-methods comparison study, survey methods and open ended questions	Survey created by authors for purposes of study	Responses on SIBR unit significantly higher in all categories	Limited sample size, single hospital	Future work should explore what aspects of SIBR are most beneficial, should also tie into patient safety and quality data
Gonzalo, Kuperman, Lehman, & Haidet, 2014,	Evaluate perceptions of practitione	Academic teaching hospital,	Two physicians and a nurse at bedside	Observational, cross-sectional survey	Survey developed specifically for the study	Benefits included improving communicat	One teaching hospital limits generalizabil	More investigation in differences between nurses,

Bedside interprofessional rounds: Perceptions of benefits and barriers by internal medicine nursing staff, attending physicians and housestaff physicians. *Journal of Hospital Medicine*, (Gonzalo, Kuperman, et al., 2014)	rs on the benefits and barriers of bedside interdisciplinary rounds (BIR)	internal medicine	discussing plan of care, not scripted, presentation by trainees in hallway or bedside, patients encouraged to talk.			ion, awareness of clinical issues and improvement of team building. Lowest benefits included decreasing LOS, improving timeliness, reduction of ordering unnecessary tests. Nurses more favorable of BIRs than physicians. Barriers include limited nursing time, coordination.	ity. Increased awareness of BIR in study hospital. No rigorous assessment of instrument.	physicians and other care providers. Focus on educational interventions.
Henkin et al., 2016, Improving nurse-physician teamwork through interdisciplinary	Assessing effect of interdisciplinary bedside rounding on	Four general medicine teams in a single nursing unit at	Bedside, with checklist for RN, medicine team notified nurse to	Pre-/post survey data collection of physicians and nurses	Nurse-Physician teamwork measured using Safety attitudes	Within-group and between-group variations present pre-intervention	Low response rate from nurses post-intervention, physicians and nurses	More research to explore the hierarchical differences in responses. More work needed to

bedside rounding. *Journal of Multidisciplinary Healthcare.* (Henkin et al., 2016)	improving nurse-physician teamwork on general medicine inpatient teaching unit	academic teaching hospital	come to bedside when rounding		questionnaire (SAQ)	s. Nurses generally lower on SAQ initially. Post-intervention, only between-group difference on one item about speaking up.	surveyed differently, lower participation rate in rounds.	assess interdisciplinary bedside rounding impact on patient satisfaction and outcomes.
Luthy et al., 2017, Bedside or not bedside: Evaluation of patient satisfaction in intensive medical rehabilitation wards, *PLOS One* (Luthy et al., 2017)	Measured differences between bedside and outside of room rounding practices	90 patients from each of two groups, 6 units total studied—3 bedside and 3 outside	Compared hallway vs. bedside, no checklist, attended by physicians and nurses	Prospective, quasi-experimental controlled study comparing bedside and outside patient room rounding practices	Patient satisfaction using the Picker (PiQ) questionnaire	Improvement in bedside rounding group in treatment coordination, involvement of family/friends, discharge planning and reduction in problematic scores. Trust in nurses and recommendation of hospital	Overlap in styles across units, single –site, Hawthorne effect	Bedside visits are essential, role training may be important for improving certain areas

						went down in bedside group.		
Malec, Mork, Hoffman, & Carlson, 2017, The care team visit: Approaching interdisicplinary rounds with renewed focus, *Journal for Nursing Care Quality*. (Malec et al., 2017)	Quality improvement project to enhance rounding processes	Academic Medical Center; adult medical general care unit	At bedside, patient/family present, Team includes nurse, physician/NP/PA, case manager, pharmacist and others as needed. Nurse initiates, scripted with checklist to cover safety and goals, training of team members ahead of time	Quality improvement project- Pre-/post data collection, observations and survey	Patient satisfaction (HCAHPS), CAUTI/CLABSI rates, Foley and central line utilization, and nurse-other provider perceptions of collaboration in patient care decision-making (Collaboration and Satisfaction about Care Decisions survey).	Increased nurse and others ratings of collaboration, no difference in patient satisfaction scores, increase in CAUTI and CLABSI rates and central line, decrease in Foley catheter utilization.	Difficult to determine exact effect on clinical outcomes, single unit study at single hospital.	More work needs to be done around patient experience and care team visits.
Menefee, 2014, The Menefee Model for Patient-Focused Interdisciplinary Team Collaboration, *Journal for*	Performance improvement initiative to improve and redesign	1 hospital implementation	Nurse-led plan of care rounds, participation by all members of interdisciplinary team,	Performance improvement initiative, Not experimental design, Kotter's Model for Change	Daily review of plan of care, readmission rates, patient satisfaction	Daily reviewed increased and readmission rates, Increased patient satisfaction	One hospital	Model appropriate to continue rolling out, provides increased team collaboration

Nursing Administration (Menefee, 2014)	and interdisciplinary model for patient-focused care.		extensive team training			at 6 month mark and 12 month mark		
O'Leary at al., 2011, Improving teamwork: Impact of structure interdisciplinary rounds on a medical teaching unit, *Journal of Hospital Medicine*, (O'Leary et al., 2011)	Assess impact of structured interdisciplinary rounds (SIDR) on healthcare providers' ratings of collaboration and teamwork, as well as hospital LOS and cost	147/159 (92%) survey respondent rate, large tertiary care teaching hospital, general medicine units	Use of communication tool, nurses, residents, pharmacists social worker and case manager, conference room, co-led by nurse manager and medical director	Controlled trial of intervention unit with control unit, survey design	Survey assessed quality of communication and collaboration and the Safety Attitudes Questionnaire (SAQ), also assessed perceptions of whether SIDR improved efficiency, collaboration and patient care	Physicians perceptions of communication and collaboration similar, nurses had higher ratings, teamwork climate rated higher, safety climate no difference, majority thought SIDR improved efficiency and patient care, no significant difference in LOS or cost.	single intervention and control unit at one hospital, no assessment of improved teamwork on patient safety,	More work to be done on whether improved teamwork translates into high quality and safer patient care.
O'Leary et al., 2015, Effect of patient-centered	Evaluate patient-centered	4 non-teaching hospitalist	Intervention group: Nurse and	Cluster randomized controlled trial	Patient interviews with Control	PCBR had no impact on	Control unit still was doing a	Need more research on how to

bedside rounds on hospitalized patients' decision control, activation and satisfaction with care, *British Medical Journal* (Kevin J O'Leary et al., 2015)	bedside (PCBR) rounds on patient-centered care measures	units in large urban hospital, *n*=236 total patients, 122 control and 114 intervention unit	hospitalist at bedside with communication tool, initially coached on practice Control: structured interdisciplinary rounds in conference room		Preferences Scale, Patient Activation Measure and satisfaction. Post-discharge measures on patient satisfaction survey (2 HCAHPS questions). Survey of providers on their perceptions.	perceptions of shared decision-making, activation or satisfaction with care. Most nurses but only half of physicians felt PCBR improved communication. Less than half of nurses, physicians and advanced practice providers felt efficiency was improved	structured interdisciplinary approach,	optimally improve patient-centered care in the hospital. Interesting finding that minority of patients preferred an active role in decision-making.
Paradis, Leslie, & Gropper, 2015, Interprofessional rhetoric and operational realities: An ethnographic study of rounds in four intensive	Explore operational realities with ethnographic approach to multidisciplinary	Four intensive care units at academic medical centers, 576 hours of observation	Varied by unit, but typically hallway discussion, presentation by physician or nurse, teaching and verification	Ethnographic study using observation, shadowing and clinician interviews	Major themes derived from qualitative data	Rhetoric of MIR's improving interprofessional collaboration and patient care often thwarted by	Ethnographic approach produces large amount of data that had to be condensed for manuscript	Need for testing models of interprofessional rounds that aim to optimize interprofessional collaboration with minimal influence by

care units, Advances in Health Sciences Education, (Paradis et al., 2015)	interprofessional rounds (MIR) in the intensive care setting	, 47 shadowing session and 40 clinician interviews	of plan for day.			time constraints, space, and emphasis on medical education.		the identified operational realities.
Pritts & Hiller, 2014, Implementation of physician and nurse patient rounding on a a42-bed medical unit. *MedSurg Nursing*. (Pritts & Hiller, 2014)	Evaluate impact of nurse-physician rounding on improving collaboration	42-bed medical unit, rural community hospital; surveyed convenience sample of 26 registered nurses and 12 attending physicians.	Nurse-physician rounding; nurse notified when physician entered unit and would accompany for rounds at bedside	Pilot study; pre-post survey design	Collaborative Practice Scale-measures collaborative practices of physicians and of nurses in two subscales; National Database of Nursing Quality Indicators also used to measure nurse satisfaction with physicians, Press-Ganey for patient satisfaction	Some components of collaborative practice scores improved for nurses, but not physicians. NDNQI survey showed improvement. Press-Ganey item of how staff worked together improved post intervention.	Low response rate for both physicians and nurses. Difficult to tie outcomes solely to rounding intervention.	Potential area to explore is differences between BSN prepared and associate degree nurses and their effects on collaboration. Overall found nurse-physician rounding positive.
Sharma & Klocke, 2014, Attitudes of nursing staff	Explore the effect of a bedside	Tertiary care community hospital,	Hospitalist, bedside nurse and	Pre-post survey design	Survey created by authors for	Improvement in nurses' satisfaction with	single site, only surveyed nurses	Implementing interdisciplinary rounds is a potential

toward interdisciplinary inpatient-centered rounding, *Journal of Interdisciplinary Care*, (Sharma & Klocke, 2014)	rounding initiative on nurse perceptions of communication and interdisciplinary care	medical floor, surveyed 90 nurses with 67% response rate to pre & post	patient/family at bedside		purposes of study	communication and rounding with hospitalist providers after implementation, improvement in workflow, perceptions of value and job satisfaction also improved		solution to increasing nurse satisfaction on inpatient units
Shaughnessy& Jackson, 2015, Introduction of a new ward round approach in a cardiothoracic critical care unit. *Nursing in Critical Care*. (Shaughnessy & Jackson, 2015)	Evaluating new rounding approach with greater contributions from nurses	Critical care unit, British hospital	At bedside with nurse summarizing plan of care and using a checklist.	QI project-semi-structured interviews of staff, questionnaire to staff, observations	Questionnaires developed specifically for study-measuring nurse participation, effectiveness of new plan	Found increased nurse participation, checklist helped reduce omissions in conversation, increased confidence in communication between nurses and physicians,	Single unit study, not reliable/validated measures used for data collection	New process increased contributions from nurses and provide clarity for patient care, support for checklist.

						better clarification on plan of care		
Southwick et al., 2014, Applying athletic principles to medical rounds to improve teaching and patient care, *Academic Medicine* (Southwick et al., 2014)	Applied athletic principles to train and improve multidisciplinary rounding teams	Teaching hospital, trained team vs. untrained team, 1 unit	Faculty member, house staff, medical students, bedside nurses, pharmacists and a case manager-provided training on roles	two-phase pilot 11-month prospective trial comparing experimental and control rounding teams, survey-based study	Length of stay, 30-day readmission rates, physician, student and patient satisfaction	Duration of grounds improved in experimental group, no significant difference in length of stay, experimental group readmitted 30% fewer patients. Attendings, residents and mediclal students were overall more satisfied with rounding group	Only physicians, medical students and patient surveyed. All occurred on same unit. Many attending physicians did not adhere to recommendations	Interdisciplinary rounding may be an effective way to improve patient care, need to expand with bigger studies. Case managers may play a very important role in patient flow and reduction of hospital admissions.
Urisman, Garcia, & Harris, 2018, Impact of surgical intensive care unit	Evaluate impact of an IDR practice on collaboration and	32-bed medical surgical intensive care unit	Surgical team, charge nurse and bedside nurse. Presentation by resident	Pre-post survey based study	Participation in IDR, Nurse-physician collaboration measured by study specific	Achieved 81% participation in IDR; improved attitudes about the	Potential subjectivity in survey based study-response bias. Not same	Found overall positive impact of IDR as method to improve communication

interdisciplinary rounds on interprofessional collaboration and quality of care: Mixed qualitative-quantitative study, *Intensive and Critical Care Nursing*, (Urisman et al., 2018)	patient care outcomes		with follow-up input by nurse- not at bedside.		survey and rates of falls and self-extubations	quality of communication and higher satisfaction amongst nurses and physicians. Falls and self-extubations trended down, but not significant	questionnaire for nurses and physicians.	and patient outcomes.
Verhaegh et al., 2017, An exploratory study of healthcare professionals' perceptions of interprofessional communication and collaboration, *Journal of Interprofessional Care*, (Verhaegh et al., 2017)	Exploration of how practitioner perceive effective communication and collaboration during rounds	1,024 university teaching hospital in the Netherlands	Varied designs	Exploratory qualitative study	Focus groups with physicians, nurses and quality improvement members	Three major themes: structure of the medical round, decision-making and the patients' role. Sub-themes also identified	Single hospital may limit transferability of findings, no views from patients or other healthcare professionals.	Important to think about how all team members are involved in decision-making and how social and spatial structures affect communication.
Young et al., 2016, Impact of altered	Assessing impact of altered	VA Hospital—medical-	Bedside rounding-attending	Quality improvement--	Physician to nurse phone calls for	Physicians contacted nursing staff	Audited rounds only 17% of	Exploration of how scripting and open

medication administration time on interdisciplinary bedside rounds on academic medical word, *Journal of Nursing Care Quality*, (Young et al., 2016)	scheduling during interdisciplinary rounding on physician-nurse communication, teamwork climate and provider job satisfaction.	surgical unit	hospitalist, subspecialist or primary care physician with resident, intern, medical student	-rapid cycle improvement	initiating rounds, discharges before noon, RN-MD pages, provider survey measuring teamwork climate and nurse job satisfaction (adapted from existing tools).	85% of time, discharges before noon increased from 8.6% to 12.7%, non-significant decrease in page volume, mostly positive response from provider surveys	possible encounters, no control unit, no rigid scripting	structure can be combined for maximizing educational value, efficiency and collaboration amongst disciplines.

Chapter 4: Historical Perspectives Manuscript

A Historical Review of Nurse-Physician Bedside Rounding

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Abstract

The purpose of this article is to describe and analyze nurse involvement in hospital bedside rounding from 1873 through 1973. Interdisciplinary rounding is touted as a collaborative activity between nurses and physicians. Understanding the historical trends in nurse involvement in this process can shed light on the opportunities and barriers that clinical rounding presents today. This research was gathered using historical sources, both primary and secondary, and a social history framework. Primary sources included manuals for head nurses, nursing journals, and nursing student diaries.

Keywords: nursing history, bedside rounding, nurse–physician collaboration, interdisciplinary health care

In 1913, Dorothea Gothson, RN, expressed her opinion about some challenges nurses faced in making bedside rounds with physicians:

> The most important fact about the work at our hospital is that we are given a chance to be ready for the daily rounds and dressings. We know when the chief is coming and we can adjust our work accordingly. There is nothing more distressing to either patient or the earnest hardworking nurse than to be surprised by the attending doctors . . . . Equally annoying is the experience of patients and nurses being ready, waiting for the doctors and their not appearing for one or two hours after the appointed time—perhaps not at all—thus upsetting the order of the hospital.[1]

Her problems were not unique. Throughout much of nursing history, nurses were expected to adapt their schedules to accommodate physicians' needs when making bedside rounds. Today, as we strive toward interdisciplinary collaboration and away from a hierarchical health care structure, it's important to understand how nurses' perceptions of bedside rounding and their involvement in that process have evolved over the past century and a half to allow nurses to redefine the role they play in bedside rounding and achieve a more collaborative approach.

BACKGROUND AND SOURCES

The purpose of this analysis is to describe the nature and historical context of nurse involvement in bedside rounding from 1873 to 1973, thereby illuminating some of the challenges nurses and physicians face in implementing constructive, collaborative bedside rounding practices today.

Using historical sources, both primary and secondary, and a social history framework, this article addresses the following questions as they relate to various periods within this 100-year span:

- In what capacity did nurses participate in bedside rounding?
- What were the perceived goals of rounding?
- What was the perceived role of the nurse?
- What conditions or circumstances promoted or impeded nurse participation in bedside rounding?

Primary sources included manuals for head nurses and nursing journals of the various eras, with the peer-reviewed *American Journal of Nursing*, the world's oldest nursing journal, serving as a major source of nurse commentary on bedside rounding, because it has the most continuous and comprehensive archive in U.S. nursing literature, as most other U.S. nursing journals weren't launched until the second half of the 20th century. (In accordance with norms of the time, the terms *she* and *her* were used to reference nurses within the majority of this time frame, as nursing was—and largely remains—a predominantly female profession.)

THE HISTORY OF BEDSIDE ROUNDING

Medical education has long depended on bedside rounding. This tradition of teaching medical students in the wards formed the basis of medical students' education and was a source of pride for distinguished physicians. Sir William Osler, a renowned physician at Johns Hopkins School of Medicine in the late 19th and early 20th century, remarked, "I taught medical students in the wards, as I regard this as by far the most useful and important work I have been called upon to do."[2] While it's easy to understand that the medical education of physicians is rooted in rounding practices, the connection between bedside rounding and nursing practice is best understood

within the context of early hospital wards and the makeup of the nursing staff during the late 19th and early 20th centuries.

THE ERA OF OBEDIENCE

With the development of nursing schools in the United States after 1873, many hospitals relied on student nurses as a primary labor force. In fact, it was widely accepted that nurse "training schools" provided cheap labor to meet patient care needs.[3] With the exception of head nurses and a few operating room nurses, most graduate nurses left hospitals for work as private duty nurses—a trend that continued until the early 1930s.[4] The head nurse helped define the training experience of nursing students.[3] That training was rooted in strict rules and a military-like discipline, which would be embraced by many in the nursing profession well into the 20th century.[5] As an early popular nursing textbook explained, "The organization and discipline of the hospital resembles that of the army. The so-called military discipline may be criticized or by some condemned, but it must continue to hold sway, for the reason that in a hospital as in war *human life is at stake*."[6] The text goes on to stress the importance of "unquestioning obedience to superiors." Central to nursing education was a culture of deference toward physicians:

> To the doctor should be accorded the respect due a superior officer. Absolute loyalty must be given him, whether the nurse has confidence in him or not. She must not, by word or look, reveal to the patient any animosity which she may feel toward him or his methods; she may have misjudged him, and have reason later to change her mind. Whatever her personal opinion, it is not within the province of a nurse to criticize a doctor's ability or lack of it.

> The nurse should stand while speaking with a doctor or taking an order from him. She should follow, not precede him. She should not state to him her opinions, nor should she make remarks unless requested.[6]

The culture of obedience greatly influenced the way nurses viewed their role in the physicians' bedside rounding practices. In some respects, however, the military analogy allowed nurses to feel as though they had a higher status in the hospital structure.

> The physician was the commander, and the nurses were the lieutenants. But the analogy of the trained nurse as lieutenant also implied a significant amount of power. . . . She would . . . have the knowledge and the training. . . to take effective and immediate charge in the chaotic moments of the unexpected crises and emergencies that occurred in the absence of the physician commander.[7]

The military analogy with its strict hierarchy and protocols inevitably affected both nurse-to-nurse and nurse-to-physician communication. Head nurses expected nurses in lower positions to demonstrate a deference in communicating with them. Similarly, nurses were not expected to question physician orders.

BEDSIDE ROUNDS AND NURSING EDUCATION

In the early 1900s, hospitals functioned as training sites, with bedside rounds serving as educational activities for nursing students and new nurses. Head nurses took responsibility for

students' overall nursing education, as well as the delivery of patient care, and making rounds with physicians provided nursing students an additional learning opportunity. In 1923, Mary Power discussed this method of clinical instruction in the *American Journal of Nursing*:

> . . . let the pupils individually make rounds throughout the whole visit with the chief and his staff accompanied by the [nursing] supervisor. Make her [the nursing student] responsible for all questions by the chief. He may object to this at first but, as a rule, when he comes to know . . . [the] object [of the head nurse] he will not only agree to it, but will include . . . [the nursing student] in his instruction. The pupil in this way not only gets the actual knowledge transferred but catches the spirit of a great physician.[8]

THE HEAD NURSE'S ROLE IN BEDSIDE ROUNDS

From its inception in 1873, one crucial aspect of the head nurse's role was to accompany physicians during rounds, documenting new orders and notes about patient care. Bedside rounds were seen as part of the routinized system. Patients themselves recognized the different roles played by physicians and nurses. As one patient noted:

> The doctor, his assistant, and the head nurse go the rounds together just after breakfast. There is a certain order of procedure which is, I believe, invariable. The doctor raps, enters, shakes hands with the patient, sits down; the nurse stands at the foot of the bed, instruction book and pencil in hand. . . .[9]

While the head nurse's role in rounds was primarily supportive in nature, it was an important part of her job and was not to be interrupted. The following account describing a student's hesitance at interrupting rounds, even for what could have been a critical change in a patient's vital signs, demonstrates the importance head nurses placed on their involvement in bedside rounds:

> One morning a patient had just come down from the operating room. I thought her pulse was bad. The head nurse was having rounds with the doctors. I knew she'd be through in 10 minutes. . . . The last time I called her from rounds for what I thought was important, she scared me most to death, telling me never to do it again. I just couldn't decide. So I waited. The patient didn't die, but I got sent to the front office.[10]

During the early decades of the 20th century, head nurses were determined to receive the professional respect and recognition they deserved, which meant dedicating themselves solely to the physicians during rounds. From her position of power within the hospital, the head nurse focused with military discipline on obedience and streamlined efficiency.

As late as 1962, head nurses saw medical rounds as an opportunity for the nurse "to gain insight into the thinking of the medical group relative to the patient's care and prognosis."[11] But while the role of the head nurse in the mid-20th century had developed well beyond its humble origin, many head nurses still considered medical rounds a forum in which they could observe and learn, but not necessarily engage in the discussion of care planning.

NURSE PARTICIPATION IN BEDSIDE ROUNDS

A major part of nurse participation in bedside rounds involved making preparations for the physicians' arrival under the direction of the head nurse. As one *American Journal of Nursing* author noted in 1923:

> If the students have a time limit within which all beds must be made, in order that the ward may be swept before the time for rounds for physicians, the result will be clean, orderly wards and dignified medical and surgical rounds when all attention is focused on patients.[12]

The student nurses' role was thus largely ceremonial. They were meant to set the stage for rounds, take notes, provide assistance, and answer any questions posed by the physician, but they did not offer opinions or question physicians' judgments. However, despite the outwardly subservient position nurses held in the hospital hierarchy, according to some accounts, nurses and the nursing profession were gaining respect in the eyes of physicians. In one of his classic *Aequanimitas* addresses, William Osler described the nursing profession as having once been "unsettled and ill-defined," noting that it "took, under Florence Nightingale—ever blessed be her name—its modern position."[2] He later described nurses as "one of the greatest blessings of humanity, taking a place beside the physician and the priest, and not inferior to either in her mission."[2]

THE BUREAUCRATIZATION OF NURSING

An increasing professionalism in nursing created a need for more bureaucracy. As the role of head nurse became more clearly defined over the first two decades of the 20th century, head nurses and hospital administrators called for support from assistant head nurses. In 1931, Marian Rottman expressed her concerns:

> With increasing demands made on the head nurse, one woman can no longer be held responsible for the proper maintenance and upkeep of supplies and equipment and for nursing service on her ward. [T]he time has arrived for assistant head nurses…. [O]ne to administer and lend her cooperation to the frequent demands and "rounds" of the medical staff, the other should supervise nursing care and instruction of the patients . . . .[13]

Nursing was coming into its own as a profession, but an increasingly complex health care system made new demands on nurses.

BEDSIDE ROUNDS AND STAFFING ISSUES

During the early 20th century, nurses often made their own bedside rounds to ensure that all patients were receiving excellent care. Not only did head nurses make rounds when coming onto their shifts, but they also made rounds throughout the day for the purpose of clinical instruction. As nurses spent more time meeting the needs of physicians and medical students, often serving as chaperones during patient examinations, it became increasingly difficult for them to complete their own work in addition to the work expected of them by the physicians. In her 1933

American Journal of Nursing article, "Nursing and medical education: A study on the disposition of nursing time with reference to medical education," an RN named Blanche Pfefferkorn spoke out about the unrealistic demands imposed on nurses, given physician expectations, insufficiently sized nursing staffs, and erratic scheduling of clinics:

> To adjust nursing service needs to meet medical education needs, and at the same time to maintain good nursing standards, becomes practically impossible unless an *adequate staff* of nurses is provided, and clinics are scheduled in advance and carried out *according to schedule*.[14]

Medical students and staff often visited the wards during the morning, the busiest time of day for nursing services. As increasing numbers of medical students joined the hospital ranks, nurses had to be constantly vigilant of their activities in order to ensure patient safety.[14]

THE SHIFT FROM PRIVATE DUTY TO HOSPITAL NURSING

Hospital nursing underwent significant turbulence in the years following the onset of the Great Depression in late 1929. As work opportunities in private duty nursing dwindled in the early 1930s, graduate nurses increasingly sought employment in hospitals.[4] Hospital administrators found that they could employ experienced graduate nurses who "could manage the care of several patients, serve as head nurses on the ward, or care for the most seriously ill patients" for lower wages.[4]

The introduction of nursing aides also changed the hierarchy and power dynamics on the wards.[3] With the majority of nursing work performed or supervised by graduate nurses, rather than by students, the role of the nurse on the hospital ward was primed for a change.

EFFECTS OF WARTIME STAFF REDUCTIONS

World War II brought many challenges to the nursing profession, both in the military and on the home front. Hospitals, newly accustomed to employing registered graduate nurses, had to adjust to staff reductions as large numbers of nurses left the hospitals for military service. Some hospitals were forced to close wards, despite the fact that the beds were needed. A 1944 article in the *American Journal of Nursing* highlighted steps taken by one American hospital to adjust to wartime pressures: "We are living from day to day doing what we can to facilitate and improve the nursing service."[15] Some of the steps taken included adjusting salaries, reducing lengths of shifts, changing clinical teaching procedures, and adjusting policies for clinical procedures. As hospitals significantly reduced the number of general staff nurses and increased their reliance on nursing students, large numbers of RNs moved away from the patient's bedside and turned instead to supervisory roles for aides and LPNs (see Figure 1).

Cooperation from the medical staff eased the adjustment to wartime pressures for nurses. With the reduction in the numbers of graduate nurses and increased demands on nurses' time, physicians often conducted rounds without nurses.[15] In an attempt to improve efficiency, nursing participation in rounds gradually diminished during the 1940s. Later in the century, nurses would find it difficult to resume their involvement in that process.

POSTWAR MOVES TOWARD INTERPROFESSIONAL COLLABORATION

After the war, a thinly stretched and overburdened nursing workforce began to show signs of stress. With many nurses returning to their roles as homemakers and a growing discontent among nurses over nursing duties, those who remained advocates for the profession rallied for stronger nurse–administrative and nurse–physician relationships. Nursing leader Marguerite Manfreda wrote:

> We must recognize the staff nurse as a truly professional person and we must strengthen the interrelationship between the physician and the nurse…. I honestly believe that, because staff nurses have been thwarted in their attempts to achieve satisfaction of their innermost needs, they have become frustrated in their work and desire to escape from it.[16]

Historically, head nurses had accompanied physicians during bedside rounds. In the late 1940s, however, staff nurses were clamoring for a higher status on hospital wards and a return to greater interaction with their physician colleagues. Some nurse leaders advocated for a reorganization, in which RNs would assume direct responsibility for patients rather than reporting to a head nurse. In a 1947 *American Journal of Nursing* article, Constance White outlined the "group nursing" model, which had been introduced at a New Orleans infirmary, as follows:

> Each nurse is directly responsible for the care of her three patients. This means that she has direct contact with the patient's physician, can discuss the patient's

> care with him, accompany him on his rounds, and receive his orders directly…. [T]here is time for the nurse to give quality nursing to each patient, with the resulting satisfaction and pride that come with the knowledge of work well done.[17]

Nurse–physician collaborative efforts were described by Marguerite Manfreda as being mutually beneficial. To "have the responsibility of discussing these patients with the physician, making rounds with him, and in general working *with* him to provide the best care for the patient" was seen as a way to increase the nurses' status.[16] According to Manfreda, "the physician would come to know the real value and contribution of staff nurses, and the patient, in turn, would have higher regard for them."[16] While much nursing discontent at the time surrounded salary and hours, advocates like Manfreda argued that recognition as a professional nurse was the only way to produce a generation of satisfied nurses.

EFFECTS OF SEX-BASED STEREOTYPES

While roles for women were changing rapidly in the postwar United States, the majority of the nursing workforce was still primarily female, while physicians were typically male. In fact, nearly 98% of the nursing workforce was female in 1950.[18] Meanwhile nurses were beginning to question their role in relation to the physician. Writing in the *American Journal of Nursing* in 1947, one student nurse made her position clear:

> The respect given doctors has been overdone. In the first place, it's unnatural to treat a fellow worker like a god. Courtesy is desirable at all times, but … [w]hy should busy nurses have to attend doctors routinely on the floor? During the war

> in one hospital, the doctors were told to request a nurse if they needed one to help with an examination. If they were just making rounds… the nurse was not expected to accompany them. Someplace along the way a compromise must be made. . . .[19]

By the middle of the 20th century, it was apparent that working conditions needed to improve in order for the nursing profession to attract the type of women it needed. This idea laid the groundwork for recognizing the contribution of nurses as valuable members of a health care team.

THE HEAD NURSE: LINK BETWEEN NURSE AND PHYSICIAN

By the mid-1950s, the head nurse had resumed her early 20th-century role as the link between hospital physicians and nursing staff. In 1954, Helen Graves explained the importance of the head nurse's role in the *American Journal of Nursing*:

> When she makes rounds with the doctors, she has an opportunity to learn about the medical plan of care and how it is to be carried out. She is often called upon to interpret the plan to the patient or reinforce the plan. In turn she is expected to interpret to the doctor the patient's problems, as the nursing staff have noted them, and thus help the doctor to develop better medical care plans.[20]

Nurses were aware that communication with physicians was critical to good patient care and that information obtained on rounds allowed the head nurse to make administrative adjustments for the staff she supervised.[21]

TEAMWORK FOR BETTER QUALITY CARE

The growing focus on improving patient education provided new opportunities for nurses to participate in rounds. In 1953, Virginia Streeter interviewed nurses to determine which factors they felt inhibited effective patient teaching. According to Streeter, "[A]lmost all nurses interviewed expressed difficulty in teaching because they did not know what the doctor wanted taught."[22] Patient rounds were seen as an opportunity to increase nurse–physician communication, even if it was a one-way process, with the physician speaking and nurse listening. At the very least, such teamwork helped nurses gain clarity on the most appropriate educational content to impart to patients.

With rapid medical advancements and a growing ancillary workforce, nurses began to understand and accept that "team nursing" might be the best means of providing quality patient care.[23] Using this approach, the ward staff at some nursing schools began to assemble themselves into teams of nurses, ancillary staff members, and nursing students. Senior nursing students served as "team leaders."[24] One "nursing intern" remarked on her participation in the clinical rounds, noting:

> Making rounds with the doctors helped me to understand the plan of care for the patients, and I learned what to teach the patients, and consequently I was better prepared to do an effective job. I found the patients more receptive to my

> teaching, too, since they were aware that I knew exactly what the doctor wanted them to do.[24]

While her account reveals the hierarchical hospital structure in which nurses were viewed as nonautonomous caregivers, it also demonstrates that nurses and physicians participating in the rounding process together could improve patient care.

In the 1950s, nurses invited social workers to join the team. It was becoming increasingly clear that interdisciplinary rounds promoted interdisciplinary teamwork. Writing in the *American Journal of Nursing* in 1955, Minna Field, a social worker, noted:

> Where the group making medical-social rounds includes the nurse as well as the physician and social worker, these members of the three professional groups are seen by the patient as a team, all of whom are equally concerned with his progress. Problems which are upsetting to the patient can be aired, a joint evaluation of these problems achieved, and the necessary steps taken to mitigate them.[25]

As Field explained, integration of all disciplinary perspectives was necessary to achieve comprehensive patient care:

> If the team approach is to accomplish what it is designed to do, it must be based on a give-and-take relationship among the members of these groups who have an understanding of each other's function and specialized skills as well as respect for

> each other's competence. As our skills in the use of such relationships increase and as we gain better understanding of each other's roles we will be able to work together with ever-increasing effectiveness, utilizing to the fullest the contribution each profession can make toward the ultimate goal of teamwork—the patient's welfare.[25]

A NEWFOUND RESPECT FOR NURSING

By the 1960s, nursing had carved out its place in the world of modern health care alongside other health care disciplines. In 1970, the American Medical Association (AMA) released a position statement acknowledging the significance of nursing as a primary component in the delivery of health care, recognizing that nurses had taken on additional responsibilities and technical procedures formerly carried out by physicians and noting that increased administrative demands on nurses were disruptive to the nurse–physician relationship:

> The AMA supports the additional concept that the professional nurse should share authority with the physician. The nurse contributes to management decisions in patient care, carries out those decisions in the nurse's sphere of competence, takes responsibility and authority for nursing care of the patient, and makes decisions in the nursing aspects of the patient's care within the overall patient-care context agreed upon. The nurse, therefore, can take a logical place at the physician's side when associated with him in patient-care responsibilities.[26]

Ironically, there are suggestions that the newfound respect for the nursing profession may have reduced the participation of nurses in rounds. A 1971 editorial by Thelma Schorr in the *American Journal of Nursing* offers insight into the status of nurse–physician bedside rounds at the time.[27] Schorr advocated for collaborative nurse–physician rounds and expressed concern that the workforce had moved too far away from the tradition:

> Making rounds with the attendings. It's been a long time since we've heard that eminently useful activity mentioned unself-consciously. We suspect that there is a whole generation of young nurses and physicians who never had the opportunity to go on rounds with the head nurse and the attending physician, to stop with them at every patient's bedside, to hear them discuss, evaluate, and revise his care and treatment *together*, without worrying too much about professional boundaries. If ever there was an opportunity for collaborative thinking for the patient's good, making rounds together provided it.[27]

Schorr went on to discuss the challenges of making interdisciplinary rounds, noting that there were physicians who ignored nurses, interns, and even patients for that matter. She also pointed out that there were nurses who exercise "the power of their negative martyrdom" and called for moving on from this stance:

> It's time we stop pandering to their weaknesses and start serving our own strengths. If the intellectual energy that has been spent deploring the handmaiden

> attitude and pleading for collaborative *status* were put into collaborative *effort*, the health care system might not be in the sorry state it is today.[27]

After discussing the risks of confining nurses to an inflexible system of standing orders and dependent functioning, Schorr went on to advocate for rounds writing: "Collaborative rounds, we submit, inside or outside the hospital, is a way of safeguarding against that risk. A doctor knows best about some things, but the nurse knows better about others. The patient deserves the kind of collaboration that assures him the best of both disciplines."[27]

Schorr's statements indicate that, with the increased emphasis on professionalization in nursing after World War II, nurses may have avoided participating in traditions, such as rounding, that harked back to the notion that nurses were assistants to physicians. Schorr indicated that nurses needed to redefine their role in the bedside rounding process if they were to provide excellent care to their patients and work to the full potential of their professional role. Her insights on rounding, and those of others representing nursing leadership in years past, may help us shape a more collaborative, interdisciplinary rounding process going forward.

BEDSIDE ROUNDING: 21ST-CENTURY CHALLENGES

Nurse–physician collaboration in patient care and delivery underwent several transitions over the course of the 19th and 20th centuries, the examination of which may offer us insight into the challenges still encountered during bedside rounding. While the American health care system has evolved into one that incorporates an interdisciplinary team approach, remnants of its patriarchal, rigidly hierarchical roots may still be seen in the relationship between physicians and nurses and in the increasingly outdated images representing physicians as predominantly male and nurses as

inevitably female. With nurses historically put in a subordinate position to physicians, efforts to promote collaboration often present challenges.

Today, however, there is a pervasive call for increased interdisciplinary collaboration at the bedside as a means of improving quality and safety in patient care.[28, 29] Analyses of the Joint Commission's Sentinel Event database have consistently shown that "[i]nadequate communication between care providers or between care providers and patients [or their] families is consistently the main root cause of sentinel events."[30] Health care leadership and practitioners are thus challenged to improve communication among providers, which requires them to identify the impediments to quality communication.

Nonhierarchical, collaborative rounding, in contrast to the physician-centric rounding of the past, may be a means by which to promote clear communication, increased collaboration, and improved quality of care. It has been shown to reduce mortality, medication errors, hospital length of stay, and hospital costs; improve staff and patient satisfaction; expand the health care team's understanding of the patient's plan of care; and increase both efficiency and perceptions of patient safety.[28, 31, 32]

With a tradition so steeped in physician education and lingering sex-based stereotypes, it's easy to see why nurse participation in bedside rounding may have been perceived by some as reinforcing regressive role identities. Understanding the historical and existing barriers to effective collaboration and communication in the rounding process is a critical first step to implementing progressive reform.

Figure 1. Staffing Changes on an American Hospital Unit between December 1941 and April 1944.[15]

PROFESSIONAL NURSING AND AUXILIARY NURSING PERSONNEL

	1941 DECEMBER	1942 DECEMBER	1944 APRIL
General staff nurses	176	92*	74
Student nurses assigned to hospital wards, exclusive of preclinicals	79	92	169
Postgraduate students	0	10	8
Licenced practical nurses	45	53	42
Ward secretaries	10	14	16
Paid aides	53	35	32
Orderlies and male attendants	36	15	13
Red Cross nurse's aides	0	73	104
Men volunteers	0	10	78
Women volunteers	83†	251	320†

* 137 per cent turnover in 1942.
† Estimated.

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REFERENCES

1. Gothson D. Ward dressings. *Am J Nurs* 1913;13(7):511-13.
2. Osler W. *Aequanimitas, with other addresses to medical students, nurses and practitioners of medicine*. 3rd ed. New York: Blakiston Division, McGraw-Hill Book Company, Inc.; 1932.
3. Reverby SM. *Ordered to care: the dilemma of American nursing, 1850-1945*. Cambridge, UK; New York, NY: Cambridge University Press; 1987. Cambridge history of medicine.
4. Keeling AW, et al. *History of professional nursing in the United States: toward a culture of health*. New York, NY: Springer Publishing Company; 2018.
5. Winslow GR. From loyalty to advocacy: a new metaphor for nursing. *Hastings Cent Rep* 1984;14(3):32-40.
6. Goodnow M. *First-year nursing: a text-book for pupils during their first year of hospital work*. 2nd ed. Philadelphia, PA: W.B. Saunders; 1916.
7. D'Antonio P. *American nursing: a history of knowledge, authority, and the meaning of work*. Baltimore, MD: Johns Hopkins University Press; 2010.
8. Power MS. Clinical teaching in schools of nursing. *Am J Nurs* 1923;23(5):383-5.
9. M.E.R. In hospital. *Am J Nurs* 1901;1:8-14.
10. Richards EL. Mental hygiene and the student nurse. *Am J Nurs* 1928;28(2):159-69.
11. Barrett J. *The head nurse*. New York, NY: Appleton-Century-Crofts; 1962.
12. Hilliard A. Hospital standardization. *Am J Nurs* 1923;23(7):585-90.
13. Rottman M. The role of nursing service in the promotion of the medical administrative aims of the hospital. *Am J Nurs* 1931;31(4):480-4.
14. Pfefferkorn B. Nursing and medical education: a study on the disposition of nursing time with reference to medical education. *Am J Nurs* 1933;33(12):1188-92.
15. Editors. A nursing service adjusts to wartime pressures. *Am J Nurs* 1944;44(6):537-40.
16. Manfreda ML. Money isn't everything. *Am J Nurs* 1947;47(2):80.
17. White C. Group nursing. *Am J Nurs* 1947;47(9):596.
18. D'Antonio P, Whelan JC. Counting nurses: the power of historical census data. *J Clin Nurs* 2009;18(19):2717-24.
19. Student Nurse. Nursing school: a disillusioning experience. *Am J Nurs* 1947;47(5):292.
20. Graves HG. Head nurses are key people. *Am J Nurs* 1954;54(5):572-4.
21. Kane B. A head nurse looks around. *Am J Nurs* 1951;51(10):598-601.
22. Streeter V. The nurse's responsibility for teaching patients. *Am J Nurs* 1953;53(7):818-20.
23. Abdellah FG. Methods of identifying covert aspects of nursing problems; a key to improved clinical teaching. *Nurs Res* 1957;6(1):4-23.
24. Swiss MT. The nursing intern and the team plan. *Am J Nurs* 1952;52(2):221-2.
25. Field M. The nurse and the social worker on the hospital team. *Am J Nurs* 1955;55(6):694-6.
26. American Medical Association, Committee on Nursing. Medicine and nursing in the 1970s: a position statement. *JAMA* 1970;213(11):1881-3.
27. Schorr TM. Roles and rounds. *Am J Nurs* 1971;71(8):1529.
28. Ashcraft S, et al. Interprofessional clinical rounding: effects on processes and outcomes of care. *J Healthc Qual* 2017;39(2):85-94.
29. Malec A, et al. The care team visit: approaching interdisciplinary rounds with renewed focus. *J Nurs Care Qual* 2018;33(2):135-42.

30. Joint Commission. *Improving America's hospitals: the Joint Commission's annual report on qauality and safety*. Oakbrook Terrace, IL; 2007 Nov. https://www.jointcommission.org/assets/1/6/2007_Annual_Report.pdf.
31. Curley C, et al. A firm trial of interdisciplinary rounds on the inpatient medical wards: an intervention designed using continuous quality improvement. *Med Care* 1998;36(8 Suppl):AS4-12.
32. Gausvik C, et al. Structured nursing communication on interdisciplinary acute care teams improves perceptions of safety, efficiency, understanding of care plan and teamwork as well as job satisfaction. *J Multidiscip Healthc* 2015;8:33-7.

Chapter Five: Results- Quantitative Findings

Interdisciplinary Rounding Design Features and Associations with Collaboration, Effectiveness and Patient Experiences

Target Journal: *Journal of Interprofessional Care*

Abstract:

Multiple models of interdisciplinary rounding (IDR) exist. However, research shows mixed effects for their impact, pointing to the possibility that variations in design may impact the effectiveness of the practice. This study explored whether design variations (location, use of script and who leads the rounds) are associated with team collaboration (partnership and cooperation), team effectiveness and patient experiences. A cross-sectional, survey-based method design was used targeting practitioners on 15 different hospital units at two academic health centers. Routinely collected HCAHPS scores were used to capture patient experiences. Statistical analysis included multilevel modeling with moderation. The role of the leader had a significant impact on cooperation. Units with nurse-led and shared-led rounds demonstrated higher levels of cooperation than those with physician-led rounds after controlling for age and hospital. The role of leader remained significant when included in a model controlling for age, hospital, location and script. In this model, use of a script also had a significant positive association with cooperation. Cooperation moderated the relationship between location and team effectiveness and leader role and team effectiveness as well. Script was also associated with higher levels of team effectiveness after controlling for age, hospital and the interaction with cooperation. There was a significant inverse relationship between cooperation and patient inclusion. Results add to the body of literature on IDR and raise new questions for future exploration.

Interdisciplinary Rounding Design Features

The complexity of patient care and the focus on outcomes across delivery sites necessitates collaboration from a diverse group of practitioners (Nester, 2016). Interdisciplinary collaboration is when two or more healthcare professionals from different disciplines share accountability and develop an interdependence on each other for delivering patient care (Reeves, Xyrichis, & Zwarenstein, 2018). Improving interdisciplinary collaboration leads to better outcomes for patients, teams, and organizations (Baker et al., 2006; Kara, Johnson, Nicley, Niemeier, & Hui, 2015; Lemieux-Charles & McGuire, 2006; Rosen et al., 2018). To address the changing landscape, new practice models are being developed in all areas of healthcare aimed at improving interdisciplinary collaboration (Stein et al., 2015; Zwarenstein, Goldman, & Reeves, 2009). Consequently, healthcare leaders are primed for studying and instituting innovative changes that help promote diversity of ideas when developing plans of care.

Interdisciplinary rounding (IDR) is one intervention commonly studied as a mechanism to improve collaboration on hospital inpatient units (Mercedes, Fairman, Hogan, Thomas, & Slyer, 2016; O'Leary, Sehgal, Terrell, & Williams, 2012; Stein et al., 2015). IDR involves multiple healthcare practitioners, to include physicians, nurses, social workers, pharmacists and case managers, gathering face-to-face to discuss a patient's plan of care. Traditionally, rounds were part of the physician's domain and often considered a quintessential component of medical education (Gonzalo et al., 2010). However, in today's era of emphasis on team-based care, interdisciplinary rounds have garnered renewed focus as the hub of collaboration on hospital units (Mercedes, Fairman, Hogan, Thomas, & Slyer, 2016). Despite this focus, there is still minimal evidence as to what constitutes best practices for IDR. The research described in this paper seeks to help close that gap.

Background

Multiple studies have measured the effect of IDR on various patient outcomes. The evidence is mixed. Several researchers found associations between IDR and decreased length of stay, urinary tract infections and other quality measures (Arora et al., 2014; Curley et al., 1998; Kim et al., 2010; O'Mahony et al., 2007; Southwick et al., 2014; Yoo et al., 2014). In contrast, Pannick et al.'s 2015 systematic review concluded that IDR had little effect on measures of quality care. Conflicting results on IDR's association with improved patient satisfaction or experiences also exist. Gonazlo, Chuang, Huang, and Smith (2010) found improved patient satisfaction associated bedside IDR while others found no difference (O'Leary et al., 2015; Ramirez et al., 2016). The inconclusive results found in the literature provide evidence that more research is needed on how IDR affects patient outcomes.

In addition to patient outcomes, studies have been conducted on IDR and the association with practitioner satisfaction and perceptions of teamwork. Multiple studies found IDR interventions resulted in increased teamwork climate and safety attitudes (Gausvik et al., 2015; Henkin et al., 2016; Young et al., 2016). Similarly, practitioners reported satisfaction and increased perceptions of collaboration when IDR was in place (Malec et al., 2017; Sharma & Klocke, 2014; Southwick et al., 2014). Limitations of these studies include that most were single-site studies that compared the presence of an IDR practice against a control unit or used a pre/post study design. Additionally, studies vary in whether they include all the design features for IDR such as location, who leads the rounds and whether it is a scripted discussion or not. In fact, there is little or no guidance on how to design IDR to maximize its positive impact (Hendricks et al., 2017; Lane et al., 2013).

The three design features most often described and therefore included in this study are location, use of script and who leads the rounds. Location is a physical design feature while use of a script and leader role are procedural. There are several variations of location where rounds take place. Rounds may occur in the hallway where teams are outside a patient's room or at a central station. A second rounding location is a conference room (Stickrath et al., 2013). The third variation seen is dual/bedside where rounds typically involve a brief hallway conversation by the team and then there is additional discussion with the patient and family at the bedside (Gonzalo et al., 2010).

The second design feature assessed was the use of a script. Some teams use a script or checklist that outlines exactly what each discipline should contribute. For example, a nurse may be responsible for addressing pain control, fall risk, mobility, vaccine status and the patient's goals of care. Other teams may not use a script and disciplines contribute as they feel necessary (Lane et al., 2013; Paradis et al., 2015).

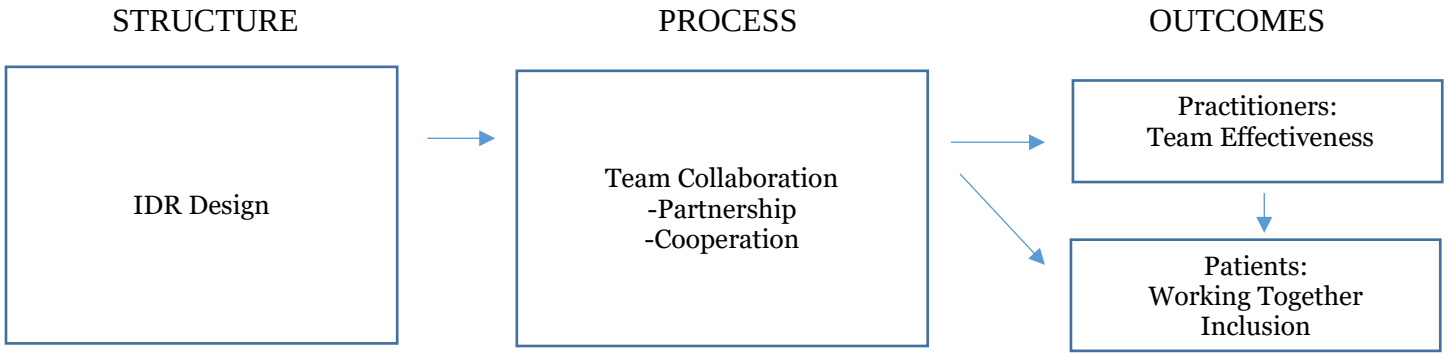
The third design feature assessed was who leads IDR. The leader is the person who helps initiate the rounds and organizes the team to be sure the right people are present. The leader of rounds typically helps manage the flow of the discussion and controls when the conversation should move on to the next patient. The leader may be a licensed independent practitioner (physician or nurse practitioner), a nurse, or the role can be shared between more than one discipline to include social workers, therapists, pharmacists and case managers (Bhamidipati et al., 2016; Lane et al., 2013; Menefee, 2014; Stein et al., 2015).

Conceptual model

The conceptual framework guiding the study is adapted from Donabedian's Structure, Process, Outcomes model and Gittell's Relational Coordination Theory (Donabedian, 1966,

1978, 1980; Gittell et al., 2000). Donabedian's work provides a linear way to assess the quality of healthcare delivery as outcomes are impacted by process and that process relies on the structure in which it occurs. Relational coordination theory adds to Donabedian's model by specifying high performance work practices, such as cross functional meetings (e.g., IDR) that lead to more collaborative processes between team members (Gittell & Suchman, 2011). **Figure 1** illustrates the conceptual framework guiding this study.

Figure 1. Interdisciplinary Rounding Design Model of Structure, Process, & Outcome



In the model, IDR is a structural mechanism that has multiple design variations that may impact elements of team collaboration such as partnership and cooperation. Given the recent emphasis on increasing patient participation, patient centeredness and improving experiences, it was deemed important to consider collaboration as occurring not only between practitioners, but with patients as well (Batalden et al., 2016). The outcomes of interest for practitioners is the effectiveness of the team and for patients, their experience of seeing the team work together and being included in care decisions. IDR's effect on practitioner and patient outcomes is moderated by team collaboration.

Methods

Design

A cross-sectional study was used to address the three specific aims to examine: 1) the association between selected IDR design features and team collaboration, 2) the association between selected IDR design features, team collaboration and practitioner experiences, and 3) the association between selected IDR design features, team collaboration, practitioner experiences and patient experiences. Observational field research completed by the principal investigator (PI) confirmed IDR design features present on the participating inpatient units. Team collaboration and practitioner experiences of effectiveness were measured with web-based surveys for practitioners on hospital units with IDR. Patient experience data was extracted from routinely collected unit performance data. The study took place from October 2017 to July 2018.

Sample/Setting

A convenience sample of fifteen adult hospital units from two large, academic health centers was used for the setting of this study. Units that could identify a prevailing, structured IDR practice were invited to participate. Table A displays the IDR design features present on each unit. Approvals from both institutions' Institutional Review Boards were received prior to conducting the study.

The hospital units selected for the study included general medicine, neurosurgery/neurological, cardiology, vascular surgery, comprehensive/progressive medicine, bone-marrow transplant, organ transplant, orthopedics/trauma, and bariatric medicine/surgery. The hospital units ranged in size from 14 to 34 hospital beds with an average size of 26 beds. Intensive care and specialty units (i.e., pediatrics, operating room, labor and delivery) were not included due to their unique unit dynamics such as lower nurse to patient staffing ratios.

Participants included physicians, nurses, pharmacists, social workers, case managers and other health professionals (i.e. physical and occupational therapists) who in the last month had participated in IDR and spent the majority of their working hours on a specific unit.

Table A. IDR Design by Unit

Unit	Location	Leader of Rounds	Use of Script
A	Dual/Bedside	Shared*	No
B	Conference Room	Shared	No
C	Hallway	Shared	No
D	Conference Room	Nurse	Yes
E	Conference Room	Physician/NP	Yes
F	Conference Room	Shared	No
G	Conference Room	Shared	No
H	Dual/Bedside	Physician/NP	Yes
I	Conference Room	Nurse	No
J	Dual/Bedside	Shared	Yes
K	Dual/Bedside	Physician/NP	No
L	Conference Room	Nurse	No
M	Hallway	Nurse	No
N	Dual/Bedside	Physician/NP	No
O	Dual/Bedside	Shared	Yes
Total	**Dual/Bedside (6)** **Conference Room (7)** **Hallway (2)**	**Shared (7)** **Physician/NP (4)** **Nurse (4)**	**Yes (5)** **No (10)**

*Shared leadership indicates rounds were facilitated by a nurse and a physician or another practitioner. In some cases, social work led rounds along with a charge nurse.
NP= Nurse Practitioner

Measures

The following section provides an overview of each construct, the corresponding variable, measures/tools, and sources of data (See Table B).

Table B. Construct, Variables, Measures and Source of Data			
Construct	**Variables**	**Measure/Tools**	**Source**
IDR Design -Physical -Procedural	*Physical*- Location *Procedural*- Use of Script Leader	PI field research: IDR Design Checklist (see appendix A)	Correspondence with hospital unit nurse managers Observations on each hospital unit
Team Collaboration	Partnership Cooperation	Assessment of Interprofessional Team Collaboration Scale II-subscales (appendix C)	Healthcare practitioners
Patient Experiences	Inclusion Working Together	HCAHPS* Patient Experience Survey	Patient experience data-aggregated to hospital unit level
Practitioner Experiences	Team effectiveness	Primary Care Team Dynamics Survey-subscale (appendix D)	Healthcare practitioners
Demographics/ Control Variables	Practitioner role Age Gender Time in Role	Demographic descriptive questions on survey (appendix B)	Healthcare practitioners
	Hospital	Hospital A vs. Hospital B	PI Recorded
*Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)			

Field Research. The PI corresponded with nurse managers of each unit to verify the status of the three IDR design features on the units at the beginning of the study. Additionally, the PI conducted a series of observations of IDR before, during, and at completion of the survey administration period on each unit to verify the design was present as reported. Each hospital unit received an identifying number serving as a cluster variable for analysis.

Practitioner Survey: Demographics. Demographic information included identification of their practitioner role (i.e., nurse, physician, pharmacist), age, race/ethnicity, gender, time on unit and time in role.

Team Collaboration. Subscales from the Assessment of Interprofessional Team Collaboration Scale (AITCS-II) were selected to measure team collaboration (Orchard et al., 2012). The 23-item survey measures respondents' level of agreement using a 5-point Likert-style scale ranging from 1 = never to 5= always. The scale consists of three subscales: partnership (8 items), cooperation (8 items) and coordination (7 items). Scores can be averaged overall and by subscale for analysis. For the purposes of this study, only the average scores for the partnership and cooperation subscales were used.

Team Effectiveness. Team effectiveness was measured by a subscale from the Primary Care Team Dynamics Survey (Song, Chien, et al., 2015). The 5-item subscale is part of a larger survey that was validated in the Primary Care setting but is general enough to apply to the inpatient setting.

Hospital Consumer Assessment of Healthcare Practitioners and Systems (HCAHPS). Data capturing patients' experiences were obtained from routinely collected data. A randomized sample of patients are surveyed post-discharge from each hospital unit. Data from two survey items were extracted and summarized for the study period. The items were: *staff effort to include you in decisions about your treatment* (inclusion) and how *staff worked together* (working together). Patients rated their experiences on a five point Likert-style scale with 1= very poor and 5 = very good. Since patient experience scores are generally high, a "top box" score representing the percentage (0-100%) of respondents that selected the highest score (5 = very good) was used. For the purposes of analysis, the top-box percentage score will be treated as a continuous, numerical variable.

Data Collection and Analysis

To maximize recruitment, a three-phase follow up sequence to maximize the response rate as outlined by Dillman (2000) was implemented. Practitioners were sent: 1) a pre-notification email before the survey, 2) an email with the survey invitation and link, and 3) reminder emails at seven and fourteen days. Additionally, the PI spoke about the study at hospital unit staff meetings as well as posted flyers in common areas as permitted. All of the surveys were anonymous with no identifying information.

After data screening and cleaning (i.e., removing cases with missing values, assigning labels, examining for outliers), descriptive statistics were computed for the sample. Continuous variables were summarized using mean and standard deviation. Categorical variables were summarized with frequencies and percentages. To assess between-unit comparisons, analysis of variance (ANOVA) was used for continuous data and Fisher's exact test for categorical data. Fisher's exact test is recommended when the expected cell count may be fewer than five. The sample size was low (n=15) when aggregated to the unit level. Fisher's exact test is more appropriate for small samples as opposed to Chi-Square test (Kim, 2017). Following this, Cronbach's alpha was computed for each of the dependent variables to determine reliability of the subscales (partnership, cooperation, and team effectiveness). All analyses were performed in the statistical platform R (version 3.4.0) (R Core Team, 2013).

The first specific aim was to examine the association between IDR design features and team collaboration. For this aim, multilevel modeling (MLM) was used to examine the association between IDR design features (level-2, fixed-effect, independent variable) and the two elements of team collaboration (level-1, dependent variable). The multilevel package in R was used with maximum likelihood estimation. Maximum likelihood is recommended when group

sizes (in this study, responses from hospital units) are unequal (Snijders & Bosker, 2012). Assumptions for MLM including: multicollinearity, linearity, homogeneity of variance and normality, were verified during the analysis (see appendix F). Each of the three design features were included in a separate model along with the controls (level 1: age, gender, and time in role, level 2: hospital) to assess their association with both elements of team collaboration (partnership and cooperation). While the hospital is conceptually a level-3 variable, with only two hospitals in this small sample, it was included as a fixed effect level-2 variable. To achieve a parsimonious model only control variables that were significantly associated with the dependent variable at a p-value less than 0.25 were selected for the final MLM where all three design features were included to determine associations with team collaboration (Hosmer & Lemeshow, 2000).

The second specific aim was to examine the moderating effect of team collaboration between IDR design features and team effectiveness (practitioner experience). These associations were examined using the same steps as for aim 1. Specifically, the associations between each IDR feature and practitioner experiences (level-1, dependent variable) were evaluated while the elements of team collaboration were modeled as moderators using interaction terms while controlling for significant level-1 and level-2 variables. Analyses for both specific aim #1 and #2 were conducted at the individual level. Assumption testing was conducted to verify that MLM was the most appropriate method for addressing this specific aim (see appendix G).

Because the analyses for aim 2 used interaction terms to test for moderating effects second aim, partnership and cooperation variables were grand-mean centered to test for their interactions with the IDR design features. With grand mean centering, the overall mean is subtracted from each observation (Bleise, 2016). The resulting intercept term represents

between-group variance after controlling for level-1 variables (Hofmann & Gavin, 1998). Bleise (2016) recommends grand-mean centering when using interaction terms in the models as is the case for this second specific aim (Bliese, 2016). For more information see Notes on Centering in appendix H.

The third specific aim was to examine the association between IDR design features, team collaboration, practitioner experiences and patient experiences. Specifically, this aim assessed the association between 1) IDR design features and patient experiences, 2) team collaboration and patient experiences and 3) practitioner experiences and patient experiences. Each of the associations was addressed to gain a more complete understanding of potential influences on patient experiences. Because the data for patients' experiences were collected as aggregated data at the hospital unit level, statistical appropriateness for aggregating team collaboration and practitioner experience scores to the unit level was assessed by calculating the within-group interrater reliability, intra-class correlation (ICC1) and the reliability of the unit mean (ICC2) (James et al., 1984; Klein & Kozlowski, 2000). Due to the limited number of clusters (the 15 hospital units), descriptive statistics [i.e., mean, standard deviation (SD) or median (IQR) for continuous variables and frequency and percentage for discrete variables] were calculated and compared to broadly explore the associations. The data for team collaboration, team effectiveness and patient experience were found to have normal distributions despite the small sample size. The Shapiro-Wilk test was used to numerically verify normality (Razali & Wah, 2011). To test the association between IDR design features and patient experiences, analysis of variance (ANOVA) was selected. The data met the additional assumptions for a one-way ANOVA with independent groups and a continuous dependent variable. Homogeneity of variance was addressed after analysis with Levene's test and the assumption was met. To test the

association between both team collaborative and team effectiveness with patient experiences, assumptions for Pearson correlation coefficient were assessed for and met to include continuous variables, normality, linear relationships and no influential outliers (Kellar & Kelvin, 2013).

Results

Field Research

Observations of IDR practices across the fifteen units revealed similar structures and team membership. The typical team membership included a physician and/or nurse practitioner (NP), a nurse, clinical coordinator or charge nurse, pharmacist, social worker and case manager. On the orthopedic unit, physical therapy and occupational therapy were also included. On all units, residents, medical students and nursing students also participated in rounds. All of the IDR practices observed were held in the morning. Units varied by how they scheduled or notified the start of rounds. For units with conference room rounds, nurses typically rotated in to present their patients. On units with hallway rounds, the team went from room to room in numerical order and started when the team gathered at one end of the unit at a designated time. One unit with dual/bedside rounds assigned times for each patient according to nurse assignments. On multiple units, the physician or the charge nurse would call the staff nurse assigned to the patient when they were ready for discussion at the bedside. For the majority of the IDRs practices were consistent for each unit across the three observations. Although there were a few cases for the hallway and/or dual/bedside rounds where nurses were unable to join the discussion and therefore the charge nurse or clinical coordinator stepped in. The format of discussion typically included a presentation of the patient with follow up discussion by the team. Units with scripted formats had all disciplines contribute. On units with less structured formats, all disciplines were

not actively participating in the discussion. No matter how rounds were led, the leader did ensure that discussions about patient care remained targeted and efficient.

Characteristics of the Respondents

Of the 218 practitioners that responded to the surveys, 174 responses (average of 11.6/unit) had no missing data and therefore were included in the analyses. Descriptive statistics for age, gender and race are presented in Table C and descriptive statistics related to roles and experience are presented in Table D. The majority of the respondents identified themselves as white and female, 84% and 89% of the sample respectively. The average age was 36 years old. Over half (67%) of the respondents were nurses while 7% were case managers or social workers, 12% were licensed independent practitioners (LIP: interns, residents, fellows, attending physicians, and nurse practitioners), and 13% identified themselves as *other* (pharmacists, physical or occupational therapists and respiratory therapists). Fifty-five percent had less than or equal to five years of experience in their role, and 71% had been on their unit for less than five years.

Table C. Practitioner Demographic Characteristics- Total Sample and by Unit							
Unit	**# Completed Surveys**	**Age (mean)**	**Gender n (%)***		**Race n (%) ****		
			Female	**Male**	**White**	**Black**	**Other/Prefer Not to Answer**
A	15	30	15 (100%)	-	15 (100%)	-	-
B***	15	39	15 (93.8%)	-	13 (81%)	-	3 (19%)
C	8	38	6 (75%)	2 (25%)	8 (100%)	-	-
D	13	28	9 (64.3%)	4 (28.6%)	12 (86%)	-	2 (14%)
E***	11	37	11 (100%)	-	6 (54.5%)	3 (27.3%)	
F***	17	36	17 (100%)	-	12 (71%)	4 (24%)	-
G	8	30	6 (75%)	2 (25%)	6 (75%)	1 (12.5%)	1 (12.5%)
H***	12	30	11 (78.6%)	1 (7.1%)	11 (79%)	-	3 (21%)
I	13	31	13 (100%)	-	11 (84.6%)	1 (7.7%)	1 (7.7%)
J	11	27	10 (90.9%)	1 (9.1%)	11 (100%)	-	-
K	10	30	10 (100%)	-	7 (70%)	2 (20%)	1 (10%)
L	11	32	10 (90.9%)	1 (9.1%)	9 (81.8%)	1 (9.1%)	1 (9.1%)
M	13	33	9 (69.2%)	4 (30.8%)	12 (92.3%)	-	1 (7.7%)
N***	7	33	6 (85.7%)	1 (14.3%)	5 (71.4%)	1 (14.3%)	
O	10	41	7 (70%)	3 (30%)	8 (80%)	2 (20%)	-
Total	**174 practitioners**	**36**	**155 (87.1%)**	**19 (10.7%)**	**146 (82%)**	**15 (8.4%)**	**13 (7.3%)**

*2.2% missing data for demographic question related to gender, totals will not add to 100%
**2.3% missing data for demographic questions related to race, totals will not add to 100%
*** missing data present for individual demographic questions, percentages will not add to 100%

Table D. Practitioner Role Characteristics Total Sample and By Unit								
Unit	**Role n (%)**				**Time in Role n (%)**		**Time on Unit n (%)**	
	RN	**Case Manager /Social Worker**	**Licensed Independent Practitioner**	**Other***	**≤5 years**	**> 5 years**	**< 5 years**	**> 5 years**
A	13 (87%)	1 (7%)	-	1 (7%)	9 (60%)	6 (40%)	13 (87%)	2 (13%)
B	9 (56%)	1 (6%)	3 (19%)	3 (19%)	5 (31%)	11 (69%)	8 (50%)	8 (50%)
C	6 (75%)	1 (13%)	-	1 (13%)	3 (38%)	5 (62%)	4 (50%)	4 (50%)
D	10 (71%)	-	4 (29%)	-	10 (71%)	4 (29%)	11 (79%)	3 (21%)
E	7 (64%)	1 (9%)	2 (18%)	1 (9%)	6 (55%)	5 (46%)	8 (73%)	3 (27%)
F	8 (47%)	1 (6%)	1 (6%)	7 (4%)	7 (41%)	10 (59%)	11 (65%)	6 (35%)
G	7 (88%)	-	-	1 (13%)	3 (38%)	5 (63%)	5 (63%)	3 (38%)
H	8 (57%)	-	6 (43%)	-	11 (77%)	3 (21%)	14 (100%)	-
I	8 (62%)	2 (15%)	-	3 (23%)	8 (62%)	5 (39%)	8 (62%)	5 (39%)
J	9 (82%)	2 (18%)	-	-	9 (82%)	2 (18%)	8 (73%)	3 (27%)
K	8 (80%)	1 (10%)	-	1 (10%)	6 (60%)	4 (40%)	8 (80%)	2 (20%)
L	9 (82%)	1 (9%)	-	1 (9%)	7 (64%)	4 (36%)	9 (82%)	2 (18%)
M	8 (62%)	1 (8%)	1 (8%)	3 (23%)	6 (46%)	7 (54%)	7 (54%)	6 (46%)
N	2 (29%)	1 (14%)	2 (29%)	2 (29%)	4 (57%)	3 (43%)	5 (71%)	2 (29%)
O	7 (70%)	-	3 (30%)	-	4 (40%)	6 (60%)	7 (70%)	3 (30%)
Total	**119 (66.9%)**	**13 (7.3%)**	**22 (12.4%)**	**24 (13.4%)**	**98 (55%)**	**80 (45%)**	**126 (71%)**	**52 (29%)**
**Other* practitioner role includes pharmacist, physical, occupational or respiratory therapists.*								

Between-Unit Comparisons

Between the units, there were significant differences in participants age (p=0.01) and gender (p=0.003). With the relatively small number of responses from each unit, these differences may be expected as there were multiple (6) units with only female respondents and some units with up to four male respondents. Additionally, the average age range for each unit was from 27 to 41 years old. Age and gender were controlled for in subsequent analyses of the

specific aims. There were no statistically significant differences between units regarding practitioners' time in role, time on unit, or race.

Psychometric Data

Three subscales were used for this study. The partnership and cooperation subscales from the AITCS-II scale were used to represent elements of team collaboration. The team effectiveness subscale was used to capture practitioner experience. Cronbach's alpha scores for each subscale were used to assess reliability. Overall, reliability was high for all three subscales: 1) partnership α=0.88, 2) cooperation α=0.92, and 3) team effectiveness α=0.9. While an α score of greater than 0.9 is desired, a score greater than 0.7 is acceptable for newly developed scales such as the AITCS-II and the Primary Care Team Dynamics Survey (Valentine et al., 2012). The average score for the partnership subscale was 4.2 (SD=0.49) with a range of 2.9-5.0. The average score for the cooperation subscale was 4.0 (SD=0.56) with a range from 2.3-5.0. A score of four on the five-point scale indicates that the practitioners feel their team performs a particular action *most of the time.* The average score for the team effectiveness subscale was 4.2 (SD=0.72) with a range of 1.20 to 5.0 indicating most respondents agreed or strongly agreed with each item. The range of top box patient experience scores for inclusion was 48.9%-80.3% with an average of 64.02% and for seeing the team working together, 62.5%-84.7% with an average of 72.2%.

IDR Design Features and Team Collaboration

IDR Design Features and Partnership. Significant control variables associated with partnership included age (p=0.09), gender (p=0.14) and hospital (p=0.004). These variables were included as controls in subsequent models. Results for the three models with each design feature and the one combined model are presented in Table E and F respectively.

Table E. Significant Control Variables and each IDR Design Feature on Partnership		
Variables	**β-coefficient**	***p*-value**
Location and Partnership		
(Intercept)	3.612	0.000
Age	0.007	0.027
Gender (reference group-female)	-0.09	0.449
Hospital	0.228	0.020
Location (conference room)**	0.072	0.598
Location (dual/bedside)**	0.054	0.696
Script and Partnership		
(Intercept)	3.596	0.000
Age	0.007	0.026
Gender (reference group-female)	-0.102	0.386
Hospital	0.245	0.008
Script (reference group-yes)	-0.014	0.868
Leader and Partnership		
(Intercept)	3.596	0.000
Age	0.007	0.028
Gender (reference group-female)	-0.107	0.365
Hospital	0.308	0.004
Leader (shared) +	-0.033	0.712
Leader (physician/NP)+	-0.186	0.119
**Reference group = hallway location +Reference group = nurse leader NP = nurse practitioner		

Table F. Combined Model: Significant Control Variables and all IDR Design Features on Partnership		
Variables	**β-coefficient**	***p*-value**
(Intercept)	3.626	0.000
Age	0.008	0.018
Gender (reference value-female)	-0.111	0.358
Hospital	0.314	0.011
Location (dual/bedside) **	0.107	0.508
Location (conference room) **	0.033	0.817
Script (reference group- yes)	-0.040	0.660
Leader (physician/NP) +	-0.265	0.086
Leader (shared) +	-0.072	0.481
**Reference group = hallway location	+Reference group = nurse leader	

In the first model, location was assessed for its association with partnership. Location did not have a significant association with partnership after controlling for age, gender and hospital

(conference room vs. hallway: p=0.598, dual/bedside vs. hallway: p=0.696). The reference value for location was changed and the model was run a second time with no new findings (conference room vs. dual/bedside: p=0.827). Next, the remaining two IDR design features, script and leader, were also assessed individually for their associations with partnership. Neither script (p=0.868), nor leader (shared vs. nurse: p=0.712, physician/NP vs. nurse: p=0.119) had an association with partnership after controlling for age, gender and hospital. As with location, the reference value for leader was adjusted so that all possible associations were addressed (physician/NP vs. shared: p=0.712). Lastly, all three IDR design features were placed in a combined model together with the other control variables. No significant associations were found between any of the IDR design features and partnership (location: p= 0.508, 0.817; script: p=0.660; leader: p=0.086, 0.481).

IDR Design Features and Cooperation. Age (p=0.01) and hospital (p=0.02) were identified as the only significant control variables with cooperation and thus were controlled for in the subsequent models. Results for the models for each of the IDR design features are presented in Table G. In the models, there were no significant findings for variations in location (dual/bedside vs. hallway: p=0.579, conference room vs. hallway: p=0.598) or script (p=0.30). However, how rounds were led had a significant association with cooperation. After controlling for age and hospital, physician/NP-led rounds resulted in a 0.35-point reduction on the cooperation scale when compared to nurse-led rounds (p=0.03). There were no significant differences when physician/NP led were compared to shared-led rounding practices (p=0.0882) or between nurse-led and shared-led rounds (p=0.37) in this model.

Table G. Significant Control Variables and Each IDR Design Feature on Cooperation		
Variables	**β-coefficient**	***p*-value**
Location and Cooperation		
(Intercept)	3.191	0.000
Age	0.008	0.011
Hospital	0.305	0.031
Location (dual/bedside) **	-0.111	0.579
Location (conference room) **	-0.104	0.598
Script and Cooperation		
(Intercept)	3.326	0.000
Age	0.009	0.007
Hospital	0.274	0.026
Script (reference group-yes)	-0.122	0.300
Leader and Cooperation		
(Intercept)	3.207	0.000
Age	0.008	0.011
Hospital	0.394	0.004
Leader (physician/NP) +	-0.350	0.030***
Leader (shared) +	-0.104	0.370
Reference group= hallway location +Reference group = nurse leader * statistically significant $p < 0.05$ NP= nurse practitioner		

The results for the combined model incorporating all three IDR design features is presented in Table H. Leader and Script were significantly associated with cooperation. After controlling for age, hospital, location and script, the study found that nurse-led (p=0.006) or shared-led rounds (p=.01) resulted in higher cooperation when compared to physician/NP led rounds. There was a 0.53-point increase in the average cooperation scores (range 1-5) with nurse-led rounds compared to physician/NP led rounds. In this combined model, shared-led rounds had a 0.4-point higher average cooperation score than physician/NP led rounds. There was no significant difference between nurse-led and shared-led rounds (p=0.24). Additionally, after controlling for age, hospital and location, the study also found that having a script resulted in a 0.23-point increase on the cooperation scale (p =0.035).

Table H. Combined Model: Significant Control Variables and all IDR Design Features on Cooperation		
Variables	**β-coefficient**	***p*-value**
(Intercept)	3.223	0.000
Age	0.009	0.005
Hospital	0.530	0.001
Location (dual/bedside)**	-0.109	0.519
Location (conference room)**	-0.251	0.118
Script (reference group-yes)	-0.231	0.035***
Leader (physician/NP) +	-0.534	0.006***
Leader (shared) +	-0.130	0.24
Leader (physician/NP) ††	*-0.404*	*0.010****
Reference group= hallway location +Reference group = nurse leader †† Reference group releveled to *shared* for complete analysis * statistically significant $p < 0.05$		

Moderating Effects of Partnership and Cooperation

Similar to the results for cooperation partnership and cooperation, control variables (age, gender, time in role and hospital) were each placed in the models to assess their effects on team effectiveness. Age (p=.04) and hospital (p=0.245) were kept for inclusion in the subsequent models. Next, each IDR design feature's effect on team effectiveness was modeled while controlling for age of practitioner and the hospital (Table I). While this analysis was not directly testing the specific aim, it aided in interpretation of the more complex interaction models because it determined the direct relationship between IDR design features and team effectiveness. None of the three IDR design features were found to have any direct association with team effectiveness when modeled individually. Reference groups were reassigned to test all possible comparisons and provided no new findings.

Table I. Control Variables and IDR Design Features' Effect on Team Effectiveness		
Variable	**β-coefficient**	**p-value**
Location and Team Effectiveness		
(Intercept)	3.578	0.000
Age	0.009	0.034
Hospital	0.199	0.335
Location (Dual/Bedside**)	0.051	0.871
Location (Conference Room**)	0.052	0.866
Script and Team Effectiveness		
(Intercept)	3.752	0.000
Age	0.009	0.028
Hospital	0.218	0.185
Script (reference group-yes)	-0.328	0.065
Leader and Team Effectiveness		
(Intercept)	3.514	0.000
Age	0.009	0.036
Hospital	0.355	0.075
Leader (Shared^{+})	-0.159	0.412
Leader (Physician/NP^{+})	-0.436	0.087
** Reference group= hallway $^{+}$Reference group= nurse leader		

Partnership. After centering the IDR design features and partnering the interaction between the two on team effectiveness was modeled (Table J). Partnership does not have a significant moderating effect on the association between any of the IDR design features and team effectiveness ($p>0.05$). However, surprisingly partnership had a significant main effect on team effectiveness after controlling for age, hospital, IDR design features ($p<0.05$) and the interactions. As partnership increased, so did team effectiveness. Additionally, there was a significant association between script and team effectiveness ($p=0.025$) after controlling for age, hospital, partnership (at grand mean) and the interaction between script and partnership.

Table J. Moderating Effect of Partnership on Association between IDR Design Features and Team Effectiveness		
Variable	**β-coefficient**	***p*-value**
Interaction of Location with Partnership		
(Intercept)	3.963	0.000
Age	0.005	0.149
Hospital	0.037	0.828
Location (Dual/Bedside**)	-0.010	0.970
Location (Conference Room**)	-0.016	0.953
Partnership (scaled)	0.720	0.003***
Location (Dual/Bedside**) *Partnership	0.160	0.587
Location (Conference Room**) *Partnership	-0.557	0.833
Interaction of Script with Partnership		
(Intercept)	4.220	0.000
Age	0.004	0.203
Hospital	0.027	0.835
Script (reference group-yes)	-0.324	0.025***
Partnership (scaled)	0.702	0.000***
Script * Partnership	0.056	0.786
Interaction of Leader with Partnership		
(Intercept)	3.975	0.000
Age	0.005	0.192
Hospital	0.136	0.421
Leader (shared^{+})	-0.145	0.395
Leader (Physician/NP^{+})	-0.314	0.154
Partnership (scaled)	0.659	0.000***
Leader (shared^{+})*Partnership	-0.026	0.896
Leader (Physician/NP^{+})*Partnership	0.323	0.221
**Reference group = hallway $^{+}$Reference group= nurse leader ***statistically significant $p< 0.05$		

Cooperation. The same process that was used for partnership was completed for analyzing the moderating effect of cooperation (Table K). Cooperation significantly moderates the association between location and team effectiveness in two ways. When comparing dual/bedside rounds to hallway rounds, cooperation serves as moderating variable (p=0.007). As cooperation increases by one point, the association between dual/bedside rounds and team effectiveness increases by 0.71 in addition to the main effect of 0.17 when compared to hallway rounds. Similarly, when comparing conference room rounds to hallway rounds, cooperation

serves as a moderating variable (p= 0.011). As cooperation increases by one point, the association between conference room rounds and team effectiveness increases by 0.64 plus the additional main effect of 0.16 in comparison to hallway rounds.

Table K. Moderating Effect of Cooperation on Association between IDR Design Features and Team Effectiveness		
IDR Design Feature: Location Interaction with Cooperation		
Variable	**β-coefficient**	***p*-value**
(Intercept)	4.266	0.000
Age	0.001	0.808
Hospital	-0.04	0.728
Location (Dual/Bedside**)	0.171	0.352
Location (Conference Room**)	0.155	0.390
Cooperation (scaled)	0.193	0.396
Location (Dual/Bedside**) *Cooperation	0.708	0.007***
Location (Conference Room**) *Cooperation	0.640	0.011***
IDR Design Feature: Script Interaction with Cooperation		
(Intercept)	4.326	0.000
Age	0.001	0.776
Hospital	0.000	0.996
Script (reference group-yes)	-0.231	0.026***
Cooperation (scaled)	0.678	0.000***
Script (reference group-yes) * Cooperation	0.150	0.377
IDR Design Feature: Leader Interaction with Cooperation		
(Intercept)	4.183	0.000
Age	0.001	0.864
Hospital	0.068	0.579
Leader (shared^{+})	-0.110	0.372
Leader (Physician/NP^{+})	-0.169	0.286
Cooperation (scaled)	0.777	0.000***
Leader (shared^{+})*Cooperation	0.297	0.103
Leader (Physician/NP^{+})*Cooperation	0.616	0.007***
** Reference Value = hallway $^{+}$Reference value = nurse leader ***statistically significant p< 0.05		

There were no significant main effects for location or cooperation on team effectiveness. Due to the significant interaction effect and non-significant main effects, the data were further explored for a crossover interaction. A crossover interaction may occur when the interaction between the independent and moderating variable is significant, but there were no significant

main effects of the independent variable or the moderating variable on the outcome (Piantadosi & Gail, 1993). In a crossover interaction, the effect of one independent variable on the dependent variable might be opposite (i.e., positive slope vs. negative slope) depending on the value of a moderating variable. In this case, no crossover interaction was noted. As cooperation levels change, it does not change the direction of the effect of the independent variable on the outcome variable. More notes on testing for the crossover interaction are located in appendix I.

Additionally, the results indicated that cooperation moderates the association between leader and team effectiveness. When comparing physician/NP led rounds to nurse led rounds, cooperation moderates the association on team effectiveness (p=0.007). As cooperation increases by one point, the association between physician/NP rounds and team effectiveness increases by 0.45 (0.62 minus the main effect of 0.17) when compared to nurse led rounds. There was no moderating effect when comparing nurse or physician/NP led rounds with shared rounds. Additionally, there were no main effects identified for leader role. As with location, the data were assessed for a crossover interaction by generating an interaction plot. No crossover interaction was noted for leader role on team effectiveness (see appendix I).

As with the partnership results, there were unexpected findings. Script was significantly associated with team effectiveness when age, hospital and the interaction of script with cooperation were controlled for (p=0.026). No moderating effect was discovered. There was also a significant association between cooperation and team effectiveness when age, hospital and the interaction between script (p<0.001) and leader (p<0.001) were controlled for.

Patient Experience

The third specific aim for this study explored associations of IDR design features, team collaboration, and practitioner and patient experiences. Appropriateness for aggregating the individual data (elements of team collaboration and team effectiveness) to the unit-level was evaluated using within-group interrater reliability (r_{wg}), ICC1 and ICC2 for the three subscales (partnership, cooperation and team effectiveness). The $r_{wg,}$ ICC1 and ICC2 values for the three scales are presented in Table L. Scores for r_{wg} ranged from 0.67 to 0.79. A score of greater than 0.7 for all three measures is generally considered appropriate justification for aggregation (Klein & Kozlowski, 2000). The r_{wg} for team effectiveness was slightly lower at 0.67, thus a limitation for this analysis. An ICC1 score greater than 0 indicates that multilevel modeling is an appropriate analysis method (Tofighi & Thoemmes, 2014). Scores for ICC1 help explain the percent of individual scores that can be associated with group membership. Thus, 8% of the responses on the partnership scale can be attributed to being part of a specific hospital unit. Similarly, 12% and 17% on the cooperation and team effectiveness scales respectively can be attributed to belonging to a specific hospital unit group membership. Only one scale (team effectiveness) achieved the commonly acceptable score of 0.7 for ICC2. The small group size may have contributed to the lower ICC2 values (Klein & Kozlowski, 2000). Overall, the three measures provided appropriate justification for aggregation since it is not each procedure, but a complementary assessment that justifies aggregation (Klein & Kozlowski 2000). That is to say that one could use any or all methods to assess the extent of shared team constructs. Next, a subset of the data were extracted representing the unit-level data for each hospital unit (Table M). Unit averages for partnership, cooperation and team effectiveness were calculated for each unit.

Table L. r_{wg}, ICC1 and ICC2 for Subscales used in Specific Aim #3			
Scale	**r_{wg}**	**ICC1**	**ICC2**
Partnership	0.79	0.08	0.50
Cooperation	0.78	0.12	0.61
Team Effectiveness	0.67	0.17	0.71

Table M. IDR Design, Team Collaboration, Effectiveness and Patient Experiences by Unit

Unit	Location	Leader of Rounds	Use of Script	Partnership	Cooperation	Team Effectiveness	Inclusion	Working Together
A	Dual/Bedside	Shared*	No	3.87	3.65	3.79	72.7	62.5
B	Conference Room	Shared	No	4.09	3.59	3.54	80.3	79.9
C	Hallway	Shared	No	3.86	3.86	4.0	64.3	74.7
D	Conference Room	Nurse	Yes	4.10	4.01	4.44	61.3	63.6
E	Conference Room	Physician/ NP	Yes	4.18	3.94	4.36	60.3	71.3
F	Conference Room	Shared	No	4.46	4.34	4.39	57.4	70.2
G	Conference Room	Shared	No	4.48	4.19	4.43	71.4	75
H	Dual/Bedside	Physician/ NP	Yes	4.16	4.08	4.11	57.9	63.8
I	Conference Room	Nurse	No	4.39	4.26	4.49	49	68.5
J	Dual/Bedside	Shared	Yes	4.34	4.28	4.6	53.1	75.5
K	Dual/Bedside	Physician/ NP	No	4.43	4.01	4.22	52.5	73.8
L	Conference Room	Nurse	No	4.24	4.02	4.27	67.4	84.7
M	Hallway	Nurse	No	4.12	3.93	4.08	76.1	75.8
N	Dual/Bedside	Physician/ NP	No	4.18	3.63	351	61.3	73.3
O	Dual/Bedside	Shared	Yes	4.38	4.13	4.68	72	78.7
Total	**Dual/Bedside (6) Conference Room (7) Hallway (2)**	**Shared (7) Physician /NP (4) Nurse (4)**	**Yes (5) No (10)**	**μ=4.22**	**μ=4.16**	**μ=4.19**	**μ=64.02**	**μ=72.2**

*Shared leadership indicates rounds were facilitated by a nurse and a physician or another practitioner. In some cases, social work led rounds along with a charge nurse.

First, the associations between the IDR design features and the patient experience scores were explored. Table N displays the average patient experience scores for each IDR design

feature. The average scores for both inclusion and working together were higher for units with IDR occurring in the hallway (inclusion:71.6, working together:75.38) compared to a conference room (inclusion:63.69, working together:72.99) or dual/bedside (inclusion:62.08, working together:70.14). However, assessing the associations further with a one-way ANOVA revealed that the differences were not statistically significant different (inclusion: F=0.613, df=2, p=0.56, working together: F=0.32, df=2, p=0.73). Next, units without scripted IDR had a higher average inclusion score of 65.75 versus 60.6 and a higher working together score of 73.44 versus 69.76. The differences were not significantly different (inclusion: F=0.709, df=1, p=0.42, working together: F=0.891, df=1, p=0.36). Lastly, units with shared leadership for IDR scored higher on both patient experience questions (inclusion: 67.54, working together: 73.23) followed by nurse-led (inclusion:63.25, working together:72.51) and physician/NP led (inclusion:57.81, working together:69.73). Again, the differences were not statistically significant (inclusion: F=1.354, df=2, p=0.30, working together: F=0.315, df=2, p=0.74).

Table N. Average Patient Experience Scores for Each IDR Design Feature

IDR Design Feature	Groups	Inclusion	*p*-value*	Working Together	*p*-value*
Location	Hallway	71.6	p=0.56	75.38	p=0.73
	Conference Room	63.69		72.99	
	Dual/Bedside	62.08		70.14	
Script	Yes	60.6	p=0.42	69.76	p=0.36
	No	65.75		73.44	
Leader	Nurse	63.25	p=0.30	72.51	p=0.74
	Physician/NP	57.81		69.73	
	Shared	67.54		73.23	

Next, the association between team collaboration and patient experience scores were assessed with the Pearson correlation coefficient. There was no significant association between levels of partnership and inclusion (r = -0.4, p=0.14) or working together (r = 0.25, p=0.38). There was also no significant association between levels of cooperation and working together (r

= -0.02, p =0.94). However, there was a significant moderate and negative association between cooperation and inclusion (r = -0.54, p=0.03). Lastly, the association between team effectiveness and patient experience scores were assessed. There was no significant association between team effectiveness and inclusion (r = -0.42, p=0.12) or working together (r =0.009, p =0.97).

Discussion

The purpose of this study was to evaluate the associations between IDR design features, team collaboration, and practitioner and patient experiences. To summarize the results, the study found that cooperation moderates the relationship between both location and leader and team effectiveness. Also, who led the IDR and whether a team used a script was associated with different levels of cooperation. Practitioners who participated in rounds led by nurses or where leadership was shared noted higher levels of cooperation than those led by a licensed independent practitioner (physician/NP) when all features were included in a model together. Use of a script was associated with higher cooperation. Using a script also had an association with greater team effectiveness after controlling for other variables and interaction effects. The study did not find any associations between IDR design features and partnership. Similarly, partnership did not have any moderating effect on the relationship between IDR design features and team effectiveness. Lastly, there were no noted associations between IDR design features and patient experiences, partnership and patient experiences, or team effectiveness and patient experiences. However, there was a negative relationship between cooperation and patient experiences of inclusion.

The results in this study offer new information to the current body of knowledge about IDR. To date, research has focused primarily on comparing whether having an IDR practice in place is better than not having one at all (O'Leary, Haviley, et al., 2011b; Townsend-Gervis,

Cornell, & Vardaman, 2014). There is strong evidence to support that IDR is important, but there is limited evidence for how to design or structure the practice, especially in general-care hospital units (Hendricks et al., 2017; Lane et al., 2013; Stein et al., 2015). With so many different IDR designs seen across hospital units, as well as inconsistent reporting in the literature, researchers and practitioners alike do not have a solid evidence-base for what constitutes best practices (Bhamidipati et al., 2016; Hendricks et al., 2017). Our study adds to the evidence by specifically focusing on how the design of IDR influenced subsequent processes (collaboration) and outcomes.

The Importance of Cooperation

This study highlighted the importance of cooperation in team processes. The study found that cooperation is influenced by IDR design features and it is an important factor for achieving team effectiveness. Cooperation moderated the relationship between both location and leader and team effectiveness. Additionally, cooperation was affected by who the leader was and use of a script.

For location, the association of both dual/bedside and conference room rounds with team effectiveness was moderated by cooperation. As levels of cooperation increased, there was a stronger association between both locations and team effectiveness when compared to hallway rounds. This means that rounds occurring at dual/bedside and in the conference room are associated with higher levels of team effectiveness when cooperation is high as compared to hallway rounds. Cooperation is characterized as the interpersonal behaviors such as respect and trust between team members (Orchard et al, 2012). It is possible that when the rounds occur in a location that supports more in depth discussion of patients' plans of care, *and* that discussion is cooperative, that the team is able to be more effective. These findings validate other studies

recognizing that the sense of feeling valued and respected is an important factor in IDR (Busby & Gilchrist, 1992; Hendricks et al., 2017; Manias & Street, 2001). When team members do not feel respected, they are less likely to participate in discussions (Walden, Elliott, & Gregurich, 2009). One component potentially affecting the cooperation during discussions is how valued interdisciplinary practice is by the individual team members. The initiation of IDR often comes as a mandate from unit or hospital leadership. Without complete buy-in from team members, their engagement and cooperation in the interdisciplinary discussion of patient care plans may be diminished. Hendricks et al. (2017) found that skepticism of IDR was a significant barrier in their implementation. The results of this study further emphasize the importance of positive cooperation between team members in order to improve practitioners' experiences and team effectiveness. Future research needs to explore units where teams demonstrate significantly high levels of cooperation to better understand the mechanisms supporting it.

The Role of Leader and Script.

In this study, the role of the leader in IDR impacted cooperation. Rounds that were nurse-led or shared-led demonstrated higher levels of cooperation than physician/NP led rounds. The dynamics that occur with physician/NP led rounds may be more similar to traditional, physician-centric rounding practices even though they are attended by an interdisciplinary team. In some physician-centric rounding practices, there is minimal interaction with nursing staff (Stickrath et al., 2013). This situation may occur when an existing traditional model is in place, but a unit initiative prompts the other non-physician disciplines to join in the current structure without addressing barriers to make it a truly interdisciplinary practice. Complete restructuring of traditional rounding practices may need to occur for them to be effective, including a shift in leader role. Nursing staff often feels disengaged and non-central to decision making discussions

occurring during rounding practices when they are physician-led (Zwarenstein et al., 2013). Nurse-led or shared-led rounding practices create a more egalitarian environment that allows all disciplines to feel valued in the discussions.

However, cooperation moderated the relationship between the leader role and team effectiveness. When cooperation was high and the rounds were physician-led, there was a greater association with team effectiveness compared to nurse-led rounds. These results suggest that a physician or NP skilled at fostering cooperation amongst the team may be the most optimal leader. Future research should focus on identifying the specific behaviors in the leaders of rounding practices that improve perceptions of cooperation the most. It is possible that influence on the team is affected by perceived expertise attributed to an individual's status (i.e., physician or nurse) (Bunderson, 2003). For now, hospital units considering an IDR practice intervention should explore leadership training opportunities for whomever will be leading the rounds so that they are skilled in facilitating an inclusive and productive interdisciplinary discussion.

Next, the study found that having a script was associated with higher levels of cooperation and also associated with higher team effectiveness. The results support other studies recommending the use of a structured tool or checklist during IDR (Nørgaard, Ringsted, & Dolmans, 2004; Stein et al., 2015). A script is especially useful when addressing specific quality or safety concerns such as urinary catheter status or fall risk (Dubose et al., 2008). Paradis et al., (2015) found that practitioners participating in scripted IDR felt as though they were more included in the discussion; the script served as an invitation to participate. However, there are potential limitations to using a script as well. According to Paradis et al's (2015) study, some team members were frustrated when discussions went *off-script*, leading to a perception of time

wasted. Practitioners on units with unscripted IDR appreciated more free-flowing discussions and less repetition, but sometimes questioned their role in the conversations (Paradis et al., 2015). While the results of this study support that having a script may be beneficial, units implementing IDR may want to strongly consider the purpose and content of the script so that it does invite all to participate but does not limit discussion or create inefficiencies in the practice.

Location

According to the results of this study, location has a minimal association with elements of team collaboration, team effectiveness and patient experiences. Practitioners' perceptions of partnership or cooperation were similar on units that held rounds in a conference room, the hallway, or at the patient's bedside. Additionally, there was no significant difference in two measures of patient experience when comparing across the different locations. Our results indicate that just moving rounds to the bedside will not produce the significant impact desired and that there are likely many other factors, such as leadership characteristics and work environment, contributing to team collaboration, team effectiveness and patient experiences.

Our study aligns with previous research that does not provide strong evidence that location makes an impact on practitioner and patient experiences. One study found that rounds occurring away from the bedside were more efficient and produced better communication (Lyons, Standley, & Gupta, 2010). Another study by Ramirez, Singh and Williams (2016) found no differences in how patients perceived their involvement in decision making, their trust in the team or satisfaction with care when comparing bedside rounds versus rounds away from the bedside. However, patients viewed their medical team as more compassionate with bedside rounds. Overall, the results in this study support the findings of a systematic review indicating that there is no strong evidence to support holding rounds in a *specific* location (Lane et al.,

2013). The literature suggests that a *consistent* location is most important. Hospital units interested initiating IDR at the bedside should consider exploring ways to mitigate some of the potential concerns of the location (i.e., timeliness and efficiency) to still reap the benefits of being with the patient.

Patient Experiences

Lastly, the study found no associations between IDR design features and patient experiences. Interdisciplinary rounding practices have become popular partly because of the rising pressures of value-based purchasing to make sure that patients have good experiences and are satisfied with their care (Stein et al., 2015). Hospitals are reimbursed according to how patients respond on the HCAHPS survey questions. It was expected that there would be higher patient experience scores with IDR at the bedside. However, there were no differences in patient experience scores between locations, use of script or leadership. Previous research on IDR has been similarly challenged with demonstrating that the intervention makes a difference in patient outcomes. No change was noticed in patient satisfaction scores with the introduction of a hallway IDR practice in one study (Cornell, Townsend-Gervis, Vardaman, & Yates, 2014). Another study assessing a bedside model found no improvement in patient satisfaction, despite an improvement in the staff satisfaction (Malec et al., 2017). Lastly, a third study found no improvement with a bedside model in patient's activation, engagement and shared decision making (O'Leary et al., 2015). Our results corroborate this previous research indicating that additional or different organization, unit or team characteristics must be responsible for improving patient satisfaction and experiences.

Achieving higher patient ratings is challenging due to the unique nature of healthcare as a

service industry. When compared to other services, healthcare is steeped in complexity and different because of the higher risk of harm for services performed as well as the length of the encounters (Vogus & McClelland, 2016). Despite these challenges, multiple studies have found improved patient satisfaction with the implementation of various patient-centered care processes such as individualized treatment plans, deliberate physical and emotional support and care coordination services (Rathert, Wyrwich, & Boren, 2012). However, overall HCAHP scores remain lower than desired (Aboumatar et al., 2015), In fact one recent study found that almost 20% of patients felt insufficiently informed about their care (Bachnik et al., 2018). Indeed, there is much to be learned about optimizing the patient experience.

The study found a negative association between cooperation and patient inclusion in decision making. While these results could be an anomaly, it might also indicate that the cooperative behaviors of teams may not universally carry over to interactions with patients. A team of practitioners may work well together internally, but still not include the patient in decision making. Future research should identify models of care where patient inclusion is high and how that associates with team members' team dynamics in general.

Patients view the quality of communication as the prime indicator of high healthcare quality (Mohammed et al., 2014). There are a number of patient-level interventions that are linked with improved patient experience scores, all of which increase the number of encounters with the health care team and promote specific behaviors like explaining care decisions. Interventions such as nursing rounds to check-in, attention on customer-service behaviors (i.e., friendliness and eye contact), post-discharge calls and IDR were all common across high performing hospitals on HCAHPS surveys (Aboumatar et al., 2015). Our study found no

associations between specific design IDR features and improved patient experiences. However, when considered with previous research highlighting the specific behaviors of units in high-performing hospitals, future studies should measure the frequency of such behaviors across variations in IDR design features.

Nonetheless, more targeted research is necessary to better understand how patients experience IDR and the work of their healthcare team. A limitation of using the HCAHPS scores as an outcome of IDR is that they are not directly tied to the practice, thus limiting its usefulness in informing the practice. A more nuanced approach may reveal important factors that influence patients' perceptions about their interactions with their healthcare team. Previous research has attempted to explore some of these nuances. For example, one study found that some patients think of the whole team except the physician as learners and not as equal collaborators (Burdick, Kara, Ebright, & Meek, 2017). This perception may lead patients to believe that the discussion occurring during rounds is for the benefit of the "learners" and not for them. The same study highlighted patients' negative experiences of IDR when physicians were the only ones speaking and the rest of the team was silent. Practitioners that make their collaboration more visible to the patients may have a greater impact than those that only engage in teamwork behind the scenes. A study comparing physician-centric rounds with a bedside IDR practice found that patients rated the teamwork higher in the latter, thus indicating that patients are capable of recognizing collaborative behaviors (Beaird et al., 2017). These findings have important implications for designing IDR in a way that makes collaborative behaviors more explicit to the patients in order to impact their experiences.

Limitations

This study has important limitations that need to be considered. First, the study took place in two academic health centers. Results may look different if the study had taken place in a non-teaching facility. Second, most of the respondents in the study were nurses. A more balanced sample may yield different results. Nurses may view nurse-led or shared-led rounds more favorably than other members of the team, thus adding bias to the results. Future research should explore how practitioners differ in their perceptions of IDR. Structures that work best for nurses may not be ideal for physicians or other members of the team. While the sample size was sufficient for the analyses performed in this study, the sample was nonetheless relatively small with only 15 units. The size presents challenges to making sweeping generalizable claims applicable to all hospital units. More data are needed to test the hypotheses and conceptual framework more comprehensively. Lastly, the study took place in general-care units that also served patients other than the primary physician teams based on the floor. It is possible that some of the patient-experience data is derived from patients that did not receive the predominant IDR practice on the floor. However, attempts were made to mitigate this limitation by targeting units with geographically located physician teams.

Conclusion

IDR remains a popular intervention aimed at improving team collaboration and patient experiences in hospital settings. However, current evidence is limited for how to best conduct IDR. This study added to the body of literature exploring practice designs and outcomes. The results of this study highlighted the need for attention on the cooperation experienced during rounding practices by team members. The study found that cooperation is a significant element

in achieving team effectiveness. A discussion void of respect and trust will be ineffective regardless of the structure. The study also found that who the leader is, whether nurse, physician/NP, or shared, influences levels of cooperation. The role of the leader is a significantly important feature in the success of IDR. Development and training of practitioners leading IDR in the art of team discussion facilitation may be a critical component to success. The study also found that using a script in IDR may help improve cooperation and team effectiveness when other factors are controlled for. However, unit leadership should ensure that scripts foster participation rather than be overly prescriptive. Lastly, the results support previous work demonstrating that location of IDR does not impact collaboration, team effectiveness or patient experiences. Future research should continue to explore best practice techniques for conducting IDR that support collaboration and improved patient experiences. Administrators, including nurse managers, should identify and promote practice changes that concurrently enhance team collaboration between practitioners as well as partnerships with patients. Nurse managers should advocate for their staff to have time and space to participate in IDR, which may mean readjusting patient care duties. Additionally, a restructuring of IDR with input by all disciplines including patients may be necessary for it to be accepted as beneficial by the whole team.

References

Aboumatar, H. J., Chang, B. H., Al Danaf, J., Shaear, M., Namuyinga, R., Elumalai, S., … Pronovost, P. J. (2015). Promising practices for achieving patient-centered hospital care: A national study of high-performing US hospitals. *Medical Care*, *53*(9), 758–767. https://doi.org/10.1097/MLR.0000000000000396

Arora, N., Killol, P., Engell, C., & LaRosa, J. (2014). The effect of interdisicplinary team rounds on urinary catheter and central venous catheter days and rates of infection. *American Journal of Medical Quality*, *29*(4), 329–334.

Bachnick, S., Ausserhofer, D., Baernholdt, M., & Simon, M. (2018). Patient-centered care, nurse work environment and implicit rationing of nursing care in Swiss acute care hospitals: A cross-sectional multi-center study. *International Journal of Nursing Studies*, *81*, 98–106. https://doi.org/10.1016/j.ijnurstu.2017.11.007

Baker, D. P., Day, R., & Salas, E. (2006). Teamwork as an essential component of high-reliability organizations. *Health Services Research*, *41*(4 II), 1576–1598. https://doi.org/10.1111/j.1475-6773.2006.00566.x

Batalden, M., Batalden, P., Margolis, P., Seid, M., Armstrong, G., Opipari-Arrigan, L., & Hartung, H. (2016). Coproduction of healthcare service. *BMJ Quality and Safety*, *25*, 509–517. https://doi.org/10.1136/bmjqs-2015-004315

Beaird, G., Dent, J. M., Keim-Malpass, J., Jian Muller, A. G., Nelson, N., & Brashers, V. (2017). Perceptions of teamwork in the interprofessional bedside rounding process. *Journal for*

Healthcare Quality, *39*(2). https://doi.org/10.1097/JHQ.0000000000000068

Bhamidipati, V. S., Elliott, D. J., Justice, E. M., Belleh, E., Sonnad, S. S., & Robinson, E. J. (2016). Structure and outcomes of interdisciplinary rounds in hospitalized medicine patients: A systematic review and suggested taxonomy. *Journal of Hospital Medicine*, *11*(7), 513–523. https://doi.org/10.1002/jhm.2575

Bliese, P. (2016). Multilevel modeling in R (2.6). R Development Core Team. Retrieved from papers2://publication/uuid/0E5F5708-8FD8-4139-AE3B-38E08641824C

Bryk, A., & Raudenbush, S. (1992). *Hierarchical linear models: Applications and data analysis methods*. Newbury Park: Sage Publications.

Bunderson, J. S. (2003). Recognizing and utilizing expertise in work groups: A status characteristics perspective. *Administrative Science Quarterly*, *48*(4), 557–591. https://doi.org/http://dx.doi.org/10.2307/3556637

Burdick, K., Kara, A., Ebright, P., & Meek, J. (2017). Bedside interprofessional rounding: The view from the patient's side of the bed. *Journal of Patient Experience*, *4*(1), 22–27. https://doi.org/10.1177/2374373517692910

Busby, A., & Gilchrist, B. (1992). The role of the nurse in the medical ward round. *Journal of Advanced Nursing*, *17*(3), 339–346. https://doi.org/10.1111/j.1365-2648.1992.tb01912.x

Chatterjee, S., & Hadi, A. S. (2006). *Regression Analysis by Example* (4th ed.). Hoboken, New Jersey: John Wiley & Sons, Inc.

Chou, C.-P., Bentler, P. M., & Satorra, A. (1991). Scaled test statistics and robust standard errors for non-normal data in covariance structure analysis: A Monte Carlo study. *British Journal*

of Mathematical and Statistical Psychology, *44*(2), 347–357.

Cornell, P., Townsend-Gervis, M., Vardaman, J. M., & Yates, L. (2014). Improving situation awareness and patient outcomes through interdisciplinary rounding and structured communication. *The Journal of Nursing Administration*, *44*(3), 164–169. https://doi.org/10.1097/NNA.0000000000000045

Curley, C., McEachern, J. E., & Speroff, T. (1998). A firm trial of interdisciplinary rounds on the inpatient medical wards: An intervention designed using continuous quality improvement. *Medical Care*, *36*(8).

Donabedian, A. (1966). Evaluating the Quality of Medical Care. *Millbank Memorial Fund*, *44*(3), 166–206.

Donabedian, A. (1978). The quality of medical care. *Science*, *200*(4344), 856–864.

Donabedian, A. (1980). *Explorations in quality assessment and monitoring*. Ann Arbor, MI: Health Administration Press.

Dubose, J. J., Inaba, K., Shiflett, A., Trankiem, C., Teixeira, P. G. R., Salim, A., … Belzberg, H. (2008). Measurable outcomes of quality improvement in the trauma intensive care unit : The impact of a daily quality rounding. *The Journal of TRAUMA Injury, Infection and Critical Care*, *64*(1), 22–29. https://doi.org/10.1097/TA.0b013e318161b0c8

Gausvik, C., Lautar, A., Miller, L., Pallerla, H., & Schlaudecker, J. (2015). Structured nursing communication on interdisciplinary acute care teams improves perceptions of safety, efficiency, understanding of care plan and teamwork as well as job satisfaction. *Journal of*

Multidisciplinary Healthcare, *8*, 33–7. https://doi.org/10.2147/JMDH.S72623

Gittell, J. H., Fairfield, K. M., Bierbaum, B., & Head, W. (2000). Impact of relational coordination on quality of care, postoperative pain and functioning, and length of stay: A nine-hospital study of surgical patients. *Medical Care*, *38*(8), 807–819.

Gittell, J. H., & Suchman, A. L. (2011). An overview of relational coordination. *Oxford Handbook of Positive Organizational Scholarship*.

Glaser, R. E. (2006). Levene's robust test of homogeneity of variances. *Encyclopedia of Statistical Sciences*.

Gonzalo, J. D., Chuang, C. H., Huang, G., & Smith, C. (2010). The return of bedside rounds: An educational intervention. *Journal of General Internal Medicine*, *25*(8), 792–798. https://doi.org/10.1007/s11606-010-1344-7

Hendricks, S., LaMothe, V. J., Kara, A., & Miller, J. (2017). Facilitators and barriers for interprofessional rounding: A qualitative study. *Clinical Nurse Specialist*, *31*(4), 219–228. https://doi.org/10.1097/NUR.0000000000000310

Henkin, S., Chon, T. Y., Christopherson, M. L., Halvorsen, A. J., Worden, L. M., & Ratelle, J. T. (2016). Improving nurse-physician teamwork through interprofessional bedside rounding. *Journal of Multidisciplinary Healthcare*, *9*, 201–205. https://doi.org/10.2147/JMDH.S106644

Hofmann, D. a, & Gavin, M. B. (1998). Centering decisions in hierarchical linear models: Implications for research in organizations. *Journal of Management*, *24*(5), 623–641. https://doi.org/10.1177/014920639802400504

Hosmer, D. W., & Lemeshow, S. (2000). *Applied logistic regression* (2nd ed.). New York: Wiley-Interscience Publication.

James, L. R., Demaree, R. G., & Wolf, G. (1984). Estimating within-group interrater reliability with and without response bias. *Journal of Applied Psychology*, *69*(1), 85–98.

Kara, A., Johnson, C. S., Nicley, A., Niemeier, M. R., & Hui, S. L. (2015). Redesigning inpatient care: Testing the effectiveness of an accountable care team model. *Journal of Hospital Medicine*, *10*(12), 773–779. https://doi.org/10.1002/jhm.2432

Kellar, S.P., & Kelvin, E. A. (2013). Munro's statistical methods for health care research. (6th ed). Philadelphia: Wolters Kluwer Health.

Kim, H.-Y. (2017). Statistical notes for clinical researchers: Chi-squared test and Fisher's exact test. *Restorative Dentistry & Endodontics*, *42*(2), 152. https://doi.org/10.5395/rde.2017.42.2.152

Kim, M. M., Barnato, A. A., Angus, D. D., Fleisher, L. L., & Kahn, J. J. (2010). The effect of multidisciplinary care teams on intensive care unit mortality. *Archives Internal Med*, *170*(4), 369–376.

Klein, K. J., & Kozlowski, S. W. J. (2000). From micro to meso: Critical steps in conceptualizing and conducting multilevel research. *Organizational Research Methods*, *3*(3), 211–236. https://doi.org/10.1177/109442810033001

Lane, D., Ferri, M., Lemaire, J., McLaughlin, K., & Stelfox, H. T. (2013). A systematic review of evidence-informed practices for patient care rounds in the ICU. *Critical Care Medicine*,

41(8), 2015–29. https://doi.org/10.1097/CCM.0b013e31828a435f

Lemieux-Charles, L., & McGuire, W. L. (2006). What do we know about health care team effectiveness? A review of the literature. *Medical Care Research and Review*, *63*(3), 263–300. https://doi.org/10.1177/1077558706287003

Lyons, M. N., Standley, T. D. a, & Gupta, a K. (2010). Quality improvement of doctors' shift-change handover in neuro-critical care. *Quality & Safety in Health Care*, *19*(6), e62. https://doi.org/10.1136/qshc.2008.028977

Maas, C. J. M., & Hox, J. J. (2004). The influence of violations of assumptions on multilevel parameter estimates and their standard errors. *Computational Statistics and Data Analysis*, *46*(3), 427–440. https://doi.org/10.1016/j.csda.2003.08.006

Malec, A., Mork, A., Hoffman, R., & Carlson, E. (2017). The care team visit: Approaching interdisciplinary rounds with renewed focus. *Journal of Nursing Care Quality*. https://doi.org/10.1097/NCQ.0000000000000279

Manias, E., & Street, A. (2001). Nurse-doctor interactions during critical care ward rounds. *Journal of Clinical Nursing*, *10*(4), 442–50. https://doi.org/10.1046/j.1365-2702.2001.00504.x

Menefee, K. S. (2014). The Menefee model for patient-focused interdisciplinary team collaboration. *The Journal of Nursing Administration*, *44*(11), 598–605. https://doi.org/10.1097/NNA.0000000000000132

Mercedes, A., Fairman, P., Hogan, L., Thomas, R., & Slyer, J. T. (2016). Effectiveness of

structured multidisciplinary rounding in acute care units on length of stay and satisfaction of patients and staff: A quantitative systematic review. *JBI Database of Systematic Reviews and iIplementation Reports*, *13*(8), 131–68. https://doi.org/10.11124/JBISRIR-2016-003014

Mohammed, K., Nolan, M. B., Rajjo, T., Shah, N. D., Prokop, L. J., Varkey, P., & Murad, M. H. (2014). Creating a patient-centered health care delivery system: A systematic review of health care quality from the patient perspective. *American Journal of Medical Quality*, 1–10. https://doi.org/10.1177/1062860614545124

Nester, J. (2016). The importance of interprofessional practice and education in the era of accountable care. *North Carolina Medical Journal*, *77*(2), 128–32. https://doi.org/10.18043/ncm.77.2.128

Nørgaard, K., Ringsted, C., & Dolmans, D. (2004). Validation of a checklist to assess ward round performance in internal medicine. *Medical Education*, *38*, 700–707. https://doi.org/10.1111/j.1365-2929.2004.01840.x

O'Leary, K. J., Haviley, C., Slade, M. E., Shah, H. M., Lee, J., & Williams, M. V. (2011). Improving teamwork: impact of structured interdisciplinary rounds on a hospitalist unit. *Journal of Hospital Medicine*, *6*(2), 88–93. https://doi.org/10.1002/jhm.714

O'Leary, K. J., Killarney, A., Hansen, L. O., Jones, S., Malladi, M., Marks, K., & M Shah, H. (2015). Effect of patient-centred bedside rounds on hospitalised patients' decision control, activation and satisfaction with care. *BMJ Quality and Safety*, *0*, 1–8. https://doi.org/10.1136/bmjqs-2015-004561

O'Leary, K. J., Sehgal, N. L., Terrell, G., & Williams, M. V. (2012). Interdisciplinary teamwork in hospitals: A review and practical recommendations for improvement. *Journal of Hospital Medicine*, *7*(1), 48–54. https://doi.org/10.1002/jhm.970

O'Leary, K. J., Wayne, D. B., Haviley, C., Slade, M. E., Lee, J., & Williams, M. V. (2010). Improving teamwork: Impact of structured interdisciplinary rounds on a medical teaching unit. *Journal of Hospital Medicine*, *5*(8), 55–56. https://doi.org/10.1007/s11606-010-1345-6

O'Mahony, S., Mazur, E., Charney, P., Wang, Y., & Fine, J. (2007). Use of multidisciplinary rounds to simultaneously improve quality outcomes, enhance resident education, and shorten length of stay. *Journal of General Internal Medicine, 22*(8), 1073–1079. https://doi.org/10.1007/s11606-007-0225-1

Orchard, C., King, G., Khalili, H., & Bezzina, M. B. (2012). Assessment of interprofessional team collaboration scale (AITCS): Development and testing of the instrument. *Journal of Continuing Education in the Health Professionals*, *32*(1), 58–67. https://doi.org/10.1002/chp

Palmeri, M. (2016). Testing the assumptions of multilevel models. Retrieved from: https://ademos.people.uic.edu/Chapter18.html.

Paradis, E., Leslie, M., & Gropper, M. A. (2015). Interprofessional rhetoric and operational realities: An ethnographic study of rounds in four intensive care units. *Advances in Health Sciences Education*, *21*(4), 1–14. https://doi.org/10.1007/s10459-015-9662-5

Piantadosi, S., & Gail, M. H. (1993). A comparison of the power of two tests for qualitative interactions. *Statistics in Medicine, 12,* 1239–1248.

R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.

Ramirez, J., Singh, J., & Williams, A. A. (2016). Patient satisfaction with bedside teaching rounds compared with nonbedside rounds. *Southern Medical Journal*, *109*(2), 112–115. https://doi.org/10.14423/SMJ.0000000000000419

Rathert, Wyrwich, & Boren. (2012). Patient-centered care and outcomes: A systematic review of the literature. *Medical Care Research and Review*, *70*(4), 351–379. https://doi.org/10.1177/1077558712465774

Razali, N. M., & Wah, Y. B. (2011). Power comparisons of Shapiro-Wilk , Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests. *Journal of Statistical Modeling and Analytics*, *2*(1), 21–33. https://doi.org/doi:10.1515/bile-2015-0008

Reeves, S., Xyrichis, A., & Zwarenstein, M. (2018). Teamwork, collaboration, coordination, and networking: Why we need to distinguish between different types of interprofessional practice. *Journal of Interprofessional Care*, *32*(1). https://doi.org/10.1080/13561820.2017.1400150

Rosen, M. A., DiazGranados, D., Dietz, A. S., Benishek, L. E., Thompson, D., Pronovost, P. J., & Weaver, S. J. (2018). Teamwork in healthcare: Key discoveries enabling safer, high-quality care. *American Psychologist*, *73*(4), 433–450. https://doi.org/10.1037/amp0000298

Sharma, U., & Klocke, D. (2014). Attitudes of nursing staff toward interprofessional in-patient-

centered rounding. *J Interprof Care*, *28*(5), 1356–1820. https://doi.org/10.3109/13561820.2014.907558

Snijders, T. A., & Bosker, R. J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Song, H., Chien, A. T., Fisher, J., Martin, J., Peters, A. S., Hacker, K., … Singer, S. J. (2015). Development and validation of the primary care team dynamics survey. *Health Services Research*, *50*(3), 897–921. https://doi.org/10.1111/1475-6773.12257

Song, H., Ryan, M., Tendulkar, S., Fisher, J., Martin, J., Peters, A. S., … Singer, S. J. (2015). Team dynamics, clinical work satisfaction, and patient care coordination between primary care providers. *Health Care Management Review*, *0*(0), 1. https://doi.org/10.1097/HMR.0000000000000091

Southwick, F., Lewis, M., Treloar, D., Cherabuddi, K., Radhakrishnan, N., Leverence, R., … Cottler, L. (2014). Applying athletic principles to medical rounds to improve teaching and patient care. *Academic Medicine : Journal of the Association of American Medical Colleges*, *89*(7), 1018–1023. https://doi.org/10.1097/ACM.0000000000000278

Stein, J., Payne, C., Methvin, A., Bonsall, J. M., Chadwick, L., Clark, D., … Dressler, D. D. (2015). Reorganizing a hospital ward as an accountable care unit. *Journal of Hospital Medicine*, *10*(1), 36–40. https://doi.org/10.1002/jhm.2284

Stickrath, C., Noble, M., Prochazka, A., Anderson, M., Griffiths, M., Manheim, J., … Aagaard, E. (2013). Attending rounds in the current era: what is and is not happening. *JAMA Internal*

Medicine, *173*(12), 1084–1089. https://doi.org/10.1001/jamainternmed.2013.6041

Tofighi, D., & Thoemmes, F. (2014). Single-level and multilevel mediation analysis. *Journal of Early Adolescence*, *34*(1), 93–119. https://doi.org/10.1177/0272431613511331

Townsend-Gervis, M., Cornell, P., & Vardaman, J. M. (2014). Interdisciplinary rounds and structured communication reduce readmissions and improve some patient outcomes. *Western Journal of Nursing Research*, *36*(7), 917–928. https://doi.org/10.1177/0193945914527521

Valentine, M. A., Nembhard, I. M., & Edmondson, A. C. (2012). Measuring teamwork in health care settings: A review of survey instruments. *Medical Care*, *53*(4), 16–30. https://doi.org/10.1097/MLR.0b013e31827feef6

Vogus, T. J., & McClelland, L. E. (2016). When the customer is the patient: Lessons from healthcare research on patient satisfaction and service quality ratings. *Human Resource Management Review*, *26*(1), 37–49. https://doi.org/10.1016/j.hrmr.2015.09.005

Walden, M., Elliott, E. C., & Gregurich, M. A. (2009). Delphi survey of barriers and organizational factors influencing nurses' participation in patient care rounds. *Newborn and Infant Nursing Reviews*, *9*(3), 169–174. https://doi.org/10.1053/j.nainr.2009.07.001

Yoo, J. W., Kim, S., Seol, H., Kim, S. J., Yang, J. M., Ryu, W. S., … Nakagawa, S. (2014). Effects of hospitalist-directed interdisciplinary medicine floor service on hospital outcomes for seniors with acute medical illness. *Geriatrics and Gerontology International*, *14*(1), 71–77. https://doi.org/10.1111/ggi.12056

Young, E., Paulk, J., Beck, J., Anderson, M., Burck, M., Jobman, L., & Stickrath, C. (2016). Impact of altered medication administration time on interdisciplinary bedside rounds on academic medical ward. *Journal of Nursing Care Quality*, *0*(0), 1. https://doi.org/10.1097/NCQ.0000000000000233

Zwarenstein, M., Goldman, J., & Reeves, S. (2009). Interprofessional collaboration: Effects of practice-based interventions on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews*, (3), CD000072. https://doi.org/10.1002/14651858.CD000072.pub2

Zwarenstein, M., Rice, K., Gotlib-Conn, L., Kenaszchuk, C., & Reeves, S. (2013). Disengaged: A qualitative study of communication and collaboration between physicians and other professions on general internal medicine wards. *BMC Health Services Research*, *13*. Retrieved from http://www.biomedcentral.com/1472-6963/13/494

Chapter Six: Results- Qualitative Findings
Perceptions of Interdisciplinary Rounding Practices

Target Journal: *Journal for Clinical Nursing* (8000 word limit)

Abstract (300 word limit):
Aims and Objectives: To explore practitioner perspectives on the facilitators, barriers and outcomes associated with interdisciplinary rounding practices.
Background: Interdisciplinary rounding practices are a frequently used intervention to promote collaboration and patient-centered care in hospital units. Previous research supports that having interdisciplinary rounding practices in place can lead to greater perceptions of collaboration and practitioner satisfaction, however the practice does not always lead to better outcomes for patients. It is possible that positive patient outcomes are only achieved if interdisciplinary rounding practices work to promote collaborative behaviors between practitioners and with patients. There is still limited understanding on what influences the success of interdisciplinary rounding practices at the individual and organizational levels. This study seeks to explore factors influencing interdisciplinary rounding practices and how the practice affects practitioners and patients.
Design: A qualitative design was used to address the aim of this study. Four open-ended questions were asked via an emailed survey to practitioners across fifteen hospital units in two academic health centers. All hospital units identified as having a structured interdisciplinary rounding practice in place. Practitioners included physicians, nurse practitioners, nurses, pharmacists, case managers, social workers and therapists.
Methods: A directed content analysis of practitioner responses was used to identify key themes.
Results: 141 practitioners responded to the open-ended questions. Three themes emerged from the data: 1) setting the stage; 2) the work of the team; and 3) benefits to patient care
Conclusions: The study provides a nuanced perspective of facilitators, barriers and potential outcomes associated with interdisciplinary rounding practices. Future research is needed to gain additional perspective on the role the organization plays in promoting a healthy work place environment as well as providing patient-centered care.

Perceptions of Interdisciplinary Rounding Practices

In the years since the monumental reports: *To Err is Human* (1999) and *Crossing the Quality Chasm* (2001) were published by the Institute of Medicine, there has been growing emphasis on practices promoting team collaboration in healthcare organizations. Healthcare leaders and practitioners are motivated to establish new practice models addressing growing complexity, new regulatory and reimbursement incentives, and the omnipresent Triple Aim initiative to reduce costs, enhance quality, and improve patient experiences (Berwick et al., 2008). As a result, healthcare organizations respond by initiating new systems of care aimed at addressing the quality metric standards established by regulatory bodies as well as enhancing patient-perceived value in their care. New practice models are often implemented on single hospital units through rapid-cycle improvement processes and present challenges for sustainability and transferability. Therefore, dynamic and continuous evaluation methods are needed to ensure that evidence-based changes are able to survive and thrive in the complex healthcare landscape.

While not a new patient care practice model, interdisciplinary rounding (IDR) is one initiative experiencing a resurgence in focus and inquiry (Mercedes et al., 2016). During IDR, practitioners representing multiple disciplines including nursing, medicine, nurse practitioners (NP), pharmacy, social work, case management and other therapies meet to discuss care plans. The face-to-face discussion can occur at the patient's bedside, in a conference room or as walking rounds in the hallway. Traditionally, rounding practices are thought of as a staple of medical education (Gonzalo et al., 2010). The more traditional, physician-centric type of rounds are often called attending rounds or teaching rounds. Physician-centric rounds typically involve a resident presenting the patient's history and physical, diagnosis, and updates for the day along

with teaching performed by the attending. In these types of rounds, nurses or other team members are infrequently included or consulted (Stickrath et al., 2013). However, many hospital units have embarked on a more interdisciplinary approach to the rounding practice (Gonzalo et al., 2016). For example, Structured Interprofessional Bedside Rounding (SIBR) is a model made popular by a group out of Emory University Hospital that involves a scripted discussion between the healthcare team and the patient at the bedside (Stein et al., 2015). A standard SIBR communication protocol that reviews quality and safety items as well as the plan of care is used by all participants. Practitioners report improved collaboration and communication with structured interdisciplinary rounding practices (Gonzalo, Kuperman, et al., 2014; Kevin J. O'Leary, Haviley, et al., 2011a). Patients also demonstrate improved perceptions of teamwork in their healthcare teams with interdisciplinary rounding practices (Beaird et al., 2017). However, many hospital units still struggle with implementation of such practices (Hendricks et al., 2017).

As with any change in healthcare, the introduction and sustainability of new practice models like IDR comes with multiple cultural and logistical barriers (Verhaegh et al., 2017). As the traditional practice of rounding was essentially dominated by physicians, many nurses and other allied health professionals may feel significant barriers to speaking up and participating in the discussions (Busby & Gilchrist, 1992; Manias & Street, 2001). Nurses historically participated in rounding with physicians in a supportive role, rather than as a participant in shared decision making (Beaird, 2019). Other barriers include that rounding commonly occurs during the morning hours thus coinciding with morning medication administration and multiple other nursing care duties (Young et al., 2016). Other practitioners besides nurses also find themselves pulled in multiple directions at any point in the day. Rounding at a time when there are competing demands places practitioners in a position to make judgment calls about the best

use of their time. For IDR to thrive, we must develop a deeper understanding of what supports effective practices and the effects on both practitioners and patients in terms of their collaborative behaviors, experiences being involved in care planning, and satisfaction.

Background

Current research on IDR focuses on how the practice influences practitioner and patient outcomes. Specifically, scholars have asked if having IDR in place is better for outcomes such as teamwork, practitioner satisfaction and patient outcomes than not (Gonzalo, Wolpaw, Lehman, & Chuang, 2014; Huynh, Basic, Gonzales, & Shanley, 2017; O'Leary, Haviley, et al., 2011a). Generally, scholarly work in this area has produced positive results supporting IDR (Bhamidipati et al., 2016). Practitioners report higher levels of satisfaction and teamwork with IDR. In a 2015 study, Gausvik et al. found higher agreement on team communication, perceptions of safety and job satisfaction among practitioners using IDR compared to a physician-centric model (2015). Similarly, nurses and physicians noted improved efficiency and patient safety with bedside IDR in a 2017 study (Dunn et al., 2017). Consistent with these results, Henkin (2016) noted improved agreement in physicians and nurses' perceptions of interdisciplinary collaboration after the introduction of IDR. Generally, practitioners recognize the benefits of engaging in IDR (Gonzalo, Kuperman, et al., 2014).

While there is support that IDR benefits practitioners in terms of their satisfaction and perceptions of collaboration, the connection to improved patient outcomes is less clear. Some studies found improvement in patient satisfaction and perceptions of teamwork with IDR (Beaird et al., 2017; Luthy et al., 2017; Pritts & Hiller, 2014). However, multiple studies found no change in patient outcomes with the implementation of similar practices (Cornell, Townsend-Gervis, et al., 2014; Malec et al., 2017; O'Leary et al., 2015). Even more ambiguity is found

among the studies measuring the associations of IDR with other frequently used quality measures such as length of stay and safety events. Currently, it appears that there is no direct connection between team care interventions like IDR and improved patient outcomes (Pannick et al., 2015).

One must consider the results of findings on IDR within the context of the study designs and limitations. Many of the studies are based on single-site studies with pre/post designs or comparing units with IDR against controls. While comparison studies are valuable contributions to the literature, the science is still developing and has potential for extending to more nuanced approaches. For example, Hendricks et al., calls for a closer look at different designs of IDR and which patients may benefit most from the practice (2017). Multiple design variations of IDR are present in the literature with inconsistent reporting of features like location, disciplines involved and use of script (Bhamidipati et al., 2016). IDR often looks very different from unit to unit, presenting challenges for the transferability of study findings. Additionally, some models of the practice may not be operationalized as designed within a given unit, presenting further challenges to evaluate its effect. Another limitation is that much of the current literature has failed to root their studies in a conceptual framework. Without a conceptual framework, it is challenging to understand the relationships between rounding practices and outcomes. O'Leary (2016) recognizes these limitations and calls for improvements in the research around IDR. O'Leary's editorial posits that IDR is only able to affect patient outcomes if it works to improve the collaboration between practitioners.

Some models of IDR may not work to improve collaboration as originally intended. For example, Paradis et al. (2015) explored practitioner interactions during IDR in a year-long ethnographic study conducted in an intensive care unit. Despite the unit leadership's belief that

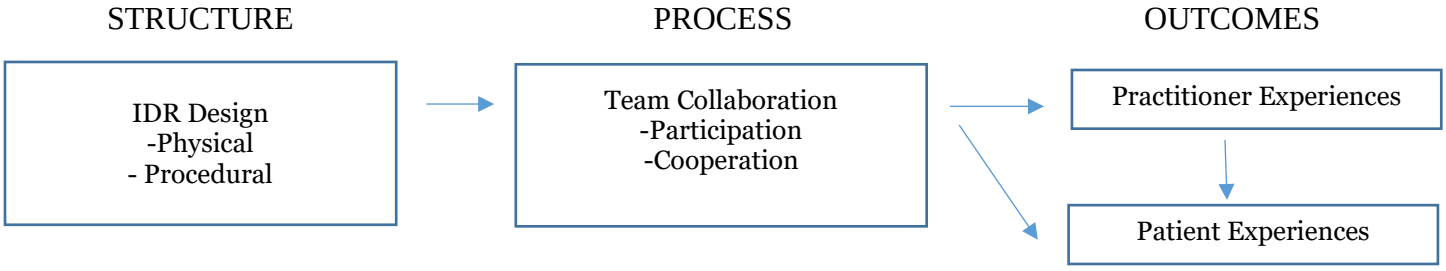
instituting IDR would automatically support team collaboration, the researchers found a number of organizational barriers to achieving this goal. Time constraints, recreated medical hierarchies (i.e., physician dominance over other staff) and a perception that rounds exist primarily to serve the interests of medical education were all impediments to an interdisciplinary rounding practice (Paradis et al., 2015). Merely bringing people together in one place is not enough. Zwarenstein et al. (2013) observed that even though morning IDR was the main forum for disciplines to connect, the directional flow of communication was *from* physicians *to* nurses. These results leave administrative leaders and scholars wondering what exactly contributes to effective and ineffective interdisciplinary rounding practices. The study presented in this paper seeks to close this gap by exploring the important factors affecting IDR across multiple hospital units as well as what practitioners view as the outcomes of the practice.

Conceptual Framework

Considering the results and limitations of previous scholarship on IDR, a conceptual framework was used to guide this study. **Figure 1** illustrates the relationship between IDR, team collaboration and practitioner and patient experiences. The conceptual framework is adapted from Donabedian's Structure, Process, Outcomes model and Gittell's Relational Coordination Theory (Donabedian, 1966; Gittell, 2009). Donabedian's structure, process, outcomes model, from which the framework is based, provides a linear way of assessing quality healthcare delivery. Gittell's Relational Coordination Theory adds specificity by recognizing team meetings as a structural intervention that influences elements of collaboration. Additionally, the conceptual framework draws from O'Leary's position that IDR is only effective at improving patient care if they work to achieve higher levels of team collaboration amongst practitioners (O'Leary et al., 2016). In order to better understand the relationships between the components of

the proposed conceptual framework, the study explores healthcare practitioners' perceptions of factors affecting IDR, team collaboration and concomitant outcomes.

Figure 1. Conceptual Framework



Methods

Practitioners were provided open-ended questions regarding their experience with interdisciplinary rounding. Specifically, the study used a directed content analysis of practitioners' responses to four open-ended questions on a computer-based survey. A directed content analysis approach allows for validation or expansion on the conceptual framework (Hsieh & Shannon, 2005).

Sample

The sample of practitioner respondents was recruited from fifteen inpatient units across two academic health centers over eight months (November 2017-July 2018). Institutional Review Board approval from each institution was received prior to initiating the study. The targeted fifteen inpatient units all reported the presence of an interdisciplinary rounding practice. The units had similar staffing models and nurse to patient ratios. The types of units included general medicine, neurosurgery/neurology, cardiology, vascular surgery, comprehensive/progressive medicine, bone-marrow transplant, organ transplant, orthopedics/trauma, bariatric, and surgical oncology. The units ranged in size from 14 to 34

hospital beds with an average size of 26 beds. Intensive care and specialty units (i.e., pediatrics, operating room, labor and delivery) were not targeted for this study due to their unique unit dynamics. For example, nurse to patient ratios are often much smaller on intensive care units. All units reported that their interdisciplinary rounding practices occurred with the primary physician/NP teams admitting patients to their floor, also called geographic units However, all floors also hosted patients that were served by off-service medical teams that did not have structured interdisciplinary rounding practices. *Off-service* refers to medical teams that are not primarily based on that particular hospital unit, but may admit patients there due to bed management considerations. The targeted practitioners for the sample included nurses, physicians, nurse practitioners, pharmacists, social workers, case managers, physical and occupational therapists from the primary teams that admitted to the geographic units. For the purposes of this study, physicians and nurse practitioners will collectively be called licensed independent practitioners (LIP) as their role is similar on the participating units. Targeted practitioners were emailed an initial introduction to the study followed by an emailed link with the survey. Reminder emails were sent twice after one- and two-weeks (Dillman, 2000).

Design

The four open-ended questions used for the study focused on facilitators and barriers affecting interdisciplinary rounding practice and its outcomes. The questions were developed as open-ended and broad, but based on the conceptual framework (See figure 1). The questions were: 1) *What do you see as the benefits of your unit holding interdisciplinary rounding practices as compared to if you did not have interdisciplinary rounding practices in place?*; 2) *What contributes to effective interdisciplinary rounding practices on your unit?*; 3) *What contributes to ineffective interdisciplinary rounding practices on your unit?*; and 4) *If you could*

change something about the current interdisciplinary rounding practices, what would it be and why?.

Characteristics of Respondents

A total of 218 practitioners across fifteen units initiated the survey. Of the 218 practitioner responses, 44 were removed due to having incomplete demographic information for the purposes of analysis. None of the 44 individuals removed contained responses to the open ended questions. A total of 141 (80%) practitioners responded to at least one of the open-ended questions on the survey and thus were included for analysis. There were no significant differences in demographics between the practitioners that completed the survey without answering the open-ended questions and the 141 that did. These 141 practitioners serve as the sample for the study. There was an average of 9.4 respondents per unit with a range of 6-14. The average age of the sample was 37.4 years old. The majority was female (89%) and white (86%). Most of the respondents were nurses (70%) with the remainder being comprised of case managers and social workers (8%), licensed independent practitioners (10%) and other roles that included pharmacists, physical, occupational or respiratory therapists (12%). The sample was evenly split between those serving in their role fewer than five years and those for more than five years. However, only 34% of the sample had been on their unit for more than five years.

Data analysis and reporting

Once the data were collected, the responses were organized by question. A spreadsheet was created with a separate sheet for each question. Individual practitioners' responses were placed on their appropriate sheet. An initial reading of the responses by the principal investigator (PI) elicited first impressions and thoughts of the responses. Analyzing the responses question by question as opposed to respondent by respondent allowed the PI to get a more complete feel for

the group's beliefs about a specific question. The PI used a constant comparative approach using line-by-line coding by hand, followed by the identification of categories and then key themes across questions (Curry et al., 2009). Methods to insure rigor in the qualitative data analysis include reflecting throughout the process, member-checks, and making all data available to the other authors. Once the PI identified initial codes and categories, she member-checked with the second author (MB). The PI and second author reviewed and adjusted the identified categories before arriving at a final set of themes. Next, the final themes were shared with the third author (KRW) and no further changes were made.

Results

A total of 454 codes were assigned to the data after line-by-line review. Following this, twenty categories were developed and analyzed for grouping into themes. Three themes emerged from the data: 1) setting the stage, 2) the work of the team, and 3) benefits to patient care. *Setting the stage* contained nine categories, *the work of the team* represents six categories and five categories fall under *benefits to patient care*.

Setting the Stage

The first theme contained the most categories (9) covering concepts such as the importance of team member presence and logistical considerations when instituting interdisciplinary rounding practices. The respondents spoke about contributing factors at the unit/organizational level, the timing and structural characteristics of rounds, and the importance of team member preparation for the discussion.

Respondents noted that getting the right people to the discussion at the right time was vital to the success of the practice. Many respondents spoke to the importance of having all the team members present. The roles of social work and case management were noted as especially

important to the conversation by many respondents. When team members were missing or there was inconsistent attendance, the discussion was not as productive. One nurse participant spoke to the importance of calling on the team to hold each other accountable "*to participate in interdisciplinary rounds. Encouraging nurses to enter the patient's room with the medical team while they are doing rounds*". Contributing factors to having consist team members present included a standard notification system for when rounds begin and the expectation that engaging in the rounding discussion was mandatory. On some units there was an announcement made on the loud speaker at the start of rounds, other units started at the same time every day, while some teams called the nurse who took care of the patient when the IDR was ready to discuss their patient. Many respondents spoke to the importance of nursing leadership and staffing models as contributing factors to getting the team present at rounds. When staff nurses were busy with patient care, having a staffing model that allows charge nurses or clinical coordinators to represent the nursing perspective was important. While having representation by all disciplines was viewed as important, the inconsistency in care teams was noted as a potential barrier to having well-prepared contributors to IDR discussions. Since teaching hospital units often rotate resident teams every two weeks, the constant turnover in teams made establishing a consistent practice and rhythm challenging. It was noted that team members may benefit from a more structured training or orientation on how to participate in rounds in order to mitigate the challenges associated with turnover of teams.

Next, respondents highlighted a number of structural considerations such as location and timing that impacted IDR. There was no prevailing consensus of an ideal location for IDR. However, many respondents cited features about various locations that impacted their ability to participate and for IDR to be effective. For example, some felt that the hallway was a busy

location for important discussions. Other respondents felt as though it was challenging to get to a conference room for IDR during a busy part of their day. Many spoke to the importance of the bedside location where the patient could be involved in the conversation. Predominantly, most spoke to the importance of having IDR held in a consistent location.

The timing of rounds was a recurring point of consideration from the respondents. On each of the floors surveyed, rounds occurred in the morning and mostly at consistent times. Some respondents felt that having rounds early in the day was troublesome because they had not had the opportunity to fully assess their patients and prepare for rounding. One nurse felt that rounds were taking valuable time away from needed nursing care rather than viewing the practice as a means to effective care planning, indicated in the statement: "*On average, we lose 30-45 minutes of the busiest part of the day to rounds".* A charge nurse echoed a similar sentiment noting the redundancies in their unit's rounding practices and the lack of consideration for nurses' work: "*multiple check-ins to discuss the same thing, nurses working around everyone else's schedule and taking more on without understanding the flow of nursing care delivery and our busy/risky times of the day"*. In some cases, nurses were expected to take part in the bedside rounds but then participate in another discharge rounds discussion once all patients had been seen. The strategies noted that helped mitigate timing issues fell on opposite ends of the spectrum. Some units prescheduled the times for each patient so that the nursing staff knew exactly what time they would expect the team to arrive at an individual patient room. Another strategy was more flexible where nursing staff rotated into a conference room to present their patients and then tagged the next available nurse when they were finished.

Consistently, nurses stated that some kind of structure was a positive contributor to effective interdisciplinary rounding practices. Nurses noted a lack of structure with off-service

teams and the patients they cover. The off-service teams did not carry out structured interdisciplinary rounding practices and therefore nurses could not predict the time or location for a discussion on the daily care plans. The unpredictability with off-service teams was viewed as a barrier to effective patient care by many respondents as there was little opportunity for collaboration. Similarly, some respondents noted a need for IDR on weekends as information was often lost.

Once everyone was present for the discussion, the next important element contributing to successful interdisciplinary rounding practices was the preparation of team members. Just being present was not enough, one needed to be able to effectively relay their discipline's perspectives of the patient's problems. One respondent listed the following as important elements to an effective rounding practice: *"when nurses and the leader of rounds is [sic] prepared and ready and able to ask appropriate questions about each patient, when each provider is aware of the roles of the others and are familiar with the progress they have made with each patient being referenced, when each provider respects the clinical opinion of the others and does not try to influence their decisions".* Some respondents noted that preparation using scripts were especially helpful with making sure important content was covered. An attending physician noted the following suggestions for preparation for the discussion, "*formal scripts help.* [Also] *nurses looking at the physician progress notes and not relying solely on nursing report to understand the patient's diagnosis and active issues".* In summary, respondents felt that being prepared for rounds is just as, if not more, important than being present.

The first theme highlights the significant logistics and organizational undertaking required by individual practitioners, units and systems to support interdisciplinary rounding.

Supporting the right team at the right place and time with the right information is necessary even before IDR is initiated.

The Work of the Team

The second theme that emerged from the data describes the interactions of the team members during IDR. The theme covered six categories that included concepts such as how IDR contributes to a spirit of team collaboration, how the practice engages nursing staff, the importance of maintaining respect throughout the discussion and mitigating competing demands on practitioners.

Participating in IDR is important for fostering team collaboration. When the discussions are positive, a feedback loop is created catalyzing a greater spirit of collaboration amongst the team members. A nurse noted: "*the more face-to-face time we have together, the more we know each other and then trust one another"*. Respondents noted that having IDR made their work more effective and efficient, "[when] *each nurse participates in rounds on their assigned patients*- [and] *gives and receives the most up the date plan and important information and can get orders placed in real-time instead of having to page or wait until later"*. Many noted that IDR served as an opportunity to "*get on the same page"* regarding barriers to discharge, daily goals, new treatment decisions and safety alerts.

For nurses, rounds are an especially important opportunity for participation in patient care planning as well as providing greater insight into treatment decisions. Many of the nurse respondents noted how IDR has a direct impact on the care they deliver as it, "*helps keep the nurses involved in the plan and gives us an easy way to communicate with the doctors. We can then adjust our assignments based on the plans for the patient such as discharge, procedures, etc."*. Participating in care planning with a diverse group of practitioners also affords greater

understanding of treatment plans that may otherwise be elusive. One nurse noted that without IDR they would, *"feel like I would be working as a needlessly blind person. It makes me feel uneasy completing provider ordered tasks that I must use the best guess method of explaining why I must do said task".* IDR offers needed clarity on plans of care and rationale for treatment decisions.

Maintaining respect for both peers and the process is important for IDR's success. One practitioner noted that rounds are ineffective "*when staff is not prepared or responsive to questions asked about each patient, when providers are not receptive to opinions of others,* [and] *when lengthy conversations are held or questions that do not pertain to a patient's hospital stay are asked".* Many respondents commented how side conversations or distractions (i.e., pagers, phones) can lead to a nonproductive conversation and indicate a lack of respect to the goals of the discussion. There were instances of disrespect noted to occur during rounds as one nurse noted that "*verbal negative, abrupt interjections into the discussion, any negative innuendos or curt remarks"* contribute to ineffective work. To summarize the second theme, most respondents find IDR useful for establishing a shared-mental model amongst team members so long as interactions are collaborative in nature.

Benefits to Patient Care

The final theme identified discussed the benefits of IDR on patient care. The theme emerged from five categories indicating that IDR is critical for care planning as well as providing an opportunity for patients to interface with the team.

Respondents noted that holding IDR on their unit was important for providing better patient care. Respondents view the practice as a vital component for discharge planning and increasing efficiency. Multiple respondents commented on how the absence of a structured IDR

practice can be detrimental to patient care. Specifically, nurses noted the differences between caring for their unit's primary medical teams' patients with whom they have the opportunity to do IDR and the off-service patients with whom formalized, routine rounds do not occur. One nurse commented on the inequity with off-service patients, stating *"we do not get to meet with off-service patients; patients do not receive the same care from an off-service team; patients should be on the unit with their teams with few exceptions*". Meeting with primary medical teams during IDR provides team members access to one another in ways that they do not get with off-service teams. Access allows disciplines to recognize how they each contribute to the care plan. One pharmacist framed this point while discussing patient-centered care: "*The care of the patient can be tailored to the individual patient better, when all the limitations/strengths of each practice area is known. Communication greatly decreases errors and duplicate work*". Practitioners recognize how their own disciplines are limited in providing the patient everything they need. Patient-centered care requires the perspectives of multiple individuals.

Several respondents reported that IDR enhanced the patient experiences of more coordinated care and having the opportunity to work with their team. Without IDR, a nurse notes that the *"patient's care plan will be ineffective and* [creates*]much* (sic) *confusion, this will bring much dissatisfaction to the patient, perhaps even delay or interrupt his medical care".* Additionally, rounding at the bedside provided important benefits to patients. One nurse also stated that having a practice that forces practitioners to be at the bedside is more effective, "*Interdisciplinary rounding allows the providers to be in the patient's room with eyes on the patient, so they are seeing the same things the nurses are seeing. With the providers at the bedside the nurse is able to bring up concerns and have the providers respond in real time, with actual visual input instead of over the phone or over page communication. The patient is also*

then able to provide input, which can keep phone tag from being played later". The visual presence of the interdisciplinary team at the bedside also helps to increase patient experiences of feeling involved in their care, as one respondent states, "*We present as a team to the patient's bedside, which shows the patient we are all working together"*. While only 40% of the units had rounding at the bedside, respondents still indicated that the practice of holding IDR in any location is an important component to providing effective patient care.

Discussion

This study revealed three themes associated with IDR: 1) setting the stage; 2) the work of the team; and 3) benefits to patient care. The themes highlight important organizational and individual factors contributing to effective practices on hospital units. Additionally, the results uncover information and new questions about how participating in IDR can affect practitioners and patients in different ways. Lastly, the conceptual framework guiding the study serves as a potential map for future inquiry.

Organizational Factors Influencing Interdisciplinary Rounding Practices

The first theme, *setting the stage*, calls for purposeful attention towards organizational factors associated with holding IDR. This finding is consistent with other studies looking at the facilitators and barriers to IDR (Hendricks et al., 2017). While individual traits such as communication skills and valuing IDR may influence the practice's effectiveness, organizational factors affecting the logistics of implementation may also play a significant role. Hendricks et al., (2017) identified organizational alignment, geo-located teams, compatible daily schedules and readiness for change as facilitators to IDR. The present study provides additional information on how location, process of staff notification and staffing models facilitate effective IDR. Hospital units must consider the facilitators at the organizational level as well as the

individual level to achieve success (Hendricks et al., 2017; Paradis et al., 2015). A well prepared and motivated team can still be ineffective if scheduling, staffing and space do not support productive conversations about patient care.

The timing of IDR was also confirmed as an important factor affecting how practitioners participate in the practice. IDR typically occurs during a busy time of day for all staff members. While many of the respondents suggested that changing the time of the rounding practice itself may be most helpful, other strategies reported in the literature include adjusting other work typically performed during the same time. For example, altering medication administration times (moving from 9:00am to 7:00am) which previously helped foster greater communication and teamwork climate during IDR (Young et al., 2016). It is important for hospital units to assess the competing demands on staff such as routine medication administration protocols that may prevent team members from attending rounds. Practitioners recognize their time is valuable. If they view IDR as redundant or unnecessary, as some respondents in this study indicated, then they will not be motivated to make time for the discussion. Perhaps some practitioners feel a sense of *collaborative overload.* Collaborative overload is the phenomenon of instituting collaborative activities with little perceived value-added (Cross, Rebele, & Grant, 2016). Hospital units seeking to implement IDR may want to consider timing considerations and competing demands when designing their practices. Perhaps there are other care activities, like medication administration, that could be adjusted to reduce the competing demands on practitioners during IDR.

Presence, Preparation, and Participation

One of the most critical factors influencing the success of IDR was the quality of engagement by and between individual staff members in the discussion. Not only was being

present at rounds important, but being prepared and actively participating was equally fundamental. While organizational factors such as timing may influence whether an individual practitioner is present and prepared, there are other factors affecting participation. This study revealed that some interactions in rounding discussions are negative. For example, a number of respondents reported being ignored, skepticism amongst their colleagues, abrupt interjections and condescending attitudes at times in the discussion. These findings support similar results by Paradis et al.'s (2015) ethnographic study of IDR in an intensive care unit. Paradis et al. found that physicians often projected a dominance over other staff members that made them feel hesitant to participate as equal partners. As IDR is the main opportunity for face-to-face interactions between practitioners, it is vital that they reinforce positive collaborative behaviors. Otherwise, IDR may serve to perpetuate negative unit cultures when the very existence of the practice is meant to support collaboration (Paradis et al., 2015). Respondents in this study put a significant emphasis on how they were treated by their colleagues during IDR as an important factor for its success. The emphasis on external factors such as how colleagues treat one another affecting participation in IDR offers a different perspective than another study assessing facilitators and barriers to IDR. Hendricks et al. (2017) did not find external factors but did suggest additional internal factors affecting participation such as practitioners' own confidence in their communication skills. Thus both the internal confidence of an individual to participate and the level of acceptance and respect offered by colleagues are important for a successful discussion.

IDR has a strong potential to promote healthy work environments. The findings indicate that IDR is where collaboration is manifested on a day-to-day basis. Therefore, the practice should be considered as a focus for research into healthy work environments, especially for

nursing staff who place significant value on the interpersonal relationships and involvement in decision-making about care processes experienced in their jobs (Van Bogaert, Kowalski, et al., 2013). It is possible that IDR may be one of the few opportunities for nurses and other team members to communicate deliberately face-to-face during a busy shift. It is known that positive interactions with peers and participation in clinical decision making are hallmarks of a professional nursing practice setting (Rendon & Stanley, 2002). It has also been demonstrated that nurse-physician relationships influence nursing job satisfaction, turnover and burnout (Van Bogaert, Clarke, et al., 2013). Therefore, there is a need to explore the role that participation in IDR plays in achieving overall job satisfaction, joy in work, and even further to retention and turnover for nurses and other practitioners as well.

Interdisciplinary Rounding Practices and Patients

IDR influences the experiences of patients as well as practitioners. While much research on IDR focuses on its effect on clinical outcomes such as length of stay, there is also a significant push to discover how the practice impacts patients' experiences and involvement in their care (Bhamidipati et al., 2016). Respondents in this study reported how bedside IDR allowed the patient to see their team and be a part of the conversation about their care. The experience of seeing and engaging with the team at work is a more complex construct than being satisfied, however patient satisfaction is one of the most common outcome measures of choice when evaluating patients' experience of IDR (Shale, 2013; Wolf, Niederhauser, Marshburn, & Lavela, 2014). As noted by others, more research is needed that explore a broader range of concepts related to patient experiences or patient-centeredness (Bachnick et al., 2018). Some researchers have attempted to capture concepts of patient-centeredness by assessing how IDR impacts patient experiences beyond just satisfaction. O'Leary et al. (2015) explored the effect of

a bedside IDR on patients' preferred and experienced role in decision making and activation, that is, the degree to which one feels confident in managing their own health. However, no differences in patient outcomes were found. Beaird et al. (2017) concluded that patients exposed to IDR perceived higher levels of teamwork in their medical team compared to patients exposed to a more physician-centric model. Yet, there are still questions on what that means for patients' overall care experience. The results from this study indicate that IDR serves as an opportunity for the patient's voice to be incorporated into planning their treatment. While the study only accounted for practitioners' perspectives, many respondents still indicated that the practice opened up opportunities for a personalized discussion as each discipline has unique insight into the patient situation. The incorporation of the patient voice can occur in any location (not just the bedside), as long as the team brings the patient's goals and aims to the forefront of the discussion. The results raise an important question about IDR and the role it plays in providing patient centered care. To what extent is IDR able to produce care plans that are more congruent with what matters to the patient?

Conceptual Framework and Implications for Research

This study extends previous work by considering how IDR affects both practitioners and patients within the context of a conceptual framework. The structure, process, outcomes model is linear; each step affecting the next. The conceptual framework guiding this study suggests that IDR must be implemented in a way that supports elements of collaboration before practitioners and patients can realize subsequent positive outcomes. The results support this framework by indicating that when IDR is collaborative and positive, then the practice is viewed as an important component to quality patient care. However, the practice falls flat if negative team behaviors are exhibited. Other researchers drew similar conclusions stating that the primary

benefits of IDR were improved teamwork and coordination rather than *directly* benefiting patients (Gonzalo, Kuperman, et al., 2014). Thus, it is important for practitioners and healthcare leaders to continuously evaluate the effectiveness of IDR at enhancing collaboration between team members.

To further develop the conceptual framework proposed, future research should consider study designs that test elements of collaboration as mediators of IDR and outcomes. While the qualitative approach used in this study offers the benefit of a nuanced perspective of collaboration on an inpatient unit, quantitative instruments for measuring collaboration are necessary to move the science forward. However, accurately assessing collaboration is not void of challenges. As indicated earlier, there are external and internal factors at the individual level influencing how collaborative behavior is actualized. Additionally, team and organizational factors also affect collaborative behavior. Capturing the multiple facets of collaboration is a challenge for researchers. Careful consideration of the setting and type of team being evaluated is necessary for accurate measurement of collaboration (Valentine et al., 2012).

Limitations

It is important to review the results of this study within the context of the limitations. The study took place at two academic health centers on general inpatient units. Therefore, it may be difficult to generalize results to community-based, private hospitals or more specialized units with different staffing models. It is also important to note that the majority (70%) of the respondents were nurses. Therefore, the results may not represent a completely balanced perspective from all disciplines. Future research need to consider more purposeful sampling to ensure all voices are heard, as well as to contrast and compare different disciplinary perspectives about their views of IDR practices. Additionally, the patient's perspective was not directly

included in this study. While the results point towards some potential benefits to patients, they must be considered in light of the fact that they were derived from the practitioners' perspectives. Future research should consider a more purposeful incorporation of the patient's perspective. Lastly, there are many limitations that come with a qualitative study using a computer-based survey. The design did not allow for follow-up questions and respondents were not able to ask for clarification. Future studies should use semi-structured interviews or focus groups in order to gain more complete perspectives.

Conclusion

The resurgence of IDR initiatives in the first two decades of the 21st century is rooted in a national healthcare system priority on improving collaboration to improve patient outcomes. Scholarship to date supports that IDR may enhance collaboration and satisfaction amongst practitioners, but benefits to patients are unclear. This study reveals important facilitators, barriers, and outcomes to IDR. The results provide new granularity on the significant preparation that needs to be considered at the individual and organizational levels in order for rounds to be successful at promoting collaboration between practitioners. The results confirm that just having IDR in place does not automatically produce improved outcomes. It was found that the quality of the interactions that takes place between practitioners is vital for IDR to be considered a worthwhile practice, thus supporting the conceptual framework guiding the study, placing collaboration as the hinge before positive outcomes can be achieved. Additionally, the results raise important questions about the role that IDR has in supporting a healthy work place environment on hospital units. Lastly, the study highlighted how IDR may work to influence patient experiences to include more interface time with the team and input into care plan decisions. Each of the three themes: 1) setting the stage; 2) the work of the team; and 3) benefits

to patient care highlight areas that should be considered when implementing IDR or evaluating current practices, as well as potential considerations for future research in this area.

References

Bachnick, S., Ausserhofer, D., Baernholdt, M., & Simon, M. (2018). Patient-centered care, nurse work environment and implicit rationing of nursing care in Swiss acute care hospitals: A cross-sectional multi-center study. *International Journal of Nursing Studies*, *81*(October 2017), 98–106. https://doi.org/10.1016/j.ijnurstu.2017.11.007

Beaird, G., Dent, J. M., Keim-Malpass, J., Jian Muller, A. G., Nelson, N., & Brashers, V. (2017). Perceptions of teamwork in the interprofessional bedside rounding process. *Journal for Healthcare Quality*, *39*(2). https://doi.org/10.1097/JHQ.0000000000000068

Berwick, D. M., Nolan, T. W., & Whittington, J. (2008). The triple aim: Care, health, and cost. *Health Affairs*, *27*(3), 759–769. https://doi.org/10.1377/hlthaff.27.3.759

Bhamidipati, V. S., Elliott, D. J., Justice, E. M., Belleh, E., Sonnad, S. S., & Robinson, E. J. (2016). Structure and outcomes of interdisciplinary rounds in hospitalized medicine patients: A systematic review and suggested taxonomy. *Journal of Hospital Medicine*, *11*(7), 513–523. https://doi.org/10.1002/jhm.2575

Busby, A., & Gilchrist, B. (1992). The role of the nurse in the medical ward round. *Journal of Advanced Nursing*, *17*(3), 339–346. https://doi.org/10.1111/j.1365-2648.1992.tb01912.x

Cornell, P., Townsend-Gervis, M., Vardaman, J. M., & Yates, L. (2014). Improving situation awareness and patient outcomes through interdisciplinary rounding and structured communication. *The Journal of Nursing Administration*, *44*(3), 164–169. https://doi.org/10.1097/NNA.0000000000000045

Cross, R., Rebele, R., & Grant, A. (2016). Collaborative overload. *Harvard Business Review*, (February), 74–79.

Curry, L. A., Nembhard, I. M., & Bradley, E. H. (2009). Qualitative and mixed methods provide

unique contributions to outcomes research. *Circulation*, *119*(10), 1442–1452. https://doi.org/10.1161/CIRCULATIONAHA.107.742775

Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method*. New York, NY: Wiley.

Donabedian, A. (1966). Evaluating the Quality of Medical Care. *Millbank Memorial Fund*, *44*(3), 166–206.

Dunn, A. S., Reyna, M., Radbill, B., Parides, M., Colgan, C., Osio, T., … Kaplan, H. (2017). The impact of bedside interdisciplinary rounds on length of stay and complications. *Journal of Hospital Medicine*, *12*(3), 137–142. https://doi.org/10.12788/jhm.2695

Gausvik, C., Lautar, A., Miller, L., Pallerla, H., & Schlaudecker, J. (2015). Structured nursing communication on interdisciplinary acute care teams improves perceptions of safety, efficiency, understanding of care plan and teamwork as well as job satisfaction. *Journal of Multidisciplinary Healthcare*, *8*, 33–7. https://doi.org/10.2147/JMDH.S72623

Gittell, J. H. (2009). *High performance healthcare: Using the power of relationships to achieve quality, efficiency and resilience*. McGraw Hill Professional.

Gonzalo, J. D., Chuang, C. H., Huang, G., & Smith, C. (2010). The return of bedside rounds: An educational intervention. *Journal of General Internal Medicine*, *25*(8), 792–798. https://doi.org/10.1007/s11606-010-1344-7

Gonzalo, J. D., Himes, J., McGillen, B., Shifflet, V., & Lehman, E. (2016). Interprofessional collaborative care characteristics and the occurrence of bedside interprofessional rounds: A cross-sectional analysis. *BMC Health Services Research*, *16*, 459. https://doi.org/10.1186/s12913-016-1714-x

Gonzalo, J. D., Kuperman, E., Lehman, E., & Haidet, P. (2014). Bedside interprofessional

rounds: Perceptions of benefits and barriers by internal medicine nursing staff, attending physicians, and housestaff physicians. *Journal of Hospital Medicine, 9*(10), 646–651. https://doi.org/10.1002/jhm.2245

Gonzalo, J. D., Wolpaw, D. R., Lehman, E., & Chuang, C. H. (2014). Patient-centered interprofessional collaborative care: Factors associated with bedside interprofessional rounds. *Journal of General Internal Medicine*, *29*(7), 1040–1047. https://doi.org/10.1007/s11606-014-2817-x

Hendricks, S., LaMothe, V. J., Kara, A., & Miller, J. (2017). Facilitators and barriers for interprofessional rounding: A qualitative study. *Clinical Nurse Specialist*, *31*(4), 219–228. https://doi.org/10.1097/NUR.0000000000000310

Henkin, S., Chon, T. Y., Christopherson, M. L., Halvorsen, A. J., Worden, L. M., & Ratelle, J. T. (2016). Improving nurse-physician teamwork through interprofessional bedside rounding. *Journal of Multidisciplinary Healthcare*, *9*, 201–205. https://doi.org/10.2147/JMDH.S106644

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277–1288. https://doi.org/10.1177/1049732305276687

Huynh, E., Basic, D., Gonzales, R., & Shanley, C. (2017). Structured interdisciplinary bedside rounds do not reduce length of hospital stay and 28-day re-admission rate among older people hospitalised with acute illness: An Australian study. *Australian Health Review*, *41*(6), 599–605. https://doi.org/10.1071/AH16019

Institute of Medicine. (1999). To err is human: Building a safer health system. Washington, DC: National Academy Press.

Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC.

Luthy, C., Francis Gerstel, P., Pugliesi, A., Piguet, V., Allaz, A.-F., & Cedraschi, C. (2017). Bedside or not bedside: Evaluation of patient satisfaction in intensive medical rehabilitation wards. *PloS One, 12*(2), e0170474. https://doi.org/10.1371/journal.pone.0170474

Malec, A., Mork, A., Hoffman, R., & Carlson, E. (2017). The care team visit: Approaching interdisciplinary rounds with renewed focus. *Journal of Nursing Care Quality*. https://doi.org/10.1097/NCQ.0000000000000279

Manias, E., & Street, A. (2001). Nurse-doctor interactions during critical care ward rounds. *Journal of Clinical Nursing, 10*(4), 442–50. https://doi.org/10.1046/j.1365-2702.2001.00504.x

Mercedes, A., Fairman, P., Hogan, L., Thomas, R., & Slyer, J. T. (2016). Effectiveness of structured multidisciplinary rounding in acute care units on length of stay and satisfaction of patients and staff: A quantitative systematic review. *JBI Database of Systematic Reviews and Implementation Reports, 14*(7), 131–168. https://doi.org/10.11124/JBISRIR-2016-003014

O'Leary, K. J., Haviley, C., Slade, M. E., Shah, H. M., Lee, J., & Williams, M. V. (2011). Improving teamwork: impact of structured interdisciplinary rounds on a hospitalist unit. *Journal of Hospital Medicine, 6*(2), 88–93. https://doi.org/10.1002/jhm.714

O'Leary, K. J., Johnson, J. K., & Auerbach, A. D. (2016). Do interdisciplinary rounds improve patient outcomes? Only if they improve teamwork. *Journal of Hospital Medicine, 11*(7), 524–525. https://doi.org/10.1002/jhm.2587

O'Leary, K. J., Killarney, A., Hansen, L. O., Jones, S., Malladi, M., Marks, K., & M Shah, H.

(2015). Effect of patient-centred bedside rounds on hospitalised patients' decision control, activation and satisfaction with care. *BMJ Quality and Safety, 0*, 1–8. https://doi.org/10.1136/bmjqs-2015-004561

Pannick, S., Davis, R., Ashrafian, H., Byrne, B. E., Beveridge, I., Athanasiou, T., … Sevdalis, N. (2015). Effects of interdisciplinary team care interventions on general medical wards: A systematic review. *JAMA Internal Medicine, 175*(8), 1288–1298. https://doi.org/10.1001/jamainternmed.2015.2421

Paradis, E., Leslie, M., & Gropper, M. A. (2015). Interprofessional rhetoric and operational realities: An ethnographic study of rounds in four intensive care units. *Advances in Health Sciences Education, 21*(4), 1–14. https://doi.org/10.1007/s10459-015-9662-5

Pritts, K. E., & Hiller, L. G. (2014). Implemention of physician and nurse patient rounding on a 42-bed medical unit. *MedSurg Nursing, 23*(6), 408–413.

Rendon, D., & Stanley, J. (2002). Hallmarks of the professional nursing practice environment. *Journal of Professional Nursing*, *18*(5), 295–304. https://doi.org/10.1053/jpnu.2002.129231

Shale, S. (2013). Patient experience as an indicator of clinical quality in emergency care. *Clinical Governance: An International Journal, 18*(4), 285–292. https://doi.org/10.1108/CGIJ-03-2012-0008

Stein, J., Payne, C., Methvin, A., Bonsall, J. M., Chadwick, L., Clark, D., … Dressler, D. D. (2015). Reorganizing a hospital ward as an accountable care unit. *Journal of Hospital Medicine, 10*(1), 36–40. https://doi.org/10.1002/jhm.2284

Stickrath, C., Noble, M., Prochazka, A., Anderson, M., Griffiths, M., Manheim, J., … Aagaard, E. (2013). Attending rounds in the current era: what is and is not happening. *JAMA Internal Medicine, 173*(12), 1084–1089. https://doi.org/10.1001/jamainternmed.2013.6041

Valentine, M. A., Nembhard, I. M., & Edmondson, A. C. (2012). Measuring teamwork in health care settings: A review of survey instruments. *Medical Care*, *53*(4), 16–30. https://doi.org/10.1097/MLR.0b013e31827feef6

Van Bogaert, P., Clarke, S., Willems, R., & Mondelaers, M. (2013). Nurse practice environment, workload, burnout, job outcomes, and quality of care in psychiatric hospitals: A structural equation model approach. *Journal of Advanced Nursing*, *69*(7), 1515–1524. https://doi.org/10.1111/jan.12010

Van Bogaert, P., Kowalski, C., Weeks, S. M., Van heusden, D., & Clarke, S. P. (2013). The relationship between nurse practice environment, nurse work characteristics, burnout and job outcome and quality of nursing care: A cross-sectional survey. *International Journal of Nursing Studies*, *50*(12), 1667–1677. https://doi.org/10.1016/j.ijnurstu.2013.05.010

Verhaegh, K. J., Seller-Boersma, A., Simons, R., Steenbruggen, J., Geerlings, S. E., de Rooij, S. E., & Buurman, B. M. (2017). An exploratory study of healthcare professionals' perceptions of interprofessional communication and collaboration. *Journal of Interprofessional Care*, *31*(3), 397–400. https://doi.org/10.1080/13561820.2017.1289158

Wolf, J. a, Niederhauser, V., Marshburn, D., & Lavela, S. L. (2014). Defining patient experience. *Patient Experience Journal*, *1*(1), 7–19.

Young, E., Paulk, J., Beck, J., Anderson, M., Burck, M., Jobman, L., & Stickrath, C. (2016). Impact of altered medication administration time on interdisciplinary bedside rounds on academic medical ward. *Journal of Nursing Care Quality*, *0*(0), 1. https://doi.org/10.1097/NCQ.0000000000000233

Zwarenstein, M., Rice, K., Gotlib-Conn, L., Kenaszchuk, C., & Reeves, S. (2013). Disengaged: A qualitative study of communication and collaboration between physicians and other

professions on general internal medicine wards. *BMC Health Services Research, 13*. Retrieved from http://www.biomedcentral.com/1472-6963/13/494

Chapter Seven: Discussion and Conclusion

The purpose of this research was to explore associations between IDR, team collaboration, and practitioner and patient experiences. Prior to initiating the study, a literature review of current research as well as an historical analysis of the nurse's role in rounding

practices provided important contextual information that aided in study design and interpreting findings. Two manuscripts (Chapters Three and Four) resulted from this initial foundational work. Two other manuscripts resulted from the primary research study. The first of these manuscripts (Chapter Five) presents the findings from the quantitative data collected in the study. The second manuscript contains the findings from the content analysis of the qualitative data collected (Chapter Six). This final chapter will unify the different sections of the dissertation and summarize the dissertation's key findings and contributions to the current state of the science around IDR. Implications for practice along with limitations and lessons learned will also be discussed. Lastly, the chapter will conclude with recommendations for future research in this area.

Key Findings and Contributions

The systematic literature review of current research on IDR and its associations with practitioner and patient experiences yielded mixed findings. The results indicated that practitioners generally agree that having IDR leads to better collaboration with their peers than when they are not in place. However, evidence for IDR's association with improved patient experiences is limited. We found inconclusive evidence that IDR made significant differences in patient outcomes, thus suggesting that some IDR practices are more effective than others. These findings were consistent with other literature reviews that failed to find an effect of interdisciplinary interventions on patient outcomes (Pannick et al., 2015). Conclusions drawn from the literature review sparked a search for a better understanding of the relationship between IDR, collaboration and outcomes for both patients and practitioners. The investigation narrowed with noting the significant variations in designs of IDR, as well as the inconsistency in reporting of such features (Bhamidipati et al., 2016).

Prior to conducting the dissertation research, an historical analysis of nurses' involvement in rounding helped provide important context to the barriers of effective practices. Historical journals and documents described rounding as part of the physician's domain. Participation of nurses in rounding with physicians was either for the purposes of their own education or as support (i.e., taking notes, pulling charts). After World War II, it was found that in some cases, nurses shunned participation in rounding with physicians to exercise their growing autonomy and professional status. The counterproductive behavior as well as the lingering hierarchical relationship between physicians and other healthcare team members likely contributed to continued tensions and lack of collaboration during rounding practices well into the 21st century (Busby & Gilchrist, 1992; Hill, 2003; Manias & Street, 2001; Paradis et al., 2015; Zwarenstein et al., 2013).

Together, the results of the literature review and the historical analysis, along with other leading theoretical frameworks, helped form the conceptual framework guiding the dissertation research (Donabedian, 1966; Gittell & Suchman, 2011). In the conceptual framework, IDR is positioned as a structural characteristic that fosters collaborative behaviors amongst team members and patients thus leading to better outcomes for both. The dissertation study's hypothesis was that variations in IDR affect collaboration amongst practitioners and ultimately the effectiveness of the team and patient experiences. Additionally, the role of collaboration as a moderating variable between IDR design features and practitioner outcomes was explored in this study.

The study's design aimed to expand upon previous research, thus furthering the state of the science. First, multiple hospital units across two hospitals were selected for analysis as opposed to the often seen single-site, pre-/post-test, or intervention vs. control unit models. Additionally,

the concept of collaboration was expanded to occur between both practitioners and patients. Often, teamwork and collaboration are thought of as occurring solely between the healthcare practitioners. Also, much of the previous research on IDR is limited by study-specific surveys measuring practitioner satisfaction, teamwork or collaboration as opposed to using previously validated instruments. For the purposes of the dissertation study, existing, reliable and previously validated instruments were selected that capture the concept of collaboration and team effectiveness (Orchard et al., 2012; Song, Chien, et al., 2015).

Summary of results. As a result of the foundational work leading to the study's aims and design, the research provides unique contributions to the current literature on IDR. Cooperation amongst team members was highlighted as an important element contributing to team effectiveness and was also associated with different IDR design features. Cooperation and partnership are the two elements of team collaboration studied. The study found that the leader of IDR and use of a script were significantly associated with cooperation. Nurse-led and shared-led IDR practices were associated with higher levels of cooperation than physician-led. Using a script was associated with higher levels of cooperation after controlling for age, hospital and location. Additionally, there was a moderating effect of cooperation found between both location and leader and team effectiveness. Also, using a script had an association with team effectiveness after controlling for other variables and interactions. There was a negative association between cooperation and patient inclusion, but no other associations between the study variables and patient experiences were uncovered. Lastly, the qualitative findings resulted in three themes: 1) setting the stage, 2) the work of the team, and 3) benefits to patient care. Analysis of the qualitative data helped provide context to the findings from the quantitative results.

Logistical Considerations and IDR. The first theme to emerge from the qualitative findings

was *setting the stage.* The theme captures the importance of the logistical considerations and advanced planning for the discussion that occurs between practitioners and patients during IDR. The qualitative findings emphasized the importance of having the whole team present and participating, which are likely affected by organizational factors such as location and timing of IDR, as well as leadership and staffing considerations. Connecting with the quantitative portion of the study, neither the qualitative nor quantitative results emphasized a specific location as more optimal for holding IDR. Instead, results demonstrated that having consistency in location, as well as timing and process, facilitates the effectiveness of IDR. These findings are important for units considering how to best structure their own rounding practices. Currently, there is a significant emphasis on bedside rounding practices seen in the literature, thus, prompting many units to consider restructuring existing non-bedside practices (Gonzalo et al., 2013b, 2010; Southwick et al., 2014; Stein et al., 2015). However, the findings suggest that location in and of itself is not a sole contributor to effective practices.

Another logistical consideration when designing IDR is practitioners' use of a script. This study presented mixed findings on the benefits of using a script in IDR. The study did not find a significant association between use of script and collaboration when included in separate models with cooperation and partnership. However, when included in the combined model with the all three design features, using a script was associated with higher levels of cooperation (p=0.006). Using a script was also associated with greater team effectiveness after controlling for age, hospital and the interaction with cooperation. There is evidence supporting that using a script is best practice for IDR (Lane et al., 2013). However, others have found important drawbacks to using a script, such as team members' discontent when discussions went off-script or became overly repetitive (Paradis et al., 2015). In the qualitative findings of the study, practitioners did

not place emphasis on the use of scripts specifically, but rather the larger concept of preparation as a contributor to effective rounding practices. It is possible that a script helps with advanced planning as it guides a practitioner on their expected contributions to the discussion.

The quantitative portion of the study tried to determine which variations of design features associated with greater collaboration and effectiveness. However, considering the results alongside the qualitative findings, it is concluded that consistency, presence and preparation of team members is more important than exact location or use of a script.

Interpersonal Behaviors. The second theme from the qualitative findings, *the work of the team,* emphasized the interpersonal behaviors that occur between practitioners. Respondents highlighted the role of IDR in fostering collaboration and how mutual respect, trust, and engagement of all team members is vital for an effective practice. These findings support previous qualitative work on facilitators and barriers to effective IDR (Hendricks et al., 2017). Considering the findings from the qualitative work in conjunction with the quantitative results in gaining a deeper understanding of the meaning about how collaboration is fostered during IDR practices. The quantitative results indicated that nurse-led and shared-led rounds were associated with higher levels of cooperation than physician-led (single model: p=0.030, combined model: p=0.006). Cooperation is characterized by how team members value and respect other viewpoints as well as their own comfort in contributing their opinions (Orchard et al., 2012). It is possible that physician/NP-led rounds resemble a more traditional, physician-centric style that fails to actively engage with nursing or other staff. Current studies of physician-centric rounding practices find that nurses are rarely included in the discussion (Stickrath et al., 2013). Nurse-led or shared-led rounds may place greater emphasis on contributions from all members of the team, thus leading to increased cooperation. Future research may want to consider ethnographic

approaches to identify specific characteristics unique to nurse-led or shared-led rounding practices that could be applied across all models.

Cooperation also plays an important role as a moderating variable between two design features, both location and leader, and team effectiveness. Analysis of the second aim in the quantitative portion of the study revealed a significantly stronger association between both dual/bedside (p=0.007) and conference room rounds (p= 0.011) and team effectiveness compared to hallway rounds as cooperation increased. Additionally, when comparing physician/NP led rounds to nurse led rounds, cooperation moderated the association with team effectiveness (p=0.007). There was no moderating effect noted when comparing nurse or physician/NP led rounds with shared rounds. These results raise important questions about how leadership styles and location influence the ability of team members to dialog in open, mutually respectful conversations about patient care. The results also push us to consider how strong leadership characteristics in two individuals may be perceived differently based on their role status (i.e., physician/NP or nurse). These questions are outside of the scope and capabilities of this dissertation, but should be explored more in depth with future research.

Benefits to Patients. Lastly, this study did not find an association with IDR design features, team effectiveness and patient experiences. However, there was a negative association between cooperation and inclusion. Two questions from the widely-used HCAHPS survey- *staff effort to include you in decisions about your treatment* (inclusion) and how *staff worked together* (working together)-were used to capture patient experiences with the team. It was expected that units holding IDR at the bedside would result in improved patient experiences given the purposeful interaction with the team. However, the results are consistent with other research assessing patient experiences or satisfaction with bedside IDR practices. O'Leary et al., (2015)

found no difference in patient satisfaction scores with the implementation of a bedside IDR intervention. Similarly, Malec et al. (2017) saw increased collaboration among practitioners, but no improvements in patient satisfaction scores with a bedside rounding initiative. Results from interventions aimed at promoting the work of the team may not be directly visible to patients.

There were significant limitations impacting this dissertation research in measuring how IDR practices associate with patient experiences. First, the patient experience scores were measured at the unit-level. With only 15 units, the sample size was relatively small. Second, the HCAHPS questions are not tied directly to inpatient rounding practices. Therefore, other interactions with the team may influence a patients' perspective. Lastly, the patients who did not experience IDR (the off-service patients) were included in the unit ratings and thus had no experience with IDR. Therefore, their responses to questions may not be reflective of the IDR practice on the floor. Future research in this area should focus more specifically on how patients interact with their team during IDR practices and throughout their admission. Some research suggests that patients may have mixed feelings about seeing their whole team at the bedside (Burdick et al., 2017). Additionally, practitioners make an assumption that discussing the plan of care at the bedside is always patient-centered, but rarely consider an individual's control-preferences (i.e., desire to be involved) or strategies to actively engage the patient in decision-making (Berwick, 2009). Ideally, teams should be able to adapt their interactions in a way that is tailored to the individual to make it truly patient-centered rather than one-size-fits-all. There are lots of opportunities for building greater understanding in this area. Future research may want to consider using structured-interviews and observations to more specifically target team behaviors that foster shared-decision making or make visible the work of the team. Simulation-based research may also be a worthwhile approach to explore patient preferences and experiences with various

rounding models and team interactions.

Implications for Practice

This dissertation research has important implications for nurses and all members of the healthcare team engaged with IDR. The findings did not provide conclusive support for implementing IDR practices in any particular location. Individual units may have specific reasons for not moving IDR to the bedside and this research supports their decision. For example, the bone-marrow transplant unit purposely held their IDR in a conference room to reduce exposure with their severely immune-compromised patients. While all practitioners should be concerned with making their care more patient-centered, just moving discussions to the bedside is not enough to change patients' experiences or the quality of healthcare delivered.

Next, adding non-physician team members to an existing physician-centric rounding structure without purposeful engagement is not effective. The findings emphasized how important it is for all team members to feel respected and valued in the discussion for them to consider IDR worthwhile. When considering restructuring current IDR practices, representatives from all disciplines should be involved in the planning process to encourage buy-in. Employing change management strategies has been successful in previous examples of IDR implementation or restructuring (Menefee, 2014; Stefancyk, 2008). Consideration of a unit's readiness for change is also important as oftentimes staff members can feel saddled with multiple initiatives at once making them more resistant to adapting to new practices (Hendricks et al., 2017). Additionally, specific training for those leading IDR may be a useful strategy for fostering team member engagement. Our results found that nurse-led or shared-led rounding practices were associated with higher levels of cooperation, however, physician/NP-led rounding practices may still be effective when cooperation is high. Leaders skilled at facilitating an efficient, focused and

inclusive discussion are necessary for the success of IDR.

The highlighted logistical considerations have implications for unit leaders planning the structure of IDR. As previously mentioned, consistency, presence and preparation are key components to IDR's success. Rounding typically takes place during the morning hours when team members, especially nursing staff, often feel stretched to participate due to their other patient care duties. Altering the other patient care duties, such as medication administration times, may lead to better engagement by nursing staff (Young et al., 2016). Also, use of and the content of a script needs to be carefully evaluated by all members of the healthcare team. Care needs to be taken to not limit a team member's role and ability to contribute to the discussion by being overly prescriptive, while also recognizing the need for efficiency during IDR.

Limitations and Lessons Learned

The results of the dissertation research need to be considered with some limitations. Some of the limitations have been discussed throughout each manuscript and the discussion chapter. First, the study took place in two academic health centers using fifteen general-care (i.e., non-intensive care) units. Therefore, the results may not be generalizable to non-teaching facilities and other types of hospital units. Next, the sample smaller than the originally intended target. While strategies were employed to maximize survey completion, some targeted practitioners chose to not respond or did not fully complete the survey. It is possible that some practitioners were experiencing survey fatigue as this study coincided with a large, staff engagement survey initiative at one of the hospitals. Additionally, hospital units at academic health centers are often targeted for student initiatives such as PhD studies and doctorate of nursing practice (DNP) capstone projects where they are frequently asked to complete surveys. Recruiting resident physicians was also challenging during this dissertation project as they

frequently rotate floors during their training. Consequently, the sample consisted primarily of nursing staff which may bias the results and not be truly representative of the entire team's perceptions. Using other strategies besides surveys, such as focus groups or structured interviews, may yield a more balanced perspective from all practitioners engaged in IDR. Additionally, there were slight variations in IDR noted during the three observations conducted by the PI. While the IDR design features remained consistent during each of the three observations, these slight variations are noteworthy and raise new questions about the fidelity of rounding practices to their intended structure. There were also limitations with using open-ended questions administered in a computer-based survey. While this strategy afforded numerous and a broad range of perspectives, there was no opportunity to ask follow-up or clarifying questions if warranted by responses.

Future Research

Suggestions for future research have been identified throughout the individual manuscripts and discussion chapter. In this section, additional opportunities and emphasis of critical areas for further inquiry are recognized. First, closer inspection of how patients view and engage with their healthcare team during their hospital stay is necessary. Value-based purchasing strategies have prompted many hospital units to encourage, what are believed to be, patient-centered initiatives like bedside rounding practices. However, results from this study, as well as other research, indicate that patients' perspectives are likely affected by more than just having the team present together at the bedside. Identification of specific behaviors that make the work of the team visible to the patient or make them feel like they are included in the decision-making process is vital to more clearly define patient-centered care in the hospital setting.

Next, future research initiatives may want to consider contrasting perspectives by

different practitioner roles. This dissertation study attempted to identify which variations of IDR resulted in better collaboration and team effectiveness as perceived by the whole team. However, nurses, physicians and other staff members likely have different perspectives on which model is most optimal given their individual disciplinary goals. Additionally, future research should explore the role that IDR plays in role socialization, overall job satisfaction and joy in work, especially in nursing staff. Feeling valued and good nurse-physician relationships are important components to a positive work environment (Van Bogaert, Clarke, et al., 2013). If IDR is where the majority of team interface time occurs, then they may play a very important role in how nurses are oriented to their role and their job satisfaction.

Lastly, in-depth exploration of examples of positive deviants of IDR could reveal important information for practitioners attempting to implement and sustain their practices. Looking to the examples of IDR that are valued by and engage the entire team for meaningful, productive discussions about patient care may reveal critical features in structure, leadership or participation styles. Exploring this line of inquiry may also highlight important organizational or unit-based features that are most vital to successful IDR.

Conclusion

This dissertation study adds to the growing body of research on IDR in hospital settings. The study explored how variations in three different design features across fifteen different hospital units associate with elements of team collaboration, team effectiveness and patient experiences. The findings resulted in important implications for hospital unit leaders to consider when implementing or restructuring their existing rounding practices. Additionally, the results uncovered many opportunities for future research that will continue to advance knowledge in team-based, patient-centered care.

References

Berwick, D. M. (2009). What "patient-centered" should mean: Confessions of an extremist. *Health Affairs*, *28*(3/4), w555–w565. Retrieved from http://search.proquest.com.libezproxy.open.ac.uk/docview/853333965/fulltextPDF?accountid=14697

Bhamidipati, V. S., Elliott, D. J., Justice, E. M., Belleh, E., Sonnad, S. S., & Robinson, E. J. (2016). Structure and outcomes of interdisciplinary rounds in hospitalized medicine patients: A systematic review and suggested taxonomy. *Journal of Hospital Medicine*, *11*(7), 513–523. https://doi.org/10.1002/jhm.2575

Burdick, K., Kara, A., Ebright, P., & Meek, J. (2017). Bedside interprofessional rounding: The view from the patient's side of the bed. *Journal of Patient Experience*, *4*(1), 22–27. https://doi.org/10.1177/2374373517692910

Busby, A., & Gilchrist, B. (1992). The role of the nurse in the medical ward round. *Journal of Advanced Nursing*, *17*(3), 339–346. https://doi.org/10.1111/j.1365-2648.1992.tb01912.x

Donabedian, A. (1966). Evaluating the Quality of Medical Care. *Millbank Memorial Fund*, *44*(3), 166–206.

Gittell, J. H., & Suchman, A. L. (2011). An overview of relational coordination. *Oxford Handbook of Positive Organizational Scholarship*.

Gonzalo, J. D., Chuang, C. H., Huang, G., & Smith, C. (2010). The return of bedside rounds: An educational intervention. *Journal of General Internal Medicine*, *25*(8), 792–798. https://doi.org/10.1007/s11606-010-1344-7

Gonzalo, J. D., Heist, B. S., Duffy, B. L., Dyrbye, L., Fagan, M. J., Ferenchick, G. S., … Elnicki, D. M. (2013). The value of bedside rounds: A multicenter qualitative study. *Teaching and*

Learning in Medicine, *25*(4), 326–33. https://doi.org/10.1080/10401334.2013.830514

Hendricks, S., LaMothe, V. J., Kara, A., & Miller, J. (2017). Facilitators and barriers for interprofessional rounding: A qualitative study. *Clinical Nurse Specialist*, *31*(4), 219–228. https://doi.org/10.1097/NUR.0000000000000310

Hill, K. (2003). The sound of silence--nurses' non-verbal interaction within the ward round. *Nursing in Critical Care*, *8*(6), 231–9. https://doi.org/10.1111/j.1362-1017.2003.00038.x

Lane, D., Ferri, M., Lemaire, J., McLaughlin, K., & Stelfox, H. T. (2013). A systematic review of evidence-informed practices for patient care rounds in the ICU. *Critical Care Medicine*, *41*(8), 2015–29. https://doi.org/10.1097/CCM.0b013e31828a435f

Malec, A., Mork, A., Hoffman, R., & Carlson, E. (2017). The care team visit: Approaching interdisciplinary rounds with renewed focus. *Journal of Nursing Care Quality*. https://doi.org/10.1097/NCQ.0000000000000279

Manias, E., & Street, A. (2001). Nurse-doctor interactions during critical care ward rounds. *Journal of Clinical Nursing*, *10*(4), 442–50. https://doi.org/10.1046/j.1365-2702.2001.00504.x

Menefee, K. S. (2014). The Menefee model for patient-focused interdisciplinary team collaboration. *The Journal of Nursing Administration*, *44*(11), 598–605. https://doi.org/10.1097/NNA.0000000000000132

O'Leary, K. J., Johnson, J. K., & Auerbach, A. D. (2016). Do interdisciplinary rounds improve patient outcomes? Only if they improve teamwork. *Journal of Hospital Medicine, 11*(7), 524–525. https://doi.org/10.1002/jhm.2587

O'Leary, K. J., Killarney, A., Hansen, L. O., Jones, S., Malladi, M., Marks, K., & M Shah, H. (2015). Effect of patient-centred bedside rounds on hospitalised patients' decision control,

activation and satisfaction with care. *BMJ Quality and Safety*, *0*, 1–8. https://doi.org/10.1136/bmjqs-2015-004561

Orchard, C., King, G., Khalili, H., & Bezzina, M. B. (2012). Assessment of interprofessional team collaboration scale (AITCS): Development and testing of the instrument. *Journal of Continuing Education in the Health Professionals*, *32*(1), 58–67. https://doi.org/10.1002/chp

Pannick, S., Davis, R., Ashrafian, H., Byrne, B. E., Beveridge, I., Athanasiou, T., … Sevdalis, N. (2015). Effects of interdisciplinary team care interventions on general medical wards: A systematic review. *JAMA Internal Medicine*, *175*(8), 1288–1298. https://doi.org/10.1001/jamainternmed.2015.2421

Paradis, E., Leslie, M., & Gropper, M. A. (2015). Interprofessional rhetoric and operational realities: An ethnographic study of rounds in four intensive care units. *Advances in Health Sciences Education*, *21*(4), 1–14. https://doi.org/10.1007/s10459-015-9662-5

Song, H., Chien, A. T., Fisher, J., Martin, J., Peters, A. S., Hacker, K., … Singer, S. J. (2015). Development and validation of the primary care team dynamics survey. *Health Services Research*, *50*(3), 897–921. https://doi.org/10.1111/1475-6773.12257

Southwick, F., Lewis, M., Treloar, D., Cherabuddi, K., Radhakrishnan, N., Leverence, R., … Cottler, L. (2014). Applying athletic principles to medical rounds to improve teaching and patient care. *Academic Medicine : Journal of the Association of American Medical Colleges*, *89*(7), 1018–1023. https://doi.org/10.1097/ACM.0000000000000278

Stefancyk, A. L., & AL, S. (2008). Nurses participate in presenting patients in morning rounds: the first test of change was more complex than was anticipated. *American Journal of Nursing*, *108*(11), 70–72. https://doi.org/10.1097/01.NAJ.0000339161.32035.20

Stein, J., Payne, C., Methvin, A., Bonsall, J. M., Chadwick, L., Clark, D., … Dressler, D. D. (2015). Reorganizing a hospital ward as an accountable care unit. *Journal of Hospital Medicine*, *10*(1), 36–40. https://doi.org/10.1002/jhm.2284

Stickrath, C., Noble, M., Prochazka, A., Anderson, M., Griffiths, M., Manheim, J., … Aagaard, E. (2013). Attending rounds in the current era: what is and is not happening. *JAMA Internal Medicine*, *173*(12), 1084–1089. https://doi.org/10.1001/jamainternmed.2013.6041

Van Bogaert, P., Clarke, S., Willems, R., & Mondelaers, M. (2013). Nurse practice environment, workload, burnout, job outcomes, and quality of care in psychiatric hospitals: A structural equation model approach. *Journal of Advanced Nursing*, *69*(7), 1515–1524. https://doi.org/10.1111/jan.12010

Young, E., Paulk, J., Beck, J., Anderson, M., Burck, M., Jobman, L., & Stickrath, C. (2016). Impact of altered medication administration time on interdisciplinary bedside rounds on academic medical ward. *Journal of Nursing Care Quality*, *0*(0), 1. https://doi.org/10.1097/NCQ.0000000000000233

Zwarenstein, M., Rice, K., Gotlib-Conn, L., Kenaszchuk, C., & Reeves, S. (2013). Disengaged: A qualitative study of communication and collaboration between physicians and other professions on general internal medicine wards. *BMC Health Services Research*, *13*. Retrieved from http://www.biomedcentral.com/1472-6963/13/494

Appendix A. PI Field Research: Interdisciplinary Rounding Design Features Checklist

Name of Hospital Unit_____ Unit ID #_____
Nurse Manager Contact_____
Dates of On Unit Observation (if IDR unit: 1)_____, 2)_____, 3)_____
IDR Practices: Yes or No
If Yes,
How long has current practice been in place? _____
Do team members receive specific training for their participation in the IDR practice? _____
Unit size (number of beds):_____ Number of Nurses: _____
Medical Services on Floor_____

IDR Design Features/Coding	Nurse Manager Correspondence	Unit Observation 1	Unit Observation 2	Unit Observation 3
Location - Bedside (0) - Hallway (1) - Conference room (2) - Dual (3)				
Script - Yes (1) - No (0)				
Designated Leader - Nurse (0) - Physician (1) - Shared (2)				
Patient Presence - Yes (1) - No (0)				
Participating Roles - Physicians - Nurses - Case Managers - Social Workers - Pharmacists - Others?				
Additional Notes				

Appendix B. Practitioner Information Survey

Question Please answer according to your experience on _____ unit.	Response Coding
Have > 75% of the hours worked in last month been associated with ____ unit? (as compared to any other inpatient unit)	0 = No 1= Yes
Do you participate in interdisciplinary rounding practices on your unit?	0= No 1= Yes
These next questions pertain to your individual demographics:	
Age	(Ratio)
Gender	0 = Female 1= Male
Ethnicity	0= Hispanic or Latino 1= Not Hispanic or Latino 2= Prefer not to answer
Race	0 = American Indian/Alaska Native 1= Asian 2 = Native Hawaiian or Other Pacific Islander 3 = Black or African American 4 = White 5 = None of the above 6 = Prefer not to answer
What is your role?	0= RN/LPN 1 = Social Worker 2 = Case manager 3= Charge nurse/clinical coordinator 4 = intern 5= resident 6= fellow 7 = attending physician 8= other _____ (specify)
How long have you been in practice? (i.e., how long have you been a nurse, social worker, case manager, etc.)	0 = less than a year 1 = 1-5 years 2 = 5-10 years 3 = 10 or more years
How long have you been connected to this particular unit?	0 = less than a year 1 = 1-5 years 2 = 5-10 years 3 = 10 or more years

Appendix C. Assessment of Interprofessional Team Collaboration Scale

Instructions:

*Please **circle the value** which best reflects how you currently feel your team and you, as a member of the team, work or act within the team.*

1	2	3	4	5
Never	Rarely	Occasionally	Most of the time	Always

Section 1: PARTNERSHIP

When we are working as a **team**[7] all of my team members…..

1	include patients in setting goals for their care	1	2	3	4	5
2	listen to the wishes of their patients when determining the process of care chosen by the team	1	2	3	4	5
3.	meet and discuss patient care on a regular basis	1	2	3	4	5
4.	coordinate health and social services (e.g. financial, occupation, housing, connections with community, spiritual) based upon patient care needs	1	2	3	4	5
5.	Use consistent communication with to discuss patient care	1	2	3	4	5
6.	Are involved in goal setting for each patient	1	2	3	4	5
7.	encourage each other and patients and their families to use the knowledge and skills that each of us can bring in developing plans of care	1	2	3	4	5
8.	work with the patient and his/her relatives in adjusting care plans	1	2	3	4	5

Section 2: COOPERATION

When we are working as a **team** all of my team members…..

9.	share power with each other	1	2	3	4	5
10.	respect and trust each other	1	2	3	4	5
11.	are open and honest with each other	1	2	3	4	5
12.	make changes to their team functioning based on reflective reviews	1	2	3	4	5
13.	strive to achieve mutually satisfying resolution for differences of opinions	1	2	3	4	5
14.	understand the boundaries of what each other can do	1	2	3	4	5
15.	understand that there are shared knowledge and skills between health practitioners on the team	1	2	3	4	5
16.	establish a sense of trust among the team members	1	2	3	4	5

Revised version November 16, 2015

Thank you for completion of this questionnaire!

[7] A team can be defined as any interactions between one or more health professionals on a regular basis for the purposes of providing patient care.

Appendix D. Perceptions of Team Effectiveness Subscale

Perceived team effectiveness	The way my team members interact makes the delivery of care highly efficient	1 2 3 4 5
	The way my team members interact is very good for the quality of patient care	1 2 3 4 5
	Working on a team like mine keeps members of my team enthusiastic and interested in their job	1 2 3 4 5
	I feel integral to my team	1 2 3 4 5
	I experience excellent teamwork with the members of my team	1 2 3 4 5

Appendix E. Open Ended Questions

What do you see as the outcomes and effects of your unit holding interdisciplinary rounding practices as compared to if you did not have interdisciplinary rounding practices in place?

What contributes to interdisciplinary rounding practices on your unit effective?

What contributes to interdisciplinary rounding practices on you unit ineffective?

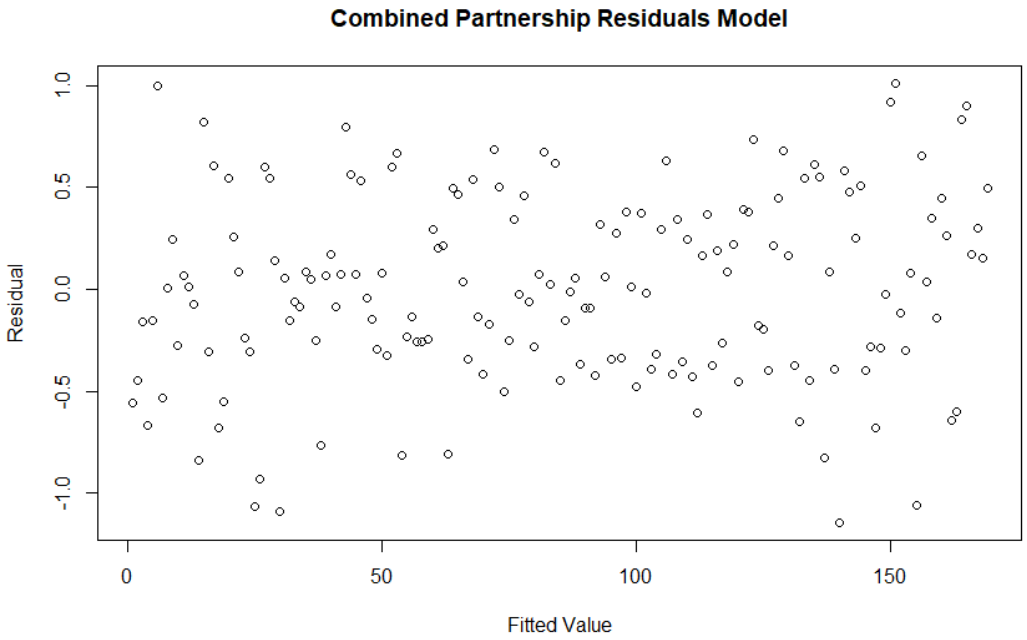
If you could change something about the current interdisciplinary rounding practices, what would it be and why?

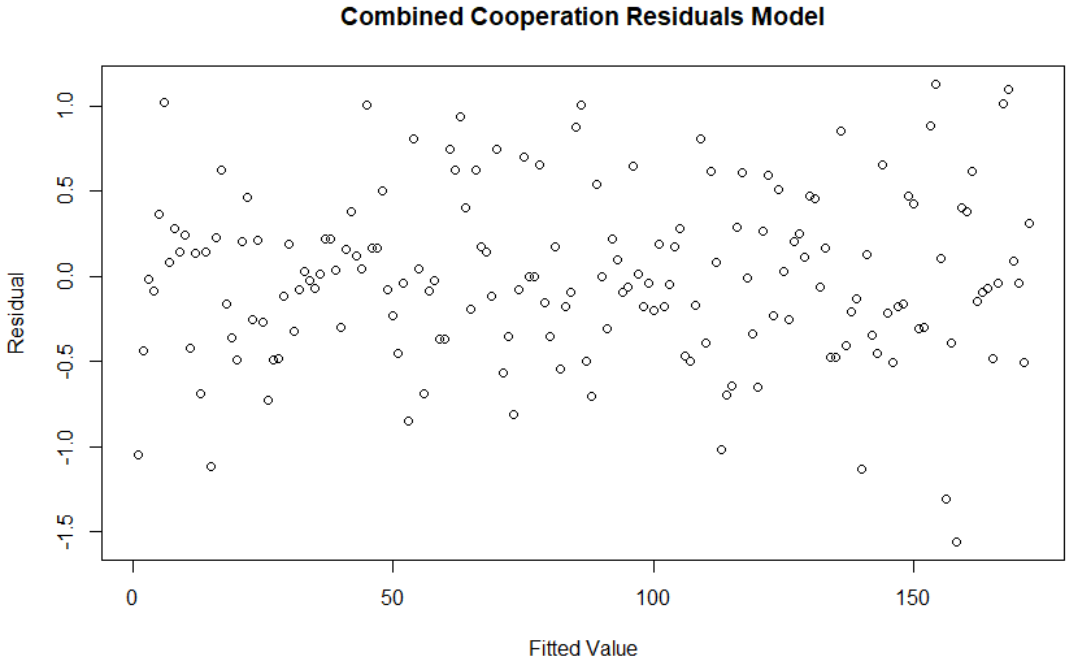
Appendix F. Assumption Testing for Specific Aim #1

Assumption Testing. There are assumptions that need to be verified when using MLM for analysis. For the purposes of the first specific aim, assumption testing was completed after initial analysis using the two most complex (combined) models. We tested for multicollinearity by analyzing the variance inflation factors (VIF) for each for the independent variables. Multicollinearity exists if the VIF is greater than 10 (Chatterjee & Hadi, 2006). The values for VIF for both models ranged from 1.09 to 2.29, indicating the assumption was met. Next, residual plots were created from the two most complex models to visually test the assumption of linearity. In these plots, the residuals were graphed against the predictors. If a pattern emerges, the assumption of linearity has been violated (Palmeri, 2016). Data appeared randomly and evenly distributed throughout the plots indicating these assumptions were met (see plots below). Additionally, the assumption of homogeneity of variance was statistically tested by comparing the residuals from the models as the dependent variable across the units (independent variable) by running a simple ANOVA (Glaser, 2006). A *p* value greater than 0.05 indicates that the variance is equal and homoscedasticity was met (Palmeri, 2016). The two models tested in the analysis resulted in *p*- values of 0.6425 (combined partnership) and 0.08421 (combined cooperation), thus meeting the assumption. Multilevel modeling also assumes that residuals of the analysis are normally distributed. To test this assumption, qqplots were generated to visually assess the deviation of the residuals from a normal line (see plots below). Moderate deviation from the normal line was visualized, potentially pointing to a violation of this assumption. However, to confirm normal distribution of the residuals, more formal, numeric normality tests can be used (Razali & Wah, 2011). Razali & Wah recommend Shapiro-Wilk test as the most

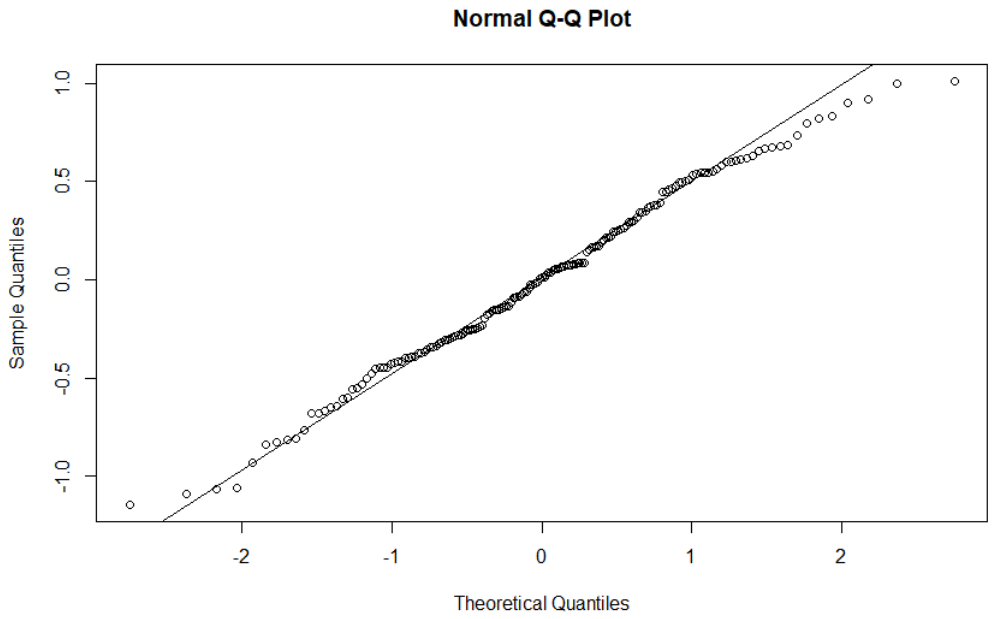
powerful for testing normality (2011). A non-significant *p*-value indicates that the assumption has been met. Normal distribution of residuals for the data was confirmed with the Shapiro-Wilk test (combined model on partnership: $p = 0.3491$ and combined model on cooperation: $p = 0.181$). In conclusion, all assumptions for MLM were met for the first specific aim.

Assumption Tests Specific Aim #1: Plots

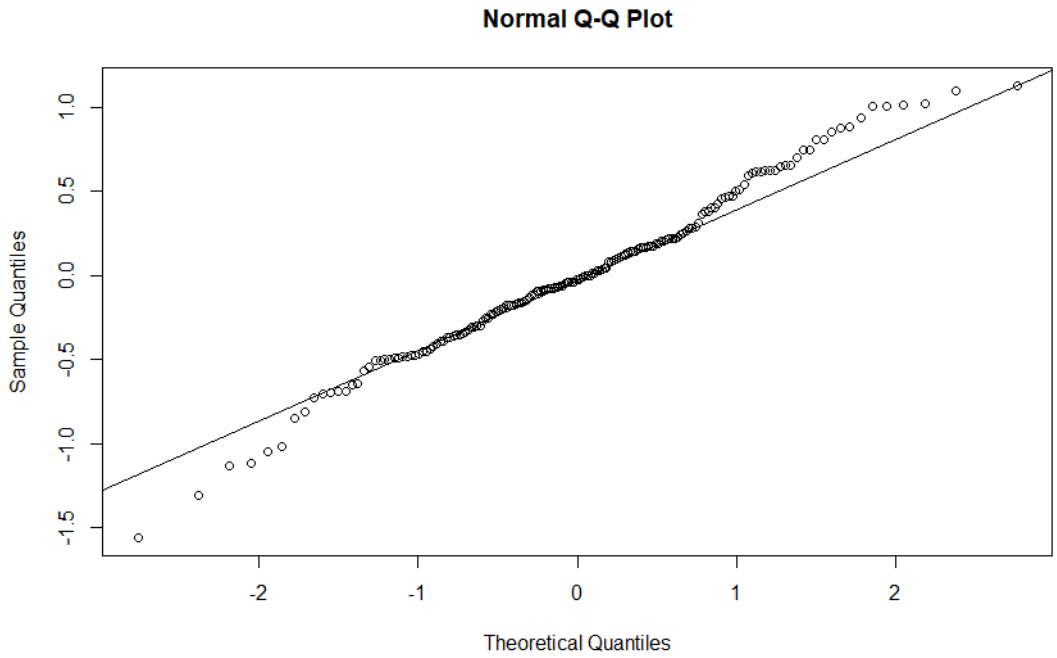




QQ Plot for Combined Model of IDR Design Features and Partnership

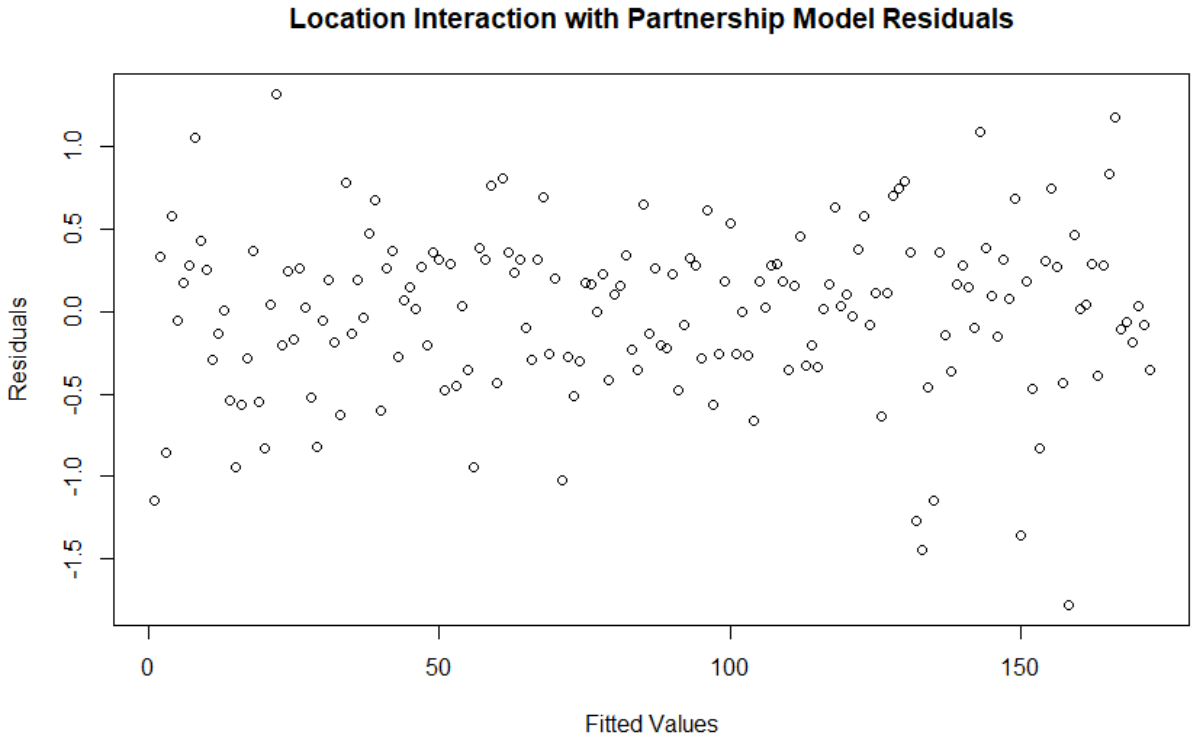


QQ Plot for Combined Model of IDR Design Features and Cooperation



Appendix G. Assumption Testing for Specific Aim #2

Assumption Testing. Like the analysis of the first specific aim, assumption testing was completed after the models were developed. Residuals from each of the six final models were plotted to assess linearity (Appendix B). A random pattern of data points was visually assessed, indicating that the assumption of linearity was not violated. Next, we looked for multicollinearity with all of the variables used in the models. The VIF ranged from 1.03 to 9.25. All values were less than 10 indicating that the assumption was not violated as well. Next, we assumed that the variance of the residuals was equal across groups. After extracting from the models, we ran an ANOVA of the squared residuals. No significant results were present indicating the assumption of homogeneity of variance was met. Lastly, qqplots were used to assess for normal distribution of the residuals (Appendix B). Data points were slightly skewed away from the normal line in all six plots indicating that numeric testing of the assumption was needed. Shapiro-Wilk test was used to numerically test normality. All six models violated the assumption of normality ($p<0.01$). In some cases of violation, it is possible to transform outcome variables using log/ln, but this creates multiple challenges with interpretation (Palmeri, 2016). However, Maas and Hox (2004) determined that when maximum likelihood (ML) methods are used for multilevel modeling, then a violation of normality is only a problem if the researcher is interested in results at the second level. Our results are reported at the individual level, thus reducing the concern with violation of normality. Additionally, in simulation studies, ML methods were found to be robust the violation of normality (Chou, Bentler, & Satorra, 1991).


Location Interaction with Partnership Model Residuals
Residuals
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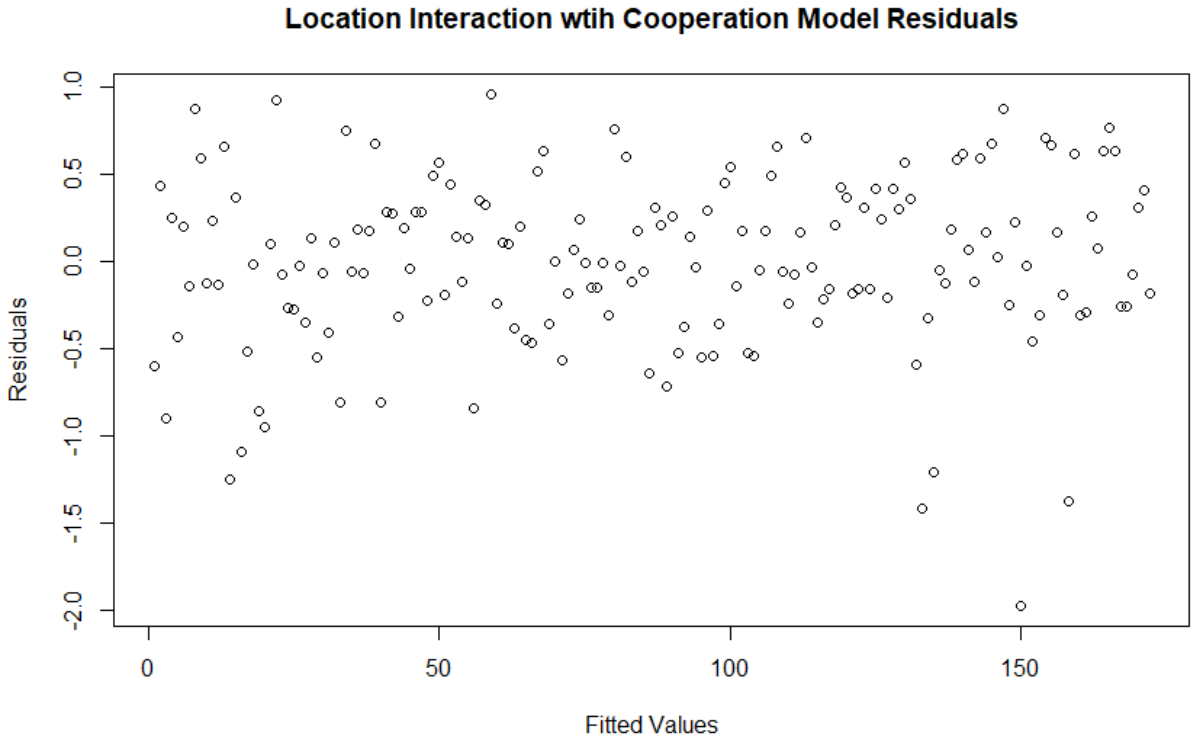
100
150
Fitted Values


Location Interaction wtih Cooperation Model Residuals
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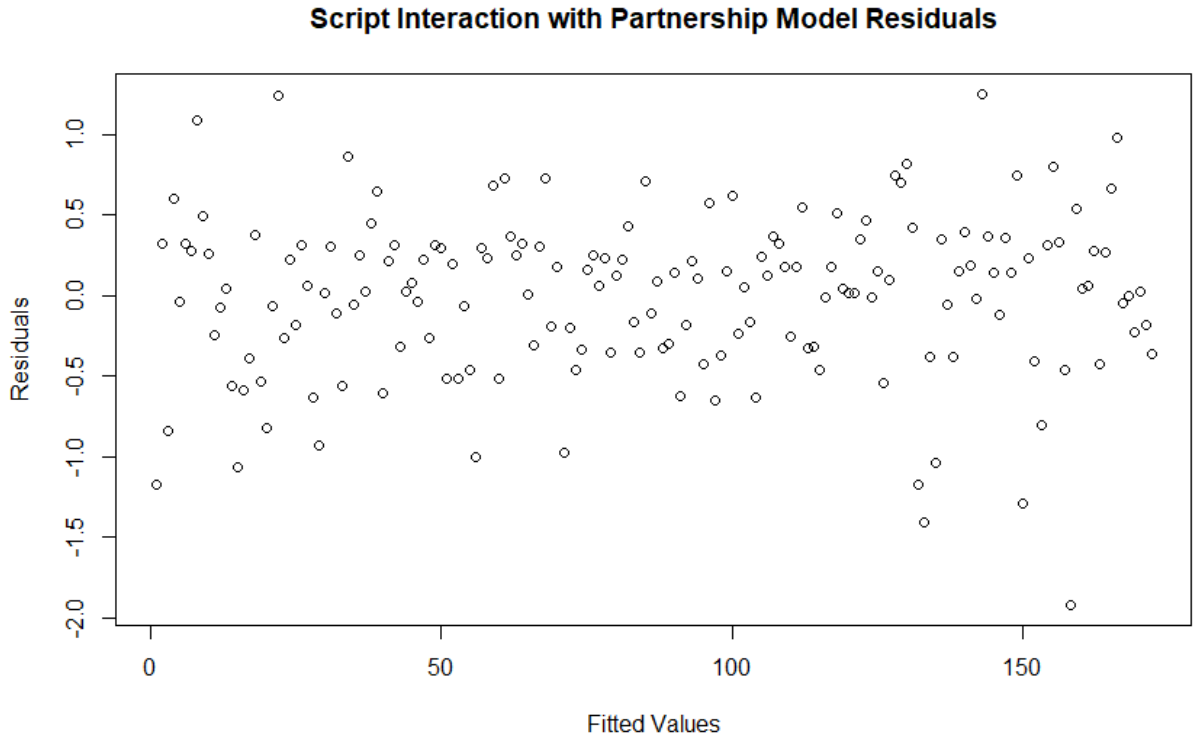
Fitted Values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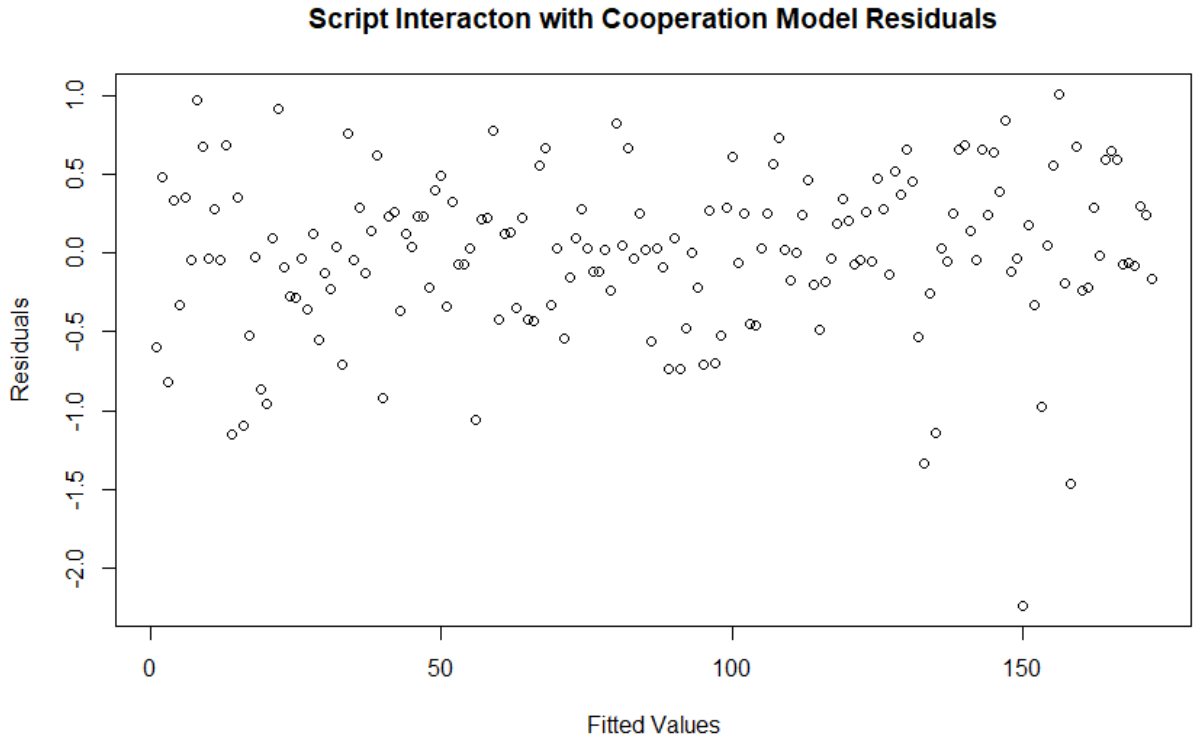
Fitted Values


Script Interacton with Cooperation Model Residuals
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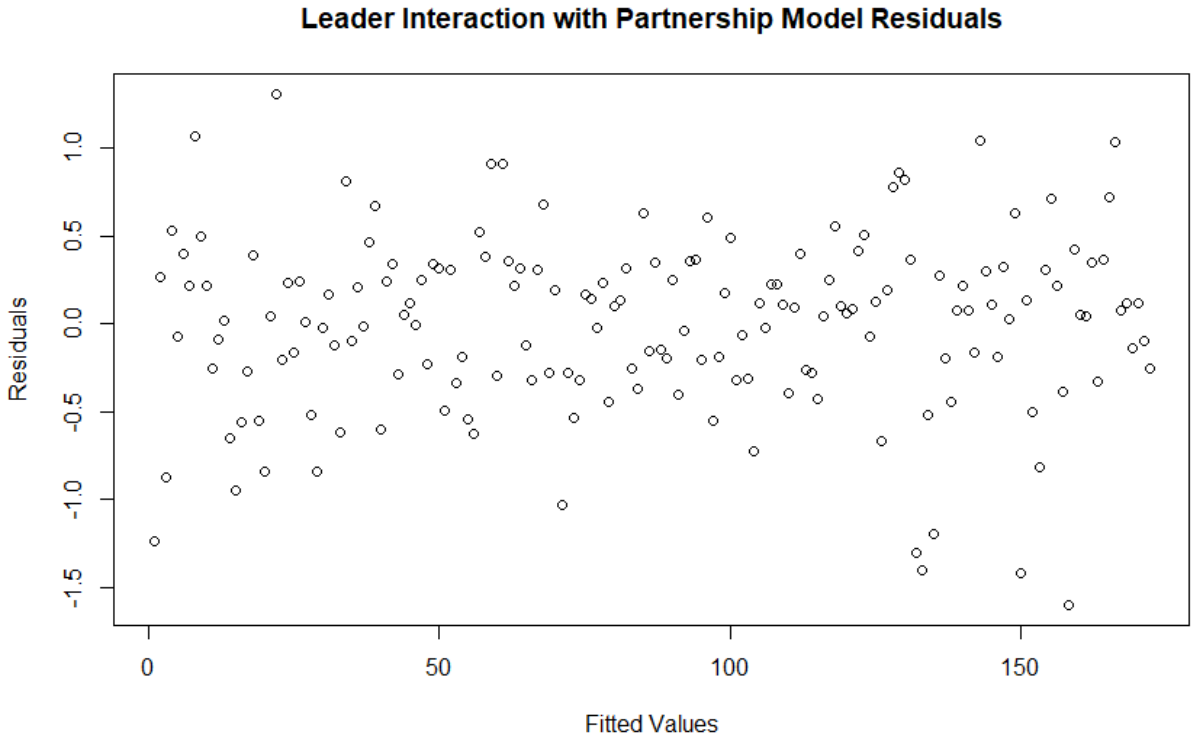
Leader Interaction with Partnership Model Residuals
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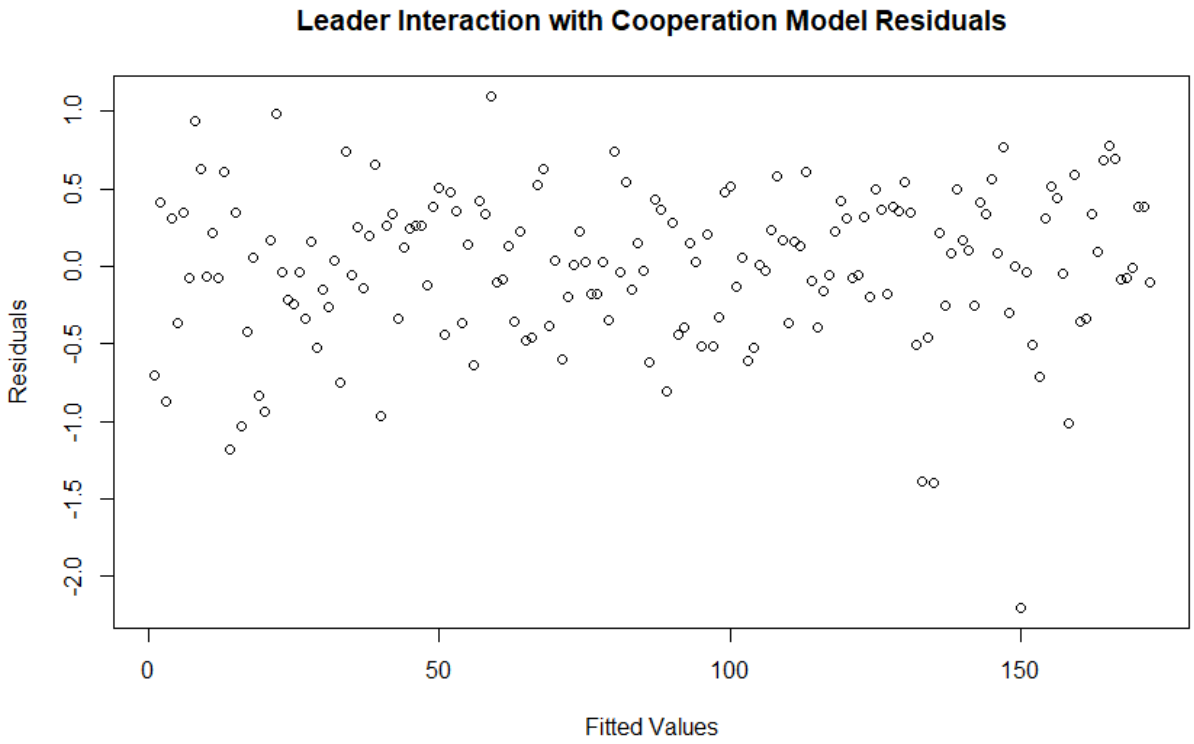
Leader Interaction with Cooperation Model Residuals
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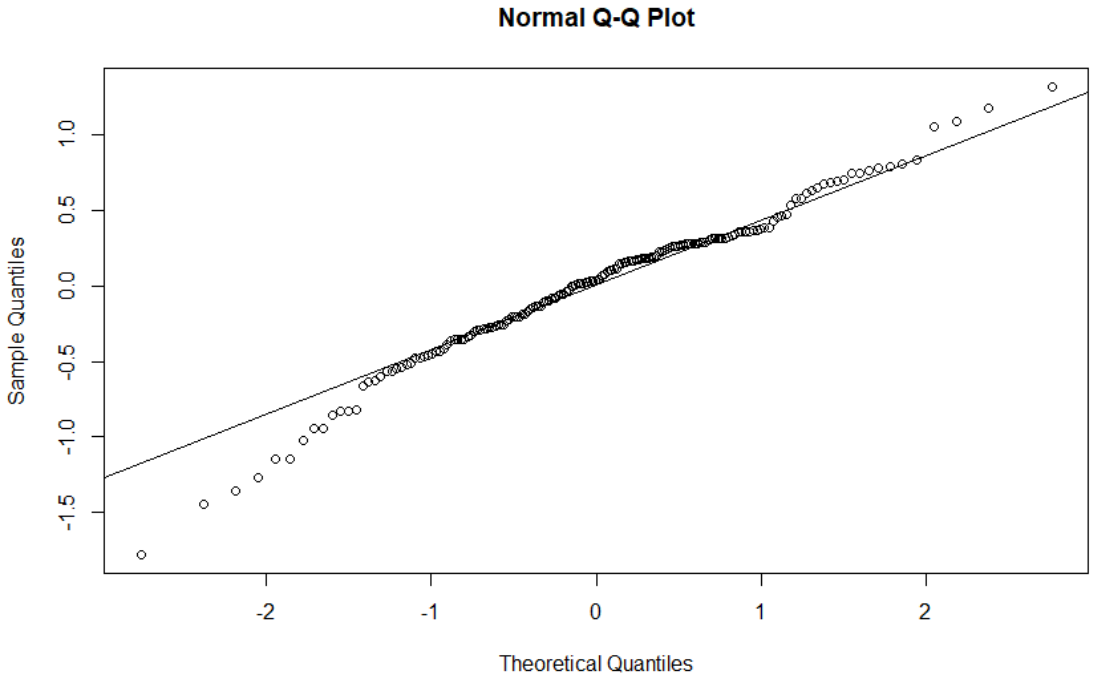
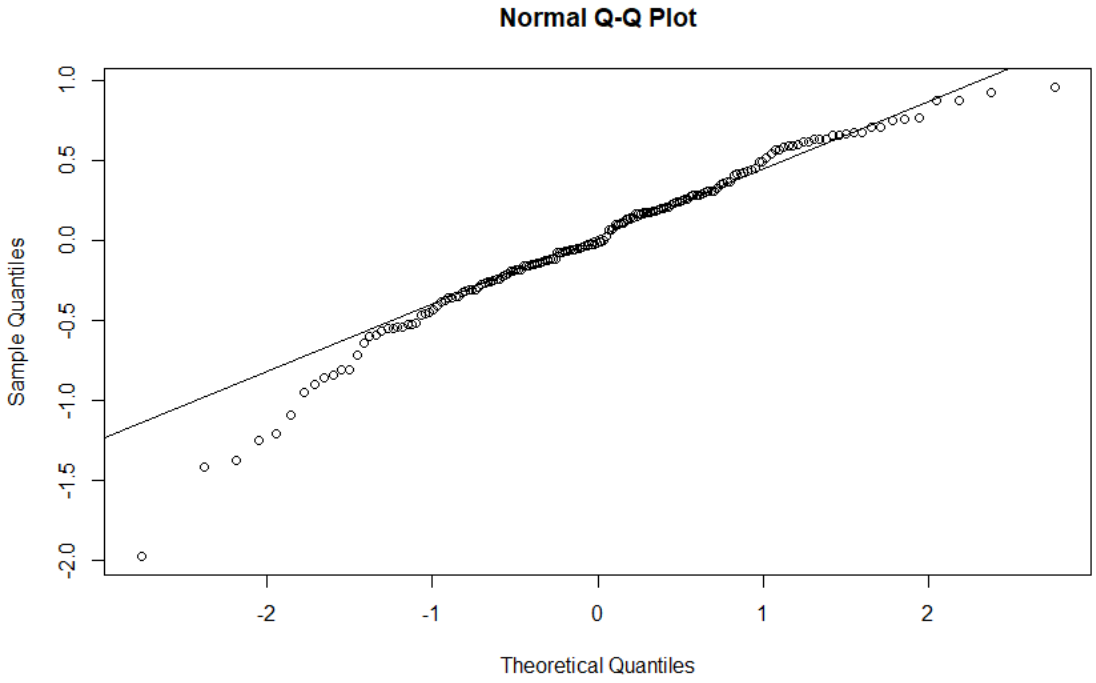
Fitted Values

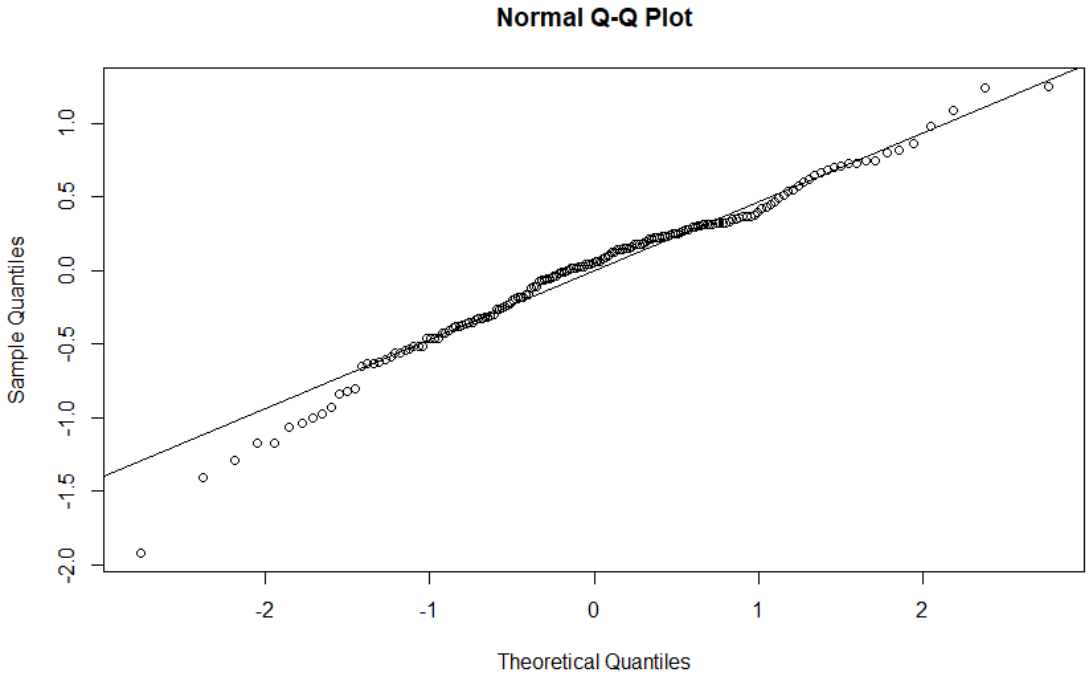
QQ Plot 6.1 Interaction of Location and Partnership



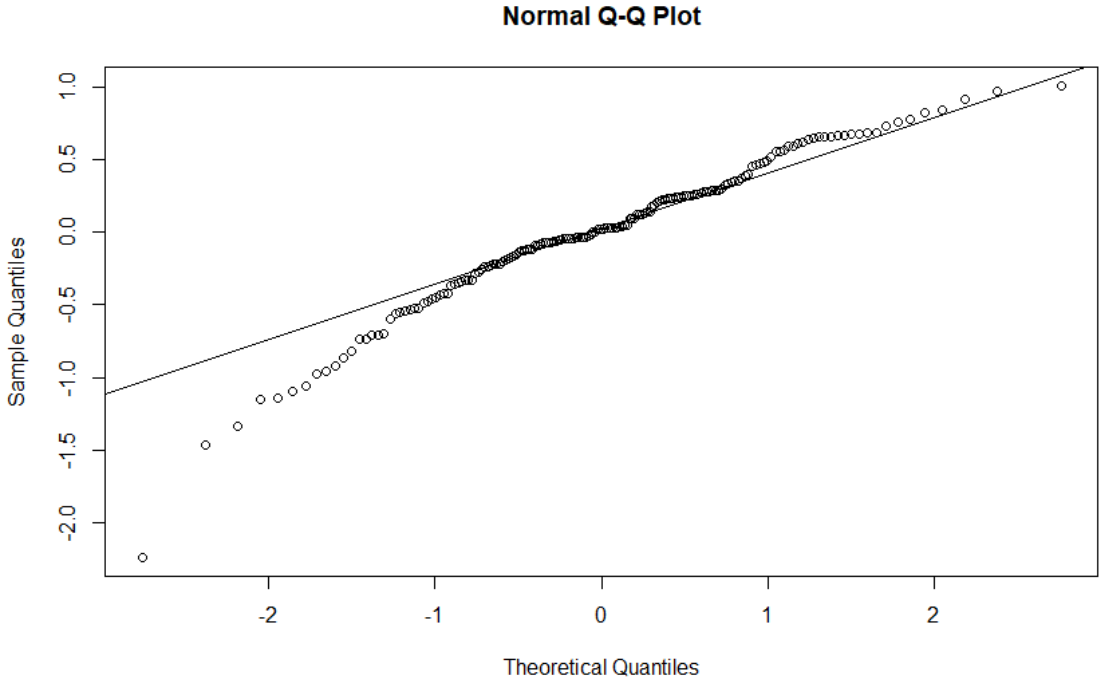
QQ Plots 6.2 Interaction of Location and Cooperation



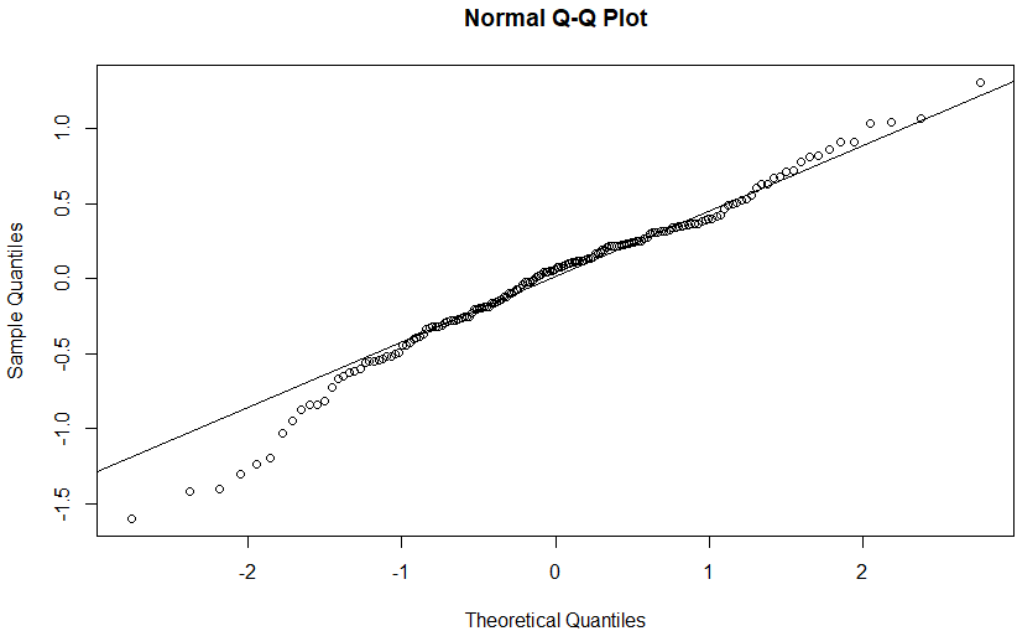
QQ Plot 7.1 Interaction of Script and Partnership



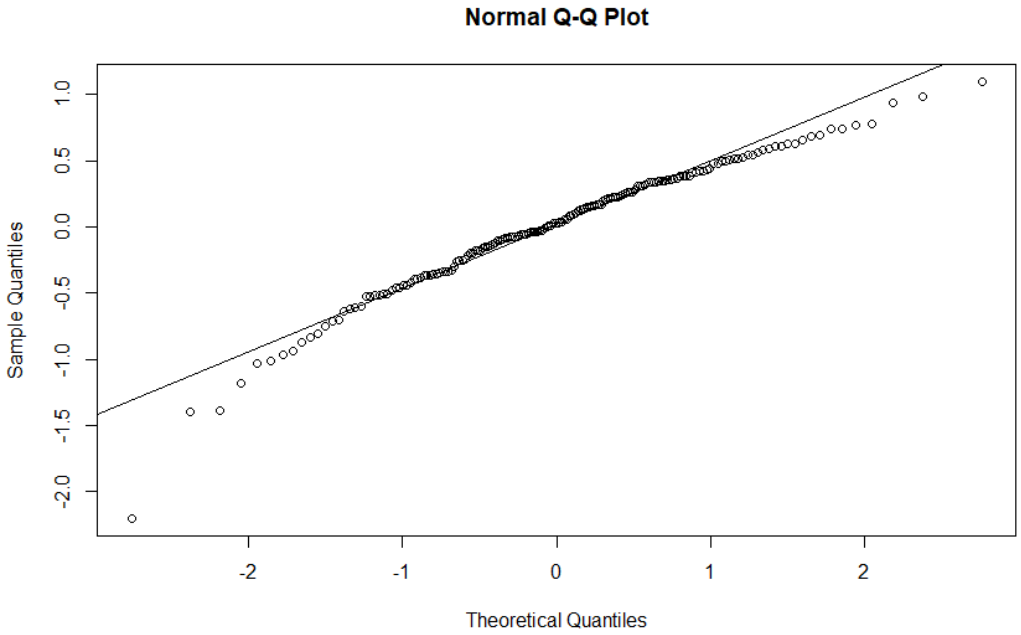
QQ Plot 7.2 Interaction of Script and Cooperation



QQ Plots 8.1 Interaction of Leader and Partnership



QQ Plot 8.2 Interaction of Leader and Cooperation

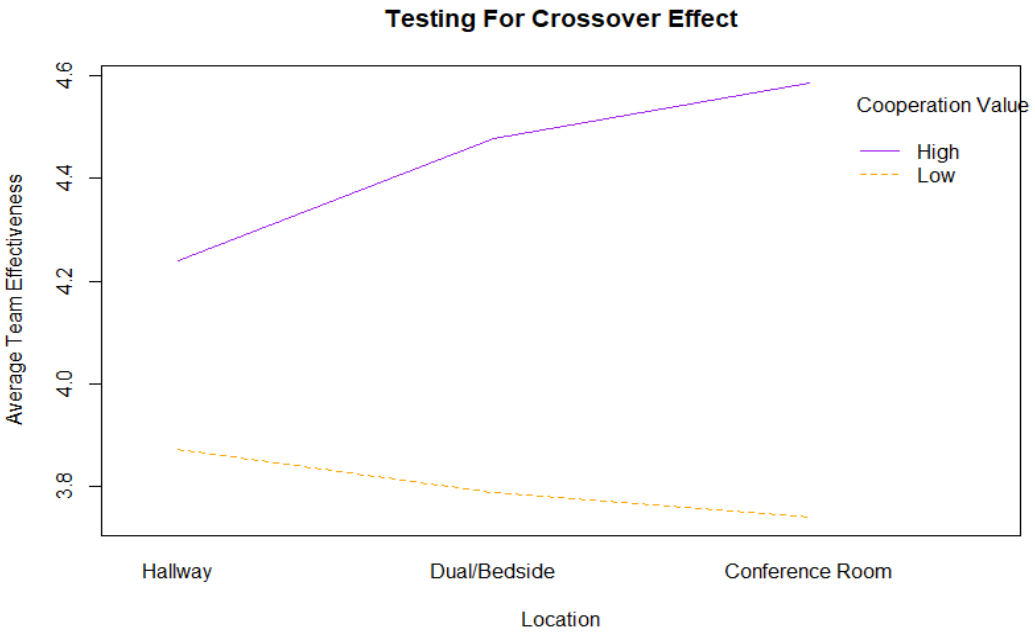


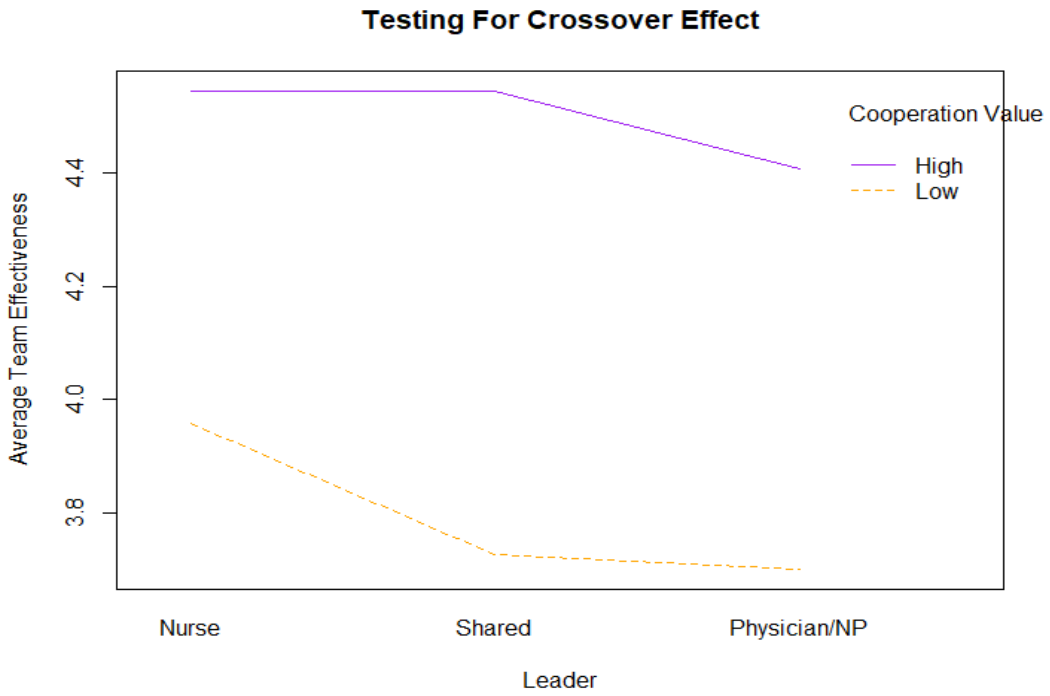
Appendix H. Notes on Centering

Centering is an important consideration when conducting multilevel analyses. With grand-mean centering, the intercept term represents the between group variance adjusted for level-1 variables (Hofmann & Gavin, 1998). Choices in centering have implications on how the intercept is interpreted, the variance of the intercept across groups and the covariance of the intercept (Bryk & Raudenbush, 1992). Researchers can choose to use raw data, group-mean center (group mean is subtracted from each case) or grand-mean center (grand mean is subtracted from each case) (Hofmann & Gavin, 1998). Because there was no concern in the analysis for an individual's relative position within their group, grand-mean centering technique was chosen. It must also be noted that there are differing opinions on the advantages of using centering techniques. In most cases, the three options show minimal statistical differences (Hofmann & Gavin, 1998).

Appendix I. Notes on Crossover Interaction

Due to the significant interaction effect and non-significant main effect, the data were further explored for a crossover interaction by dichotomizing cooperation into “high” and “low” using the mean (3.998) as a mid-point. The mean value was chosen instead of a theoretical midpoint to make for a balanced distribution. Next, the average team effectiveness for high and low cooperation values was graphed at each location (graphs below). Upon viewing the interaction plot, no crossover interaction was noted. For a final exploration, the dichotomized cooperation variable was placed in a model to test for its effect on team effectiveness and interaction with location. There were no significant results for a main effect of cooperation on team effectiveness (p=0.29) or the interaction between location and a dichotomized cooperation variable (reference group = hallway, dual/bedside*cooperation p= 0.45, conference room* cooperation p=0.11). Due to the significant limitation of using the mean as opposed to the theoretical mid-point of the scale as the mid-point, no further analyses were completed. Responses in the study skewed positive, therefore dividing at the mean for *high* and *low* creates a misnomer for the data. More data will need to be collected to further explore the interaction effect found without a main effect. Crossover effects were also assessed for leader and team effectiveness.


Testing For Crossover Effect
Average Team Effectiveness
3.8
4.0
4.2
4.4
4.6
Cooperation Value
High
Low
Hallway
Dual/Bedside
Conference Room
Location


Testing For Crossover Effect
Average Team Effectiveness
3.8
4.0
4.2
4.4
Cooperation Value
High
Low
Nurse
Shared
Physician/NP
Leader