

Relationships among Home Health Agency Characteristics, Patient Safety Culture, and
Nurse-Reported Medication Reconciliation Processes in Patients Transitioning from

Hospitals to Home Health Agency Care

by

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ABSTRACT OF THE DISSERTATION

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By MARIA SAIMBERT

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Rationale. This study was undertaken to assess interrelationships among home health agency (HHA) organizational and nursing structures (registered nurse (RN) workload, number of patient visits per day, RN caseload, medication reconciliation (MR) systems, MR facilitators, MR barriers), patient safety culture, and MR processes in patients transitioning to intermittent skilled nursing care after discharge from the hospital. This is among the first of studies looking at home health care and medication management, which includes MR.

Method. Data analysis of de-identified HHA RN-reported MR practices are reported. Foundations used to explore interrelationships between HHA organizational and nursing structures, patient safety culture dimensions, and MR processes are discussed.

Results. The presence of MR facilitators was significantly related to MR processes in both bivariate and multivariate analyses. One of the four patient safety culture dimensions, overall ratings on quality and patient safety, was significantly and positively related to MR processes in bivariate analyses. High MR facilitator scores in HHAs

compared to lower MR facilitator scores was significantly and independently associated with 3.48 higher odds of RNs always completing MR. When the effects of MR facilitators and RN current roles (full-time versus part-time) were controlled for, high levels of positive ratings on patient safety and quality were not independently associated with higher odds of MR completion. In a logistic regression model, MR facilitators, RN current role, and overall rating on quality and patient safety accounted for 20% of the variance in MR processes. Using Hayes mediation analysis, RN caseload, number of patient visits per day, workload, MR system types, and MR facilitators/barriers did not exhibit a significant indirect effect on MR processes through their effects on patient safety culture dimensions (teamwork, work pace and pressure, overall perceptions on patient safety and quality, and overall ratings for patient safety and quality) in HHAs.

Conclusion. HHA managers may wish to focus on placement and maintenance of facilitators and assignment of a full-time RN to patients transferring care from hospitals to home health as this may increase the likelihood of MR processes being done.

Preface

This dissertation is truly the efforts of many people: my dissertation chairperson, dissertation committee advisors, and most of all the work of home health care registered nurses and their countless patients. All of us collaborated to improve the balance towards more wellness than illness, for patients and families, as well as for ourselves.

This dissertation process took more than six years. The thoughts behind this dissertation were already in motion when I took a class on the meaning of work as an undergraduate nursing student. That honors course included no more than 15 students, all individually selected from different college majors by a professor in the Humanities department to engage in reading, writing, and discussions on the meaning of work. I took away from that course the reality that one's professional work affects one's personal experiences and vice versa. Work is a social responsibility and a privilege, an opportunity to help others and advance thoughts on others and their environment, essentially contributing to increasing the quality of life for persons and for supports in their environment. Anytime, my fears attempted to overshadow my faith during my dissertation work, I remembered the seminar on work and what I had learned.

The purpose of a dissertation is to share a problem in society. The problem discussed in this one is the scarcity of literature on home health agency medication reconciliation processes. This dissertation details a study of my data analysis of de-identified data from a survey taken by home health care registered nurses in a parent study.

Acknowledgements

The guidance provided by my dissertation chairperson was significant. Dr. Thomas-Hawkins, you proved to be a juggernaut that motivated me to complete my dissertation work. You also helped me slow down, enough to see things step by step, to not assume or project conclusions before really seeing the data in front of me. That is one of the biggest takeaways I cherish from our time working together. Thank you.

Credit for my continued growth in the way I think, practice, and express caring goes to those in my present work setting, the Mayo Clinic, for showing me that my philosophy of practice, which includes thoughts on patients, professional colleagues and staff, the work environment, and lifelong learning is not an oddity. I am blessed to work in a place with many workers sharing common and different perspectives, all of us striving to learn and apply learnings to help meet the needs of patients and families.

Dedication

This is for all those who have prayed for me and uplifted me to see the good and always strive to do good things.

This is for my Mom, Mrs. Anne Saimbert, one of many Haitian immigrants who are women of vision and inspiration, for their children. Mom, you teach that the world is good and that people have the potential for good and need to see examples of good.

Thank you for all you have given, year after year, unconditionally, to support my growth personally and professionally. Thank you also goes to my brother, Mr. John Saimbert and posthumously, to my Dad, Mr. Joseph Saimbert.

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Chapter 1

INTRODUCTION

The Problem

Care transitions from hospital to home have been highlighted as a time when patients are especially vulnerable to medication errors (Brody, 2016; Fitzgibbon, Lorenz, & Lach, 2013). Up to 56% of medication errors have been associated with care transitions (Rozich et al., 2004). During those times, errors can result from poor medication management, including unaddressed medication issues and poor communication among health professionals (Wilson, Murphy, & Newhouse, 2013). Patient groups, such as those 65 years and older, may warrant additional vigilance by healthcare professionals as their potential concurrent use of five or more medications, often referred to as polypharmacy, adds more complexity to medication management during their care transitions. Polypharmacy is related to unneeded hospitalizations and adverse medication events (Gamble, Hall, Marrie, Sadowski, Majumdar, & Eurich, 2014). During care transitions, such as patient discharge from the hospital to home, medications and medication schedules are changed, new medications may be added, some medicines may be discontinued, and some existing medication regimens may be adjusted. While some medication changes are intentional, others are not. All these modifications are the backdrop for medication-related problems.

The medication reconciliation (MR) process, a component of medication management, is intended to improve the quality of medication management during care transitions. The Joint Commission (2006), which has set a top priority goal as the

accurate and complete reconciliation of patient medications across the continuum of care, defines MR as the process of comparing a patient's medication orders to all of the medications that the patient has been taking. This reconciliation, done to avoid medication errors such as omissions, duplications, dosing errors, or drug interactions, should be accomplished at every transition of care in which new medications are ordered or existing orders are rewritten. Transitions in care include changes in setting, service, practitioner, or level of care. According to The Joint Commission (2006), this process comprises five steps:

- (1) Develop a list of current medications.
- (2) Develop a list of medications to be prescribed.
- (3) Compare the medications on the two lists.
- (4) Make clinical decisions based on the comparison.
- (5) Communicate the new list to appropriate caregivers and to the patient.

MR is useful to identify, document, communicate, and resolve medication-related problems (MRPs), such as post-discharge medication discrepancies, in order to obtain the best possible list of medications a patient is taking (Corbett, Setter, Daratha, Neumiller, & Wood, 2010). There is no consistent definition for the term medication-related problems (Thompson, Whennan, Liang, Alderman, & Grzeskowiak, 2015), but elements of MRPs includes medication issues which interfere with achieving best health outcomes for patients (Hepler & Strand, 1990). Categories of MRPs involve untreated conditions, drug use without indication, improper drug selection, subtherapeutic dosage, overdose, adverse drug reactions, drug interactions, and failure to receive medication (Wolstenholme, 2011). MRPs have been noted as a top contributor of death (third or

fourth cause) in patients 65 years and older, a group that often consumes five or more medications daily (Ramanth & Nedumballi, 2012).

When a patient experiences a transition from hospital to home health care, the first provider to visit the patient is a registered nurse or at times a physical therapist or speech-language therapist. If a physical therapist or speech-language therapist visits the patient first, they cannot initiate medication reconciliation, but they participate in the upcoming MR process by collecting pertinent information for the registered nurse who will perform medication reconciliation on a subsequent visit. For patients with known medication-related problems or prescriptions for new medications, a registered nurse can be sent to the patient's home to begin the care process with the prime reason to perform a medication reconciliation. A registered home health care nurse initiates medication reconciliation and looks for potential drug interactions prior to completing the Outcome and Assessment Information Set (OASIS). OASIS is a data collection tool used by Medicare-certified home health agencies to guide the plan of care for patients as well as reimbursement for services and quality of care (O'Connor & Davitt, 2012).

Though components and steps to performing MR have been well outlined by safety organizations (Agency for Healthcare Research and Quality, 2012; Institute for Safe Medication Practices Canada, 2015), there is a gap in the literature on how nurses within and across home health agencies perform MR. Home health nurses are front-line workers who can use MR to facilitate home-based medication management, medication error interception, and medication error prevention after patients return to home from an acute care inpatient setting. Their review of medications with patients includes a "kitchen-table" review of all prescriptions, over-the-counter medications, supplements,

and home remedies located in the home. In the literature, authors highlight the fragmented state of medication management that home health agency nurses face, such as patients going home with multiple medication lists and discharge instructions that may be either incomplete or may lack specific directions regarding medications still in the patients' home (Ponce de Leon & Hohler, 2017; Sharma & Iqbal, 2018; Sheikh et al., 2018; Sorita et al., 2017). These may affect how home health agency nurses perform MR processes.

Effective MR is an essential first step towards medication review for safety and appropriateness of regimens (Pai et al., 2013). It can be defined as a complete, accurate creation of a list of the patient's most current medications and medication regimens. That list is communicated with both patients and their care providers to avoid medication errors. It is well documented that effective MR leads to positive outcomes. MR may contribute to a reduction of unplanned hospitalizations associated with medication-related problems and adverse drug events (ADEs). In one study, MR resulted in interception of previously missed medication discrepancies in 60% of patients (Vira, Colquhoun, & Etchells, 2006). Another study found MR to be a low cost, safety-promoting measure that decreased ADE rates to zero (Schwarz & Wyskiel, 2006). Similarly, other researchers found steep decreases in medication errors when MR was employed. (Rozich et al., 2004). Effective MR also offers an opportunity for additional hand-off or handover communication with other health providers to resolve discrepancies, (Whittington & Cohen, 2004). Standardization of MR processes is an important factor towards supporting effective MR (Durkee & Richard, 2007; Meguerditchian, Krotneva, Reidel, Huang, & Tamblyn, 2013; Rozich et al., 2004). Standardization can decrease end-user confusion

and variability on use of MR tools and foster compliance with MR (Durkee & Richard, 2007). In reviewing the care transition of formerly hospitalized patients returning to their homes for skilled intermittent care through Medicare-certified home health agencies, details on MR processes, including steps taken by registered nurses, were not well represented in the biomedical literature.

Consequences of Poor MR in Home Health Care

Unnoticed or mismanaged medication discrepancies allowed an open door for medication-related problems. For example, findings from one study demonstrated common examples of medication-related problems from patients discharged to their homes after a hospitalization, including unintentional nonadherence to one or more medication regimens, taking medications without an indication for doing so or omitting taking medications prescribed for a present condition (Reidt et al., 2014). With regards to patients taking medications without having a current indication for doing so, Reidt et al. (2014) did not elaborate if the medications being taken without indication were formerly prescribed by a healthcare provider or self-prescribed by patients. From the Reidt study, nurses identified at least one medication discrepancy in 94% of older adults (mean age = 73). Similarly, in another study, it was found that 70% of patients experienced an actual or potential unintended medication discrepancy at hospital discharge, with 29.5% of those discrepancies having the possibility or probability of producing harm to the patients (Wong et al., 2008). In a third study, intentional nonadherence (patient factor) and illegible/incomplete discharge instructions (system factor) were the most common discrepancies (Corbett et al., 2010). Unidentified and unresolved medication discrepancies may lead to medication-related problems, harming patients.

The Joint Commission (2016) recognized that ineffective MR can lead to undetected and/or unresolved discrepancies resulting in harm to patients, such as potential adverse drug events (PADEs) or actual ADEs. PADEs, also called *near misses* are medication errors that describe instances where harm was prevented before an adverse drug event occurs. ADEs are injuries resulting from drug-related medical interventions which contribute to one million emergency room visits and approximately 125,000 hospital admissions each year (Office of Disease Prevention and Health Promotion, 2019).

Transition-related adverse medication events, a major driver of rehospitalizations, may stem from poor MR processes. From Medicare data, recipients in home health needing rehospitalization continued to rise (Medicare Payment Advisory Commission, 2018). In the United States, one of five Medicare patients in home health care will be re-hospitalized, and 28% will be re-hospitalized within 60 days (Jarrín, Flynn, Lake, & Aiken, 2014; Jencks, Williams, & Coleman, 2009). ADEs can lead to costly and potentially avoidable emergency room visits and hospitalizations, underscoring the need for effective MR at the time of transition from hospital to home. In fact, two systematic reviews revealed that effective MR contributed to decreased emergency room visits and/or unplanned hospitalizations (Ensing et al., 2015; Kwan, Lo, Sampson, & Shojania, 2013). In another study, 30-day rehospitalizations were reduced with use of both a nurse and a clinical pharmacist to facilitate interventions such as MR at the time a patient is discharged from the hospital (Jack et al., 2009). Use of MR along with other positive interventions during care transitions may contribute to decreased hospitalizations and

emergency room visits, post-acute care discharges (Kwan, Lo, Sampson, & Shojania, 2013).

Antecedents to the Problem of MR Processes in Medicare-certified Home Health Care

Many factors may affect home health care MR processes after patients transition from hospital to home. Home health agency organizational structures and work environment factors, specifically patient safety culture, may be significant characteristics that influence MR processes in home health care. The preceding assessment is in line with models noting there are relationships between structures, processes, and outcomes in healthcare. For the present study, the conceptual framework, Nursing Organization and Outcomes Model (Aiken, Clarke, & Sloane, 2002) was utilized in assessing relationships between home health agency structures on the outcome MR processes. Additionally, the effect of HHA work environment on the outcome MR processes was reviewed using the Agency for Healthcare Research and Quality (AHRQ) Patient Safety Culture Framework.

Home Health Agency Structures

Home health agency structures that may be related to care processes included both nursing structures and organizational structures. The number of home health care registered nurse (RN) visits in a day, RN caseload, and RN-perceived workload were conceptualized as HHA nursing structures for this study. MR system types: paper-based, electronic-based, or a combination of paper-electronic-based systems, and organizations' facilitators and barriers for MR were conceptualized as HHA organizational structures in this study. It was well-established that organizational structures influenced care processes across settings. In fact, a considerable body of research, in both the US and

internationally, has linked nursing organizational structures to care processes and outcomes. For example, nurses' attainment of baccalaureate education, higher levels of nurse staffing, and a richer RN skill mix have been associated with quality nursing care processes across care settings, including hospitals, nursing homes, and outpatient dialysis centers (Aiken, Clarke, Cheung, Sloane, & Silber, 2003; Aiken, Clarke, & Sloane, 2002; Aiken et al., 2011; S. Cho, Kim, Yeon, You, & Lee, 2015; Estabrooks, Midodzi, Cummings, Ricker, & Giovannetti, 2011; Fasolino & Snyder, 2012; Flynn, 2007; Hickey, Gauvreau, Connor, Sporing, & Jenkins, 2010; McHugh et al., 2013; Nantsupawat et al., 2011; Roch, Dubois, & Clarke, 2014; Schuelke, Young, Folkerts, & Hawkins, 2014; Thomas-Hawkins, Flynn, & Clarke, 2008; Yakusheva, Lindrooth, & Weiss, 2014).

There is considerable research on nursing structures as well, including some on workload, a concept that is different than staffing. Workload has been defined as the extent to which pressure and urgency dominate the work environment and is reflected in RNs' ability to take a break during the workday, monitor changes in patient status, and RNs' perceptions of the extent to which their workload is reasonable (Cox et al., 2006). Therefore, conceptually RN workload can be high despite differences in RN-to-patient ratios at the unit-level (e.g., RN-to-patient ratios in intensive care units versus medical-surgical units). In one study, home health nurses reported that sufficient staffing and reasonable workloads were important for their professional practice (Flynn, 2003). Yet, there had been no investigations of the extent to which home health agency nursing structures, that is, RN caseload, number of patient visits per day, and RN workload, influenced the rate and extent to which nurses engaged in effective MR processes for patients transitioning from hospital to home.

Home health agency MR documentation systems, that is, electronic-based, paper-based, or both, are an organizational structure that may be associated with home health care MR processes. Flynn (2003) reported that a well-run documentation system in home health care was important for home health care nurses' professional practice. Paper-based MR puts the responsibility on the nurse completing the paper form to reconcile various sources of patients' medications. This simple paper-based system masks the complexity of a thorough reconciliation, which may have included communication with patients and families, review of medication bottles and pills in the home, review of orders from the hospital, and communications with physicians and pharmacists (Porcelli, Waitman, & Brown, 2010). On the other hand, computerizing MR may reduce the time and increase the efficiency and accuracy of this process (Porcelli et al., 2010). Notably, health information systems, designed by health professionals and information technology staff, that "made sense" and were user-friendly was highlighted by nurses as desirable to facilitate MR (Varghese, 2011).

A scoping review on information technology and MR highlighted a study noting paper-based MR can be useful when standardized forms were used (Bassi, Lau, & Bardal, 2010). However, the review also emphasized another study noting paper-based forms may prove hard to integrate with other care processes. Electronic-based MR saved clinicians time, allowed for faster integration of medication lists, contained features for identifying medication discrepancies (albeit quicker than with use of paper-based medication information sources), and allowed for visualization of medications from different time periods (Fernandes & Shojania, 2012). Use of an electronic MR process decreased duplication of medication information and allowed for easier integration of

medication-related information and related tools to manage medications into a centralized location (Pronovost et al., 2003). Detection and management of medication discrepancies were more effective using an electronic medication module compared to a paper-based process (Kramer, et al., 2016).

Drawbacks of electronic-based MR systems included (a) more complex than paper-based systems; (b) provided a false-sense of accuracy; (c) may need to be in place along with full computerized prescribe order entry (CPOE) implementation; (d) not currently in use in many institutions as CPOE may not be mandatory for prescribers. One study points out that use of information technologies such as electronic MR can help prevent medication errors, contributing to cost savings, up to \$88 billion over 10 years (Agrawal, 2009). Despite the differences in MR system types, little is known about the use of MR paper versus electronic-based systems in home health care and the extent to which these systems influence MR in the home by nurses after patients' hospital discharges.

There may also be HHA organization facilitators and/or barriers that are associated with MR processes performed in the home, after a patient's discharge from the hospital. Several studies have explored and identified facilitators and barriers to MR and MR processes in hospital settings. Time constraints for teaching nurses MR processes, time essential to complete MR, integration of MR into daily workflow, and nurse/physician noncompliance and follow-through on discrepancies were barriers to effective MR. Additionally, lack of direction regarding who was responsible for performing MR, failure to implement consequences for staff non-adherence to MR processes and associated policies, and patient/family lack of knowledge about medication

schedules were also identified as barriers to effective MR in hospital settings. Facilitators of MR included multidisciplinary collaboration, and time-efficiency measures such as performing MR through an integrated electronic health record (Schwarz & Wyseil, 2006; Varghese, 2011). In one qualitative study, community pharmacists were asked about barriers and facilitators to MR for patients recently discharged from the hospital to home (Kennelty et al., 2015). Barriers included; the MR process was noted as time-consuming. Hospitalists had difficulty tracking physicians down to clarify discharge prescriptions. There were insufficient man-hours for pharmacists and pharmacy technicians to allow time to work on MR. Facilitators included transitional care teams and care coordinators, both of whom communicated discharge and medication-related information. Being able to rely on patients, caregivers, or providers as available to facilitate accurate MR was a positive factor, especially when patients were on complex medication regimens (Kennelty et al., 2015). Facilitators and barriers for MR processes have not been quantified for home health care practice. The relationships of MR processes to nursing organizational structures or work environment factors have also not been elucidated. The present study addressed these gaps in knowledge.

Work Environment-Patient Safety Culture

High-quality work environments, likely an important antecedent to effective MR processes in home health care, are workplaces that emphasize accurate, consistent, patient-centered care; there is also organizational leadership and staff commitment to supporting quality care. Commitment by leadership-supported staff retention and staff intent to leave a workplace with a high-quality work environment were low (Cowden & Cummings, 2015). In high-quality work environments, there was a focus on safe work

with organizational structures, processes and relationships in support of high-quality care. These high-quality work environments included guidelines and policies for evidence-based practices, appropriate and interoperable information systems, shared leadership, respect, and support for staff autonomy. There were encouragement of adequate staffing levels and staff mix, which included healthcare providers with different competences/skillsets, enough to handle patient acuities, and foster an environment of teamwork. There was also emphasis on interdisciplinary care, research, and support for staff education (Cowden & Cummings, 2015; Kramer, Schmalenberg, & Maguire, 2010).

Patient safety culture has been highlighted as an important dimension of high-quality work environments, a work environment dimension that was explored in this study. A patient safety culture reflected employees' perceptions of safety policies, procedures, and practices in use within an organization and also acted as a frame of reference for their behavior and attitudes (Clarke & Aiken, 2006; Mardon, Khanna, Sorra, Dyer, & Famolaro, 2010; Mearns, Flin, Gordon, & Fleming, 2001).

There has been a growing body of empirical evidence that links negative safety cultures in work environments with adverse patient events. While the mechanisms for the relationship between safety culture and adverse events were often not clear, many speculated that an important mechanism might be the role of RNs in integration of care, as well as RN care processes, monitoring and surveillance to identify real and potential hazards and patient deterioration before they contribute to errors and adverse patient events. In a before (1981-1982) and after (1985-1986) study of hospital care quality, the RAND research and development corporation found processes of care, including care quality, did not decline significantly after implementation of the Medicare prospective

payment system compared to the fee-for-service system for hospitalized Medicare beneficiaries. There were better therapeutic processes, including overall nursing surveillance under the prospective payment system, highlighting that care quality for hospitalized patients was improved. Of note, in the RAND study was the acknowledgment that some Medicare beneficiaries appeared to be discharged earlier and in less stable conditions; as such discharge status and processes of care should be monitored long-term (Kahn et al., 1990; Rubenstein, Chang, Keeler, & Kahn, 1992). Though patient safety culture has been recognized as a cornerstone of high-quality care processes in hospitals, the extent to which patient safety culture in home health agencies was associated with effective MR processes was not known.

Care processes such as care left undone, missed, and implicitly rationed nursing care were evaluated in a state-of-the-art review (Jones, Hamilton, & Murry, 2015). At least one missed nursing care process occurred among 55% - 98% of nurses. Safety climate was a predictor of unfinished care. Unfinished care was related to increased adverse events (e.g., medication-related events, falls, nosocomial infections), nurse-reported care quality, job satisfaction, and intent to leave a nursing position. From a search of the literature in traditional bibliographic databases such as PubMed (*U.S. National Library of Medicine*) and CINAHL (*EBSCO Technologies*), patient safety culture had not been measured in home health care.

Study Purpose

Important, relevant, and feasible questions surround the problem of ineffective MR at the care interface of hospital to home. Most studies were about MR in acute care and/or a non-home health care community interface. MR studies also focused on nurse or

patient outcomes, with little to no studies that have examined relationships surrounding the care process of MR. The purpose of this study was to elucidate the potential interrelationships among home health care structures, patient safety culture, and MR processes in patients going home to intermittent skilled nursing care after discharge from the hospital.

Research Question and Sub-questions

What are the relationships among home health agency nursing structures (RN caseload; number of patient visits per day; RN workload); organizational structures (MR systems; MR facilitators. MR barriers); patient safety culture dimensions (teamwork; work pressure and pace; overall perceptions of patient safety and quality; overall ratings of patient safety and quality); and MR processes in Medicare-certified home health agencies?

- a. What are the relationships between home health agency nursing structures (RN caseload, number of patient visits/day, RN workload), and MR processes in Medicare-certified home health agencies?
- b. What are the relationships between home health agency organizational structures (MR system types, MR facilitators, and barriers) and MR processes in Medicare-certified home health agencies?
- c. What are the relationships between patient safety culture (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings of patient safety and quality) and MR processes as reported by nurses who work in Medicare-certified home health agencies?

- d. Are home health agency organizational structures, nursing structures, and patient safety culture dimensions independent predictors of MR processes in home health agencies?
- e. Do patient safety culture dimensions mediate the relationships between home health agency nursing structures, organizational structures, and MR processes?

Significance of the Study

Care transitions are at times fraught with many issues that may jeopardize a patient's health status (Setter, Corbett, & Neumiller, 2012) leading to medication errors from preventable ADEs and unplanned rehospitalizations. An important component in decreased transition-related adverse medication events was effective MR. MR is a best-practices process to decrease the likelihood of adverse medication-related events resulting from a patient hand-off or care transition across settings (e.g., acute care to community), levels of care and providers. In this study, the associations among organizational structures including home health agency and nursing structures and home health agency patient safety culture were investigated for their influences on nurse-reported MR processes associated with hospital to home health agency care transitions.

The complexities and fragmentation of the U.S. healthcare system can be seen within the MR process for patients discharged from hospital to home health agency care. In a recent study, employing a qualitative component, hospital and home health care RNs noted MR as number one relating to perceived gaps in care for patients transitioning from hospital to home health care (Smith & Alexander, 2012). Within a hospital, patients experience multiple care transitions, each involving changes in medications. When discharged to home, these patients face a return back to an environment where previously

prescribed medications still exist. Even though patients are armed with an updated list of medications generated from their hospital stay, many factors may contribute to a challenging home environment where HHA RNs are attempting to perform MR. Those factors include patients being prescribed medications in a similar class to medications already in their homes, patients' failure to fill new prescriptions, and community physicians' and pharmacists' lack of knowledge of new medications prescribed post-hospital discharge.

Chapter 2

REVIEW OF THE LITERATURE

Chapter Overview

This chapter presents a discussion of the theoretical underpinnings for this research and a review of exemplar studies reported in the empirical literature that have examined the relationships tested in this study. First, home health agency organization and nursing structural determinants of MR processes, conceptualized as a nursing process in this study, are presented as derived from the Nursing Organization and Outcomes Model (NOOM) (Aiken, Clarke, & Sloane, 2002). This model purports there are relationships between structures, processes, and outcomes. NOOM concepts that were examined in this study were home health agency organizational and nursing structures, patient safety culture as a dimension of high-quality work environments, and nursing processes (MR processes). A second theoretical framework, the Agency for Healthcare Research and Policy's Patient Safety Culture (PSC) Framework, provided theorized dimensions of safety culture in healthcare settings and was also used to guide the

proposed research. Empirical literature that supports proposed relationships among theoretical concepts related to this study are also presented in this chapter.

The first section of this chapter presents a discussion of the Nursing Organization and Outcomes Model and the Patient Safety Culture Framework as the theoretical underpinnings for this study. The second section presents a review of empirical literature that supports the relationships among specific theoretical concepts that were tested. The third section is a discussion of gaps in the empirical literature and delineated the study hypotheses tested. The final section presents theoretical and operational definitions of concepts tested in this study.

Theoretical Frameworks

Nursing Organization and Outcomes Model

The Nursing Organization and Outcomes Model (NOOM) (Aiken, Clarke, & Sloane, 2002), one theory supporting the premises of this research (Figure 1), is based on Donabedian's Healthcare Quality and Outcomes Framework that stipulates a three-component approach to healthcare quality: structure, process, and outcomes (Donabedian, 2005). Donabedian defined structure as the physical and organizational properties of health care settings, while process is the treatment or service provided to the patient, and outcomes are the results of care processes. A key proposition of the model is that organizational structures, including characteristics of the clinical workforce and the practice environment, influenced nursing and physician care processes, which, in turn, influenced health outcomes. The NOOM, derived from Donabedian's seminal work, further explained that the nursing workforce in organizations represents the healthcare staff with the closest and most prolonged contact with patients; hence, serving as the

surveillance system within healthcare organizations, including home health agencies (Figure 1). Instead of hospital organizations, the focus of this study was home health agency organizations (Figure 2). Nurse staffing (i.e., nurse-to-patient ratios, skill mix) is conceptualized in the NOOM as nursing structural features of hospital organizations that influence the effectiveness of nursing surveillance and the adequacy of nursing care processes. Lower nurse-to-patient ratios, or less nurse staffing, is proposed to jeopardize the surveillance system and increase the likelihood of impaired nursing care processes and negative patient outcomes. Conversely, higher nurse-to-patient ratios, or better nurse staffing, is proposed to be associated with adequate nursing care processes and positive patient outcomes. For this study, nursing structures in home health agencies was conceptualized as RN caseload, number of patient visits per day, and RN workload (Figure 2). In addition, home health agency organizational structures were conceptualized as MR system types, MR facilitators, and MR barriers (Figure 2). The NOOM further proposed that the potentially negative impact of nursing structures on care processes may be offset by a safe, high-quality, and supportive work environment. In the NOOM, a high-quality work environment was conceptualized as one that has distinct characteristics that are supportive of professional nursing practice such as nurse autonomy, staffing and resource adequacy, and managerial support for nurses' decisions (Aiken et al., 2002). For this study, a high-quality work environment was conceptualized as four dimensions of patient safety culture including teamwork, work pressure and pace, overall perceptions of patient safety, and overall ratings of safety and quality (Figure 2). These theoretical explanations permitted empirical explication of the operant mechanisms by which

structural features of home health agencies and patient safety culture affected MR processes in home health agencies.

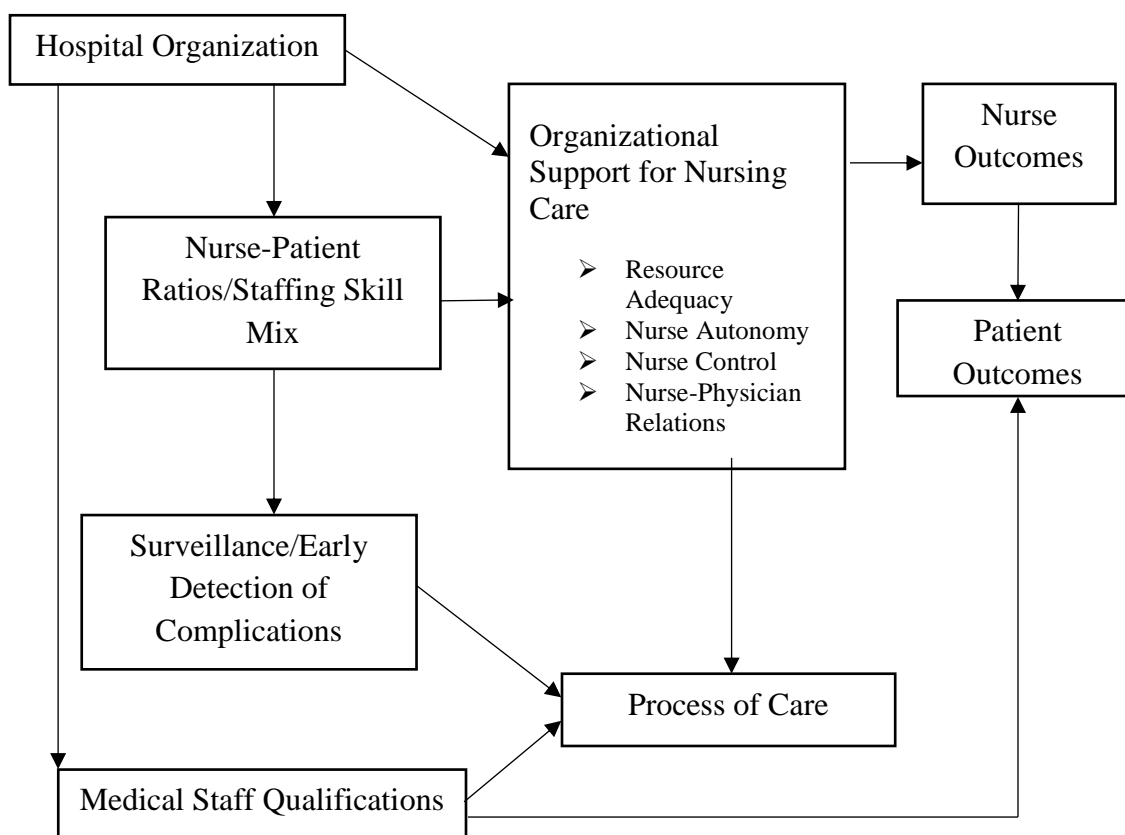


Figure 1. Diagram of Nursing Organization and Outcomes Model

Patient Safety Culture Framework

The Agency for Healthcare Research and Quality (AHRQ) described the concept of safety culture as an organization's commitment to safety at all levels of the organization in the face of inherently complex and potentially hazardous procedures (Agency for Healthcare Research and Quality, 2012a). AHRQ noted that key features of a culture of safety included (a) acknowledgement of the high-risk nature of an organization's activities and the determination to achieve safe operations; (b) an environment that is blame-free where individuals can report errors or near-misses without

fear of punishment; (c) encouragement of collaboration across ranks and disciplines to seek solutions to patient safety problems; (d) organizational commitment of safety resources to address safety concerns (Agency for Healthcare Research and Quality, 2012a). AHRQ also conceptualized patient safety culture as having multiple unit-level and hospital-level dimensions. According to AHRQ, important dimensions of patient safety culture, included teamwork, work pressure and pace, staff training, standard office processes, communication openness, communication about error, organizational learning, and overall perceptions and ratings of patient safety (Agency for Healthcare Research and Quality, 2012a). Yet, little was known regarding the state of patient safety cultures in home health agencies and the extent to which that aspect of high-quality work environments influenced nursing care processes such as MR.

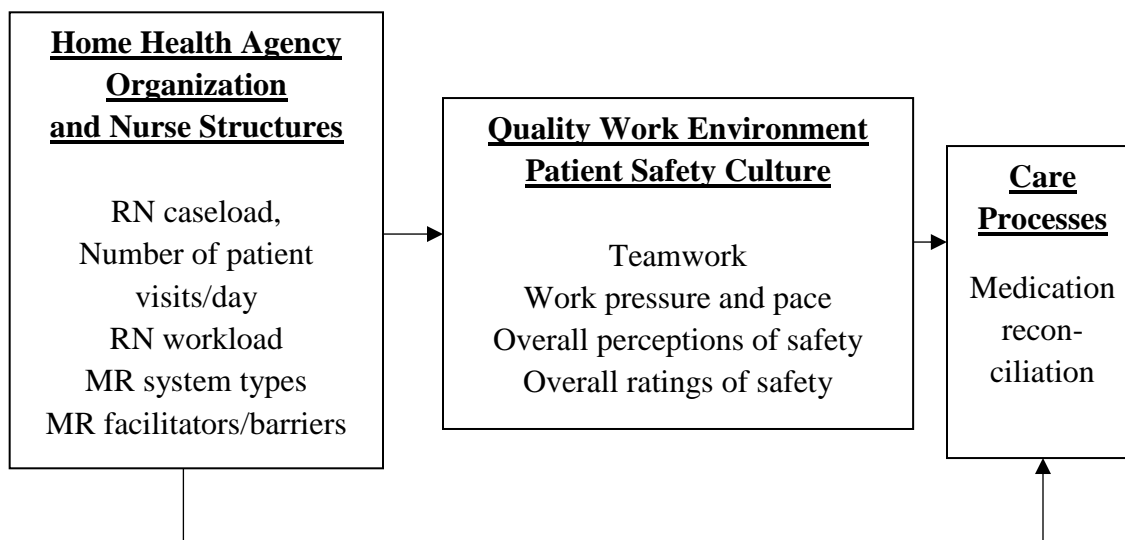


Figure 2. Diagram of Theorized Model Tested in This Study

Literature Review

An appraisal of selected literature related to the relationships tested in this research study are presented in this section. Traditional biomedical databases were

searched such as CINAHL (*EBSCO Technologies*), MEDLINE (*U.S. National Library of Medicine*), and SCOPUS (*B.V. Elsevier*). Google Scholar, an internet resource with academic literature was also searched. Literature was selected based on age of citations, 2004-2018 for currency and relevancy, or match to the relationships proposed for testing in the present study.

Organizational Structures and Care Processes

In this section, a synthesis and analysis of empirical evidence supporting the theorized relationship between the NOOM constructs of organizational structures and care processes are presented. Findings from five exemplar studies that examined relationships between organizational structures and care processes in healthcare settings are discussed (Allen et al., 2017; Cabin, Himmelstein, Siman, & Wolhandler, 2014; Clement, Bradley, & Lin, 2009; Ettner et al., 2006; Ward et al., 2004). In addition, a qualitative study that explored facilitators and barriers to outpatient palliative care was included in the review (Bekelman et al., 2016). For each study, the study design, sample characteristics, and relevant findings are summarized in Table 1.

In the studies reviewed, the types of care processes that were examined varied across the studies. Care processes included missed nursing care of neonatal nurses (Tubbs-Cooley et al., 2017), cancer care for nursing home residents (Clement et al., 2009), outpatient palliative care (Bekelman et al., 2016), and diabetes care practices by physicians (Ettner et al., 2006; Ward et al., 2004). One other study examined thirteen process-of-care indicators to compare overall scores between for-profit or proprietary home health agencies to non-profit home health agencies (Cabin et al., 2014).

Organizational structures assessed across the studies included hospital Magnet status designation, insurance status of nursing home patients (Medicare versus Medicaid), physician salary models (direct, capitated, fee-for-service), for-profit versus non-profit status of US home health agencies, and level of organizational support and leadership for implementation of diabetes care guidelines. A higher percentage of Medicare patients in nursing homes, direct physician salary models, and organizational support for clinical practice guideline implementation were significantly associated with positive care processes (Table 1). In reviewing for-profit and non-profit home health agencies, there was a lower score on indicators of care processes and care quality in for-profit agencies compared to non-profit agencies (Cabin et al., 2014). Alternately, in one of the studies reviewed, there was no association between the organizational structures and care process assessed (Tubbs-Cooley et al., 2017). Magnet designation was not associated with missed nursing care processes by neonatal intensive care nurses. However, the reasons for missing care differed significantly between Magnet and non-Magnet hospitals (Tubbs-Cooley et al., 2017). Additionally, in a qualitative study (Bekelman et al., 2016) that explored facilitators and barriers to scaling up an outpatient palliative care service in Veteran's Administration Hospitals, participants noted that a lack of organizational quality of care incentives and performance measures would serve as a barrier to effective outpatient palliative care.

In summary, the findings from most of these exemplar studies supported the theorized proposition that organizational structures were significantly associated with care processes. One study was found that examined relationships between organizational structures of home health agencies and care processes (Cabin et al., 2014). Medication

management, a functional measure with little improvement since 2007 was briefly mentioned in that study, but specific references to MR processes by RNs during home health visits were not mentioned, despite the recognized standard of MR as a part of medication management.

Nursing Structures and Nursing Care Processes

In this section, a synthesis and analysis of empirical evidence supporting the theorized relationships between the Nursing Organization and Outcomes Model concepts, nursing structures, and nursing care processes are presented. Findings from ten exemplar studies are discussed that examined relationships between nursing structures and care processes in healthcare settings. For each study, the study design, sample characteristics, and relevant findings are summarized in Table 2.

Eight of the ten studies examined relationships between nursing structures and nursing care processes in acute care hospitals; one study examined these relationships in outpatient dialysis settings (Table 2). Nurse structures were measured in part as nurse staffing in most studies and as nurse workload in a minority of studies (Table 2). Staffing and workload were operationalized differently across the studies. In five of the studies (Ball et al., 2017; E. Cho et al., 2016; E. Cho et al., 2015; S. Cho, Mark, Knafl, Chang, & Yoon, 2017; Thomas-Hawkins et al., 2008), patient-to-nurse ratios were calculated from nurse reports of unit-level staffing and patient census. In one of these studies (S. Cho et al., 2017), both patients' and nurses' perceptions of staffing adequacy (1 = very insufficient to 4 = very sufficient) were also examined. In another study (Dabney & Kalisch, 2015), nurse staffing was obtained from administrative databases and operationalized as RN hours per patient day, nursing hours per patient day, and nursing

skill mix. Nurse workload was operationalized differently in the three studies that assessed this variable. In one study, nurse workload was operationalized as workload intensity and focused on the number of patients needing monitoring and requiring assistance with activities of daily living (ADLs) (Ball, Murrells, Rafferty, Morrow, & Griffiths, 2014). In two studies, nurse workload was operationalized as either skill mix, that is number of RN direct care hours divided by number of LPN and unlicensed assistive direct care hours (Castner, Wu, & Dean-Baar, 2015) or as the number of patients and nurses on the nursing unit (Ausserhofer et al., 2014). One study was found that examined nurse workload in home health agencies (Wang, Simmons, Maxwell, Schlundt, & Mion, 2018).

Nursing care processes were conceptualized in one of three ways across the ten studies. One study reviewed the care process of care delivery and its relationship to the workload of HHA nurses caring for frail elderly with depression (Wang, et al., 2018). In three studies (Ball et al., 2014; E. Cho et al., 2016; Thomas-Hawkins et al., 2008), nursing care processes were conceptualized as necessary nursing activities that are left undone due to a lack of time. In six of the studies, nursing care processes were conceptualized as missed care, that is, any aspect of required patient care that is omitted or significantly delayed (Ausserhofer et al., 2014; Ball et al., 2017; Castner, Wu, & Dean-Baar, 2015; S. Cho et al., 2015; S. Cho et al., 2017; Dabney & Kalisch, 2015). Missed nursing care was assessed by patients in one study (Dabney & Kalisch, 2015), by nurses in two studies (Ball et al., 2017; S. Cho et al., 2015) and by both patients and nurses in another study (S. Cho et al., 2017). In one study, missed nursing care was analyzed in the context of a hospital merger on the unit- and nurse-level (Castner, 2015). No studies were

found that examined home health agency nursing care processes, in particular MR processes.

A majority of the studies revealed significant associations between nurse staffing and nursing care processes. Specifically, lower nurse staffing was significantly related with higher levels of tasks left undone in two studies (E. Cho et al., 2016; Thomas-Hawkins et al., 2008) and omitted or delayed care in three studies (Ball et al., 2017; S. Cho et al., 2015; Dabney & Kalisch, 2015). In one study (S. Cho et al., 2017), nurse-to-patient ratios were not significantly related to missed nursing care. However, both nurse and patient perceptions of staffing adequacy were significantly associated with one aspect of missed care; that is, missed communication, in this study. Moreover, nurse workload was also positively correlated with nursing care processes; specifically care left undone (Ausserhofer et al., 2014; Ball et al., 2017; Castner, et al., 2015).

In summary, the findings from the ten-exemplar studies reviewed supported the theorized relationships between nursing structures (nurse staffing indicators and RN workload) and nursing care processes (tasks left undone and missed care) in hospitals. However, no studies were found that examined nursing structures (RN caseload, number of patient visits per day, RN perceptions of workload) and MR processes in home health agencies. This study addressed this important gap in knowledge.

Patient Safety Culture (Work Environment) and Care Processes

In this section, a synthesis and analysis of empirical evidence supporting the theorized relationship between patient safety culture and care processes are presented. The literature search yielded four studies that examined or explored these relationships in healthcare settings (Brown & Wolosin, 2013; Jarrín, Kang, & Aiken, 2017; Pickering,

Nurenberg, & Schiamberg, 2017; Rea & Griffiths, 2016). For each study, the study design, sample characteristics, and relevant findings are summarized in Table 3.

One quantitative study examined hospital safety culture and care processes (Brown & Wolosin, 2013). In this study, a positive safety culture was significantly associated with fall protocol use by nurses (Brown & Wolosin, 2013). Two qualitative studies with non-nurse samples also provided empirical support for the theorized relationship between safety culture and care processes. Certified nursing assistants noted that working in a toxic environment contributed to workers modifying or omitting care processes, affecting both care quality and ultimately patient safety (Pickering et al., 2017). On the other hand, in a second qualitative study, general practitioners noted that a supportive primary care work environment facilitated their incident reporting practices (Rea & Griffiths, 2016). Jarrín et al. (2017) examined home health agency registered nurses survey responses to practice environment scale items, mapping responses to the Pathway to Excellence Program, an American Nurses Credentialing Center (ANCC) initiative with a list of 12 standards found in good nursing work environments. Agencies with higher mean Pathway standards composite scores were more likely to have better nurse work environments.

In summary, there is empirical evidence of the theorized relationships between safety culture and care processes outside of home health care settings. This study addressed the gap in knowledge regarding the impact of home health agencies' safety culture on MR processes by nurses during the first home visit after a patient is discharged from the hospital.

Mediating Role of Work Environment Factors

For this section, only one empirical study was found in the literature to support the potential for work environment factors as a mediator of the relationship between home health agency nurse and organizational structures and registered nurse medication reconciliation processes. Researchers (Westerberg & Tafvelin, 2014) examined the role of organizational and peer support in the relationship between transformational leadership style and quality of care in home health services. In an analysis of the direct and indirect effects of transformational leadership on quality of care, the indirect effect was significant ($\beta = 0.54$, 95% CI [0.35, 0.83], $p < .001$) and the direct effect was not ($\beta = -0.04$, 95% CI [-0.29, 0.18], $p = .743$). These findings were consistent with the NOOM premise that relationships among the theory concepts are complex, and suggested that home health agency patient safety culture may mediate the relationship between home health agency nurse and organizational structures and registered nurse MR processes.

State of the Literature and Gaps

There was an abundance of empirical literature focused on the endpoint patient outcomes, but there was a paucity of studies focusing on care processes as an outcome. Moreover, few published studies have examined organizational and work environment determinants of nursing care processes. Additionally, most of the studies in this review focused on RNs in hospital settings. RNs in the community, specifically home health agencies, were absent in research that examined nursing care processes in the home and factors associated with these processes. In this study, RNs employed by home health agencies, providing care for patients in their homes, and engaging in MR processes were the focus. Organizational and work environment determinants of registered nurse MR processes were examined.

Study Hypotheses

The following hypotheses were examined among RNs involved in direct patient care in Medicare-certified home health agencies.

1. RN caseload is inversely associated with MR processes.
2. The number of patient visits per day by RNs is inversely associated with MR processes.
3. RN workload is inversely associated with MR processes.
4. Presence of MR systems is positively associated with MR processes.
5. Home health agency organization barriers are inversely associated with MR processes.
6. Home health agency organization facilitators are positively associated with MR processes.
7. Patient safety culture dimensions are positively associated with MR processes.
 - a. Teamwork is positively associated with MR processes.
 - b. Work pressure and pace is negatively associated with MR processes.
 - c. Overall perceptions of patient safety and quality are positively associated with MR processes.
 - d. Overall ratings on quality and patient safety are positively associated with MR processes.
8. In an adjusted model that controls for the individual effects of each predictor variable on MR processes, RN caseload, number of visits per day, nurse workload, MR systems, MR facilitators/barriers, and patient safety culture (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings on quality

- and patient safety) will be significantly and independently associated with MR processes in home health agencies.
9. RN caseload, number of patient visits per day, workload, MR system types, and MR facilitators/barriers will have significant indirect effects on MR processes through their effects on patient safety culture (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings on quality and patient safety) in home health agencies.

Theoretical and Operational Definitions for Study Variables

Medication reconciliation was a formal process to decrease chance of medication errors and was comprised of five steps: (1) developing a list of current medications; (2) developing a list of medications to be prescribed; (3) comparing the medications on the two lists; (4) making clinical decisions based on the comparison; (5) communicating the new list to appropriate caregivers and to the patient” (Barnsteiner, 2008). For this study, MR processes was operationalized as a participant’s score on the Home Health Care Medication Reconciliation Processes Scale.

Nurse workload was conceptualized as the volume of nurses’ work (Myny et al., 2011). For this study, nurse workload was operationalized as home health agency nurses’ caseload (total number of patients responsible for), number of patient visits on the last day worked, and as a participant’s score on the workload subscale from the Individual Workload Perception Scale – Revised (IWPS-R), (Lacey, Cox, Lorfing, Teasley, Carroll, & Sexton, 2007).

Medication reconciliation systems are paper and/or computer-based systems used to create, manage, and store accurate lists of medications a patient is currently taking. In this study, MR systems was operationalized as responses to the survey item “Select the

system that is used by your home health agency for documenting medication reconciliation of your patients' medications in their homes.”

Medication reconciliation facilitators are organizational structures that support generation and updating of medication information allowing for creation of one accurate, up-to-date medication list for a patient. For this study, medication reconciliation facilitators were operationalized as a score for facilitators from the Home Health Care Medication Reconciliation Facilitators and Barriers Scale.

Medication reconciliation barriers are organizational structures that impede generation and updating of medication information, decreasing the chance that an accurate, up-to-date medication list for a patient might be created. For this study, medication reconciliation barriers were operationalized as a score for barriers from the Home Health Care Medication Reconciliation Facilitators and Barriers Scale.

Patient Safety Culture reflected an organization's commitment to safety at all levels in the face of inherently complex and potentially hazardous procedures, as well as employees' perceptions of safety policies, procedures, and practices in use within the organization (Agency for Healthcare Research and Quality, 2012a). For this study, patient safety culture was operationalized as a participant's score on the following AHRQ Medical Office Survey on Safety Culture dimensions: teamwork, work pressure and pace, overall perceptions of patient safety, overall ratings of quality and patient safety.

Home health agencies, previously called home health care services, are public or private (for profit or non-profit) organizations “that provide, either directly or through arrangements with other organizations, home health services in the patient's home”

(U.S. National Library of Medicine, 1995). Home health agencies receive certifications and accreditations from various groups. The proposed study focused on Medicare-certified home health agencies. Provision of “skilled nursing and other therapeutic services,” establishing policies to govern services provided, operating efficiently and effectively, and having a mechanism to store all patient clinical information are some of the requirements for certification of a home health agency by Medicare (U.S. Centers for Medicare & Medicaid Services, 2016). Home health care refers to skilled intermittent care; conversely, home care refers to private duty, hourly services in patients’ homes.

Registered Nurses are “professionals qualified by graduation from an accredited school of nursing and by passage of a national licensing examination to practice nursing. They provide services to patients requiring assistance in recovering from or maintaining their physical or mental health” (U.S. National Library of Medicine, 1967).

Chapter 3

METHODOLOGY

Chapter Overview

In this chapter, a discussion of study design, sample, sources of de-identified data, plan for data safety and management, and data analysis plans are discussed. This study was an analysis of secondary data from a primary study, aimed at establishing reliability and initial construct validity of two new measures for home health agencies, as well as exploration of two established measures in a sample of home health care nurses (Saimbert, unpublished data). A descriptive, correlational design was employed in the proposed study to examine the relationships between HHA structures: RN caseload,

number of patient visits per day, RN workload, MR systems, MR facilitators and barriers, patient safety culture, and home health nurse-reported MR practices in patients transitioning from hospital to home.

Study Sample

De-identified data from the principal investigator's (PI) parent study of 117 RNs working in Medicare-certified home health agencies (HHAs) and involved in direct care of adult patients (Figure 1) served as the analytic sample for this study (Saimbert, unpublished data). RNs in the parent study held an active license from a U.S. Board of Nursing and needed to be fluent in English. In the parent study (Saimbert, unpublished data), RNs were recruited at two different survey distribution periods from multiple U.S. Medicare-certified home health agencies, with the anonymous electronic study survey being available for each RN participant to take once. All RNs who took the anonymous MR survey during the first survey distribution period (December 1, 2015 through end of January 31, 2016) were from a single parent agency, with multiple branches in the US. Thus, RN participants recruited during the first survey distribution period reflected home health branches in 15 states, covering some Northeast, South and West U.S. locations. HHA RNs who took the anonymous MR survey during the second survey distribution period (March 1, 2016 through end of June 30, 2016) came from multiple agencies, each with membership in a home health care and hospice services association in New Jersey. The purpose of the parent study was to test the psychometric properties (reliability and initial construct validity) of two new instruments: The Home Health Care Medication Reconciliation Facilitators and Barriers Scale and the Home Health Care Medication Reconciliation Processes Scale. In addition, the reliability of the revised Individual

Workload Perception Scale, nurse workload subscale, and the Medical Office Survey on Patient Safety Culture for home health nurses was examined.

In the parent study, the Home Health Care Director of Clinical Practice and Accountable Care in one branch of the home health agencies noted for time period one invited RN participation in the electronic survey via an email invitation that was sent to an initial sample of approximately 1,100 home health care RNs employed in U.S. branches of the parent agency. The number of RNs from the participating HHAs who received an invitation during the first survey distribution time period was approximate because there was rapid RN turnover during this time. Also, as there was repeated electronic distribution of the survey to any RN with the designation of field worker (i.e., directly involved in patient care), additional RNs received the survey during the repeated electronic distributions. Therefore, an exact count of how many RNs were invited to complete the survey during the first survey distribution time period was not possible and was a limitation of the research. The RN sample pool for the first survey distribution period included field nurses who worked in the following regions of the US: Northeast (CT, MA, RI, VT); Mid-Atlantic (DE, MD, NJ, PA); Southeast (FL, NC, VA), and West (AZ, CO, NM). The invitation included a link to the Rutgers University IRB-approved informed consent document and an anonymous electronic Qualtrics survey. Throughout the first survey distribution time period, emailed reminders were sent three times (one week apart) to RNs to promote survey completion. Between survey distribution periods one and two, 195 participants started the MR survey. One hundred and twenty-five participants began the anonymous electronic survey at distribution time period one. Of the 125 participants, 102 self-identified as working directly with patients. Of those 102

participants, 63 completed all survey items. For the second survey distribution time period, the Director of Professional Development and Support for the home health care and hospice association invited RN participation via an email that included a link to the study informed consent document and the online survey. Invitation emails were sent to potential RN participants from 41 New Jersey-based home health agencies, a total of three times (one week apart). Seventy participants began the anonymous online survey. Of the 70 participants, 58 self-identified as working directly with patients. Of those 58 participants, 54 completed all survey items. Characteristics of the parent study RN sample across both survey distribution time periods are provided in Table 4.

Table 4

Characteristics of the Parent Study Sample

Characteristic	n (%)
Age	
18-30	10 (8.6%)
31-40	22 (19%)
41-50	25 (21.4%)
51-60	39 (33.4%)
61-70	19 (16.5%)
71+	2 (1.8%)
Gender	
Female	113 (96.6%)
Male	3 (2.6%)
Transgender	1 (0.9%)
Race/Ethnicity	
Asian/Pacific Islander	4 (3.4%)
Black/African American	5 (4.3%)
White	105 (89.7%)
Filipino	1 (0.9%)
Hispanic/Latino	1 (0.9%)
Mixed Race	1 (0.9%)
Highest level of nursing education	
Diploma	10 (8.5%)
Associate Degree	34 (29.1%)
Bachelor Degree	62 (53%)
Masters	11 (9.4%)

# Years worked in home health care	
1–5	53 (45.3%)
6–10	24 (20.5%)
11–15	7 (6.1%)
16–20	15 (12.9%)
21–25	9 (7.8%)
26–30	6 (5.3%)
31+	3 (2.7%)

Power Analyses and Sample Size

Power analyses for chi-square, correlational, and multiple linear regression analyses were calculated to determine the appropriate analytic sample size to yield sufficient power for these statistical techniques. For a 2-tailed correlation analysis using a moderate effect ($r = .25$), based on the literature for nurse workload and inadequate nursing care processes (Thomas-Hawkins et al., 2008; Dabney & Kalisch, 2015) and patient safety culture and care processes (Brown & Wolofsin, 2012), a sample size of 123 was needed to yield a power of 0.80 at a 0.05 significance (Cohen, 1988). For chi-square analysis, using a moderate effect based on previous research (McHugh, 2013), a sample size of 87 was needed to yield a power of 0.80 at a 0.05 level of significance (Cohen, 1988). For regression analysis including ten predictor variables using a moderate effect size ($f^2 = 0.15$), a power of 0.80 at a 0.05 level of significance required an estimated sample size of 117 (Cohen, 1988). For this study, the de-identified data set comprised of responses to all survey items from 117 registered nurses was considered sufficient to yield the statistical power for the planned data analyses. Study analyses were on the nurse-level. There was no plan to cluster data or review data by home health agency. The best chance to have reviewed data on an agency-level would have been from the survey released at distribution period one, as only one parent agency with branches across the

U.S. participated in that survey release. However, branches of that parent home health agency were experiencing high turnover at the time, rendering it hard to ascertain the original and final number of nurses emailed the survey at each branch of the parent agency. The survey was originally emailed to all qualifying field RNs and repeat e-mailings during the period of high turnover allowed additional qualifying field RNs a chance to participate in the survey.

Study Variables

In this section, the outcome variable of interest, as well as the predictor variables for the present, study are discussed.

Outcome Variable

Medication reconciliation practices was the outcome variable for this study. For each de-identified participant in the dataset, total scores from item responses to the Home Health Care MR Processes Scale were computed and used for hypothesis testing.

Predictor Variables

There were 10 predictor variables for the study.

Nurse Structures was operationalized in three ways for the proposed study including RN caseload (total number of patients responsible for), number of patient visits on last day worked, and RN scores on the IWPS-R, workload subscale. RN caseload and patient visit data for each respondent were used for hypothesis testing. In addition, responses to the 4-item workload scale were summed, and total workload scores for each participant were used for hypothesis testing.

Home Health Agency Medication Reconciliation System Types was operationalized as nurses' responses to a single-item question about MR systems in use at

their HHA (1 = paper-based, 2 = computer-based, 3 = both. Responses to this item was dummy-coded for multivariate regression and mediation analyses.

Home Health Care Medication Reconciliation Facilitators and Barriers was operationalized as participant scores on the 6-item MR Facilitators and 10-item MR Barriers scales. Item responses to these scales were summed, and total MR facilitators and MR barriers scores were used for hypothesis testing.

Patient Safety Culture was operationalized as participant responses to four scales on the AHRQ Medical Office Survey on Patient Safety Culture including the 4-item Teamwork Scale, the 3-item Work Pressure and Pace Scale, the 4-item Overall Perception of Safety Scale, and the 5-item Overall Safety Ratings Scale. Item responses for each scale were summed, and the total scores for each scale were used for hypothesis testing.

Measures

The instruments used in the parent psychometric study for which item responses and total scores were analyzed in this study are described below.

Measures for Predictor Variables

RN Caseload measures were developed by the PI for the parent study and were used as two-single item measures of RN caseload in the present study: “You answered ‘Yes’ to having a patient caseload. How many patients are in your caseload? On your last day worked, how many patient visits did you make?” RN caseload and patient visit data for each respondent was used for hypothesis testing.

Workload Subscale of the Individual Workload Perception Scale-Revised. In the parent study, the five-item Workload subscale of the Individual Workload Perception

Scale-Revised (IWPS-R) was used as a measure of nurse workload. The IWPS-R has been used widely to measure workload in nursing research. Each workload item was rated on a five-point summated scale ranging from strongly disagree to strongly agree. Scores could range from 5 to 20, with a higher score indicating a higher workload. Sample items included “*My current workload will cause me to look for a new position*” and “*I am able to take at least a 30-minute meal break during my shift.*”

The psychometric properties of the tool had been established in multiple studies involving staff RNs (Cox et al., 2006; Flynn, Thomas-Hawkins, & Clarke, 2009; Lacey et al., 2007). Content validity was established by three nurse executives and two experts in the field of psychometrics (Cox et al., 2006). Reliability of the scale had been demonstrated by several nurse researchers. Cox et al. (2006) reported a Cronbach’s alpha of 0.75 for the workload subscale of the IWPS-R in a large study of pediatric staff RNs. Similarly, in a study of 3,337 nurses in Magnet, Magnet-aspiring and non-Magnet hospitals, Lacey et al. (2007) reported a reliability coefficient of .70 for the Workload subscale and Flynn et al. (2009) reported $\alpha = .78$ in 422 dialysis RNs. Despite the potential differences in hospital and dialysis settings. Reliability for the five-item workload subscale in the parent study was $\alpha = .79$. The de-identified dataset included nurse responses to items on the IWPS-R workload subscale. Item responses were computed to yield total workload scores for the present study.

MR System Types. In the parent study, MR system types were assessed with the following item: “Select the system that is used by your home health agency for documenting medication reconciliation of your patients’ medication in their homes: (a) computer charting system; (b) paper charting system; (c) combination of

computer/electronic and paper charting, (d) reconciliation done but not documented.”

Nurse responses to this item were analyzed.

Medical Office Survey on Patient Safety Culture. The Medical Office Survey on Patient Safety Culture (2009) was one of several surveys on Patient Safety Culture™ (SOPS™) developed to promote continued evaluation and improvement of patient safety and care quality across a number of healthcare settings such as hospitals, nursing homes, ambulatory surgery centers and community pharmacies (Agency for Healthcare Research and Quality, 2012a). The Medical Office survey has 13 independent scales. Psychometric properties for the Medical Office Survey on Patient Safety Culture were initially established as a result of pilot testing involving 202 outpatient medical offices and more than 4,200 staff. Internal consistency reliability for the survey scales was acceptable, ranging from .76 to .87. Data from four scales in the Medical Office Survey was used in the present study: 4-item Teamwork Scale, 3-item Work Pressure and Pace Scale, 4-item Overall Perceptions of Patient Safety and Quality Scale; and the 5-item Overall Ratings on Quality and Patient Safety Scale. An example of a Teamwork Scale item was *“this office emphasizes teamwork in taking care of patients.”* An example of a Work Pressure and Pace Scale item included *“we have enough staff to handle our patient load.”* In the Overall Perceptions of Patient Safety and Quality Scale, exemplar items included *“our office processes are good at preventing mistakes that could affect patients”* and *“in this office, getting more work done is more important than quality of care.”* For the Overall Ratings on Quality and Patient Safety Scale, items addressed patient-centered, timely, effective, and equitable care practices. Item responses for the Teamwork, Work Pressure and Pace, and Overall Perceptions of Patient Safety and Quality scales were arranged in a

Likert scale ranging from 1 = strongly disagree to 5 = strongly agree, or 9 = does not apply or don't know. For the Overall Ratings on Quality and Patient Safety Scale, respondents were asked to rate quality and safety as either poor, fair, good, very good, or excellent. Internal consistency reliability for these scales in home health care nurses, which was examined in the parent study, ranged between .73 to .86.

Home Health Care MR Facilitators and Barriers Scale. This new measure was developed by the principal investigator (PI) to assess organization-level and patient-level facilitators and barriers to medication reconciliation in home health agencies. A description of the development and psychometric testing of this new scale follows.

Item Selection

There were searches of the biomedical literature for barriers and facilitators encountered by healthcare professionals in acute and non-acute care settings in regards to performing MR (Karkov, Schytte-Hansen, & Haugbolle, 2010; Kettermann, 2006; Meyer, Stern, Woolley, Jeanmonod, & Jeanmonod, 2012; Orrico, 2008; Varghese, 2011). Articles highlighting antecedents and consequences, such as medication discrepancies relating to MR, were also reviewed (Orrico, 2008; Willis, Hoy, & Jenkins, 2011). Ultimately, a focus on articles and survey documents from organizations such as the Institute for Safe Medication Practices (ISMP) were used to guide item creation for the Home Health Care Medication Reconciliation Facilitators and Barriers Scale (Institute for Healthcare Improvement, 2008; Institute for Safe Medication Practices Canada, 2010; Institute of Medicine, 2000).

Seventeen items were developed for the barriers and facilitators to MR scale based on the literature reviewed. Items were set to be rated on a Likert response scale

allowing home health care RNs to rate the degree each item impacted MR processes as a facilitator or barrier. Use of a Likert rating as opposed to a dichotomous rating option (e.g., yes or no) facilitates more thought to a response, wider range of options per item for participants to consider, and potentially more in-depth participant answers for statistical analysis by researchers.

Content Validity

The process of content validation was necessary to ensure that the instrument measures what it is supposed to measure (Lynn, 1986; Nunnally & Bernstein, 1994). A two-step item judgment and quantification process used entailed the assertion by experts that the instrument items are content valid (Lynn, 1986). Based on the recommendation that five to ten expert content validity judges are required to provide a sufficient level of control for chance agreement (Lynn, 1986), six expert reviewers, including RNs who have worked or performed direct patient care in a Medicare-certified home health agency environment and/or are also involved in research related to medications and patient safety, served as content validity judges for initial item judgment. Five RN experts (included four RNs who worked in home health care and one nurse researcher) served as content validity judges for the second round of item judgment. These judges were asked to make judgments about the degree to which each item on the scale matched a detailed description of what constitutes the domain of medication reconciliation practices in home health care (Lynn, 1986). They were given a set of instructions by which to determine the domain or content relevance of the items and also of the instrument as a whole. For each item on the instrument, expert judges were asked to rate the extent to which the item is relevant to medication reconciliation facilitators and barriers in home health care on a 4-

point ordinal rating scale ranging from 1 = an irrelevant item to 4 = an extremely relevant item. Expert judges were also asked to suggest any revisions to items and identify any areas that they felt were omitted from the instrument.

After the initial review of the scale by experts, 15 of 17 items were kept, as reviewers rated them 3 = relevant or 4 = extremely relevant. The deleted items were question number seven and fifteen, respectively – “my workload and time demands often leave me spending more time than what I have to complete medication reconciliation during a home health care visit” and “medication reconciliation is routinely monitored/audited in the home health agency where I work to ensure compliance.” Based on a suggestion by an expert reviewer, an additional item “patients and/or families are unaware of medications they are taking (e.g., names, frequencies, doses)” was added to the scale. The revised 16-item scale was subjected to a second round of item judgment. Based on the second round of item judgment, minor changes in wording for some items were made. The 16-item Home Health Care Medication Reconciliation Facilitators and Barriers Scale remained, where ten items represented barriers and six items facilitators for home health agency RN completion of MR.

Quantification of content validity was determined from the judges’ relevance ratings. A content validity index (CVI) for each item was determined by the proportion of experts who rated the item as content valid (i.e., rating of 3 or 4), and the CVI for the entire instrument was determined as the proportion of total items judged content valid (Polit & Beck, 2010; Waltz, Strickland, & Lenz, 2010). The CVI for the 16-item instrument was acceptable at 0.8 and considered content valid (Lynn, 1986; Waltz, Strickland, & Lenz, 2010).

Psychometric Properties

Psychometric properties of the MR Facilitators (6-item) and Barriers (10-item) scales were assessed in the parent study conducted from October, 2015 to June, 2016. Initial construct validity and internal consistency reliability were examined in a sample of 125 nurses, who were employed in HHAs and provided direct care to patients in their homes. The sample for the psychometric parent study ($N = 125$) was previously described in the sample description of this dissertation report.

Construct Validity. To examine initial construct validity of the MR Facilitator and Barrier instrument, the 16-item scale was subjected to exploratory principal components factor analysis with Varimax rotation. There is a lack of consensus regarding how many participants are needed per item for factor analysis (VanVoorhis & Morgan, 2007). The sample size recommendation followed in the parent study for factor analysis is guided from works of Guadagnoli & Velicer (1988), Hair, Anderson, Tatham, & Black (1995), and Reddon (1990), all noting a sample size of 100 to 150 for 40 to 50 items.

The dimensionality of items was examined using the following rules: factor loading cutoffs for each item of .40 and Eigenvalues greater than 1 (Tabachnick & Fidell, 1996). The initial and rotated solutions yielded three factors with Eigenvalues greater than 1, accounting for 62% of the variance. Loadings on two factors were unambiguous and conceptually distinct. One of these factors represented MR facilitators and focused on HHA culture, training, and leadership regarding MR processes. The second factor represented MR barriers, and the items on this factor pertained to human (patient, family, providers) and organization barriers to MR. Three items loaded ambiguously (i.e., factor loadings .40 or greater) on factor 2 (barriers items) and a third factor. Since the

ambiguous items were a conceptual fit with barriers to MR, these items were grouped with the barriers items in factor 2. In addition, although the loading for the last item in factor 2 was less than .40, it was deemed that this item was distinct from the other barrier items and was an important barrier to MR for nurses in HHAs. Thus, the item was retained. Factor loadings for the MR facilitator and barriers dimensions are presented in Table 5.

Table 5

Factor Loadings for the Home Health Care MR Facilitators and Barriers Scale

	Factor 1	Factor 2
Medication safety is an important or integral part of the culture of the home health agency where I work.	.42	
There is a standard process for medication reconciliation in the home health agency where I work.	.69	
Medication reconciliation training is provided in the home health agency where I work.	.75	
The time frame for medication reconciliation is clearly communicated in the home health agency where I work.	.73	
The medication reconciliation documentation forms and/or system (e.g., computer and/or paper-based charting) in the home health agency where I work makes it easier to verify, clarify, and reconcile my patients' medications during home health visits.	.67	
Administrative leadership in the home health agency where I work supports our medication reconciliation process.	.79	
Patients and/or families are unaware of medications they are taking (e.g., names, frequencies, doses).		.67
Patients and/or families have low health literacy and/or language barriers.		.75
Family or caregivers are not available in the home if needed for the medication reconciliation process.		.72
Facility (e.g., hospital, skilled nursing, inpatient rehabilitation) discharge medication lists have inconsistencies (e.g., different drug dosage between hospital and home health plan of care list) or incomplete medication information (e.g., missing drug names, doses, frequencies, routes, times for administrations or purpose of medications).		.59
Hospital discharge medication summary sheets are illegible.		.57

It is difficult to obtain medication information from outside providers, such as the patient's pharmacy or primary care physician (e.g., lack of callbacks, poor communication between primary care physicians and hospitalists or specialists)	.68
My workload demands preclude me from conducting a thorough medication reconciliation process.	.41
No one is held accountable when medication reconciliation is not completed.	.49
Health care providers in my home health agency are at times confused about <i>when</i> medication reconciliation should be performed	.53
Health care providers in my home health agency are at times confused about <i>who</i> should perform medication reconciliation	.38

Internal Consistency Reliability. Internal consistency for the MR Facilitators Scale was .768; .783 for the MR Barriers Scale. These coefficients represented acceptable alpha reliabilities for a new scale (Nunnally & Bernstein, 1994).

The new Home Health Care MR Facilitators and Barriers Scale was a 16-item scale, with ten items designed to measure barriers and six items to measure facilitators of MR in home health agencies. RN survey participants used the scale to rate each item on a five-point summation, from strongly disagree to strongly agree. Scores related to the barriers portion of the scale could range from 10-50, while scores related to facilitators may range from 6-30, with higher scores indicating more RN-perceived barriers or facilitators to home health care medication reconciliation, respectively.

Measure for the Outcome Variable

Home Health Care MR Processes Scale. A second new scale was created by the PI to address the absence of a measurement scale designed to assess RN MR processes in home health care. A description of the development and testing of this new scale follows.

Item selection

The biomedical literature was searched for MR processes used in acute care areas such as hospital emergency rooms, on nursing units, by home health care facilities and during care transitions (Bernstein et al., 2007; Davis, 2012; Karkov et al., 2010; Meyer, Stern, Woolley, Jeanmonod, R., & Jeanmonod, D., 2012). Ultimately, a focus on articles and documents from organizations such as the Institute for Safe Medication Practices (ISMP) Canada became the focus and guide for item creation for the MR Processes Scale by home health agency RNs (Horn, Gaunt, & Vaida, 2010; Institute for Healthcare Improvement, 2008; Institute for Safe Medication Practices Canada, 2010; Institute of Medicine, 2000). A particularly useful ISMP Canada and Victorian Order of Nurses (VON) Canada document was “Framework - Medication Reconciliation Processes in Homecare.” Eleven items were originally created based on the literature and the principal investigator’s knowledge-experience of medication reconciliation.

Content Validity

The 11-item scale was subjected to item judgment and quantification using the same processes described previously. The same expert panel of judges reviewed each of the proposed MR Processes Scale items for content validity and unanimously concurred yes to the question “Do the questions in the instrument above on HHA nurses’ frequency of engaging in medication reconciliation processes measure what was intended?” The CVI for the 11-item scale was 1. After two rounds of item judgment, based on suggestions from the expert panel minor rewording for items was done, and two additional items were added including, “asked to see the patient’s prescribed and over-the-counter medications in the home” and “reviewed any unfilled medication

prescriptions the patient is waiting to fill.” The CVI for the 13-item instrument was acceptable at 1.

Psychometric Properties

Psychometric properties of the 13-item MR Processes Scale were assessed in the parent study sample of HHA RNs, and initial construct validity and internal consistency reliability were examined.

Construct Validity. To examine initial construct validity of the MR Processes Scale, the 13-item scale was subjected to exploratory Principal Components Factor Analysis with Varimax rotation. Rules for dimensionality of the scale included a .30 factor loading cutoff for each item and Eigenvalues greater than 1 (Tabachnick & Fidell, 1996). A two-factor solution with loadings of at least .30 and Eigenvalues greater than 1 accounted for 54% of the variance. A majority of items loaded unambiguously on the first factor, which were a conceptual fit with MR processes that dealt with resolving discrepancies and communicating with fellow health professionals, patients, and families to establish an accurate medication list. Two other items loaded ambiguously on both factors and addressed the identification of medication discrepancies. Since discrepancy identification was considered a MR process, these two items fit conceptually with items on factor 1, and were grouped with that factor creating a one-dimensional scale that accounted for 40% of the variance (Table 6). Even though the loading for one item in this scale was less than .40, it was deemed that this item was distinct from the MR processes items and was an important MR process for nurses in HHAs. Therefore, the item was retained.

Table 6

Factor Loadings for the Home Health Care MR Processes Scale

	Factor 1
Asked to see the patient's prescribed and over-the-counter medications in the home	.40
Talked with patient and/or family about medication they are taking and how they are taking them (e.g., if using as prescribed)	.40
Reviewed any unfilled medication prescriptions the patient is waiting to fill	.71
Compared medication information from all available sources (e.g., medications in home, the patient/family, healthcare providers, hospital discharge list, home healthcare plan of care)	.64
Documented medication discrepancies if any	.54
Established a list of medications the patient should be continuing at home	.39
During the <u>first visit</u> , placed a call to appropriate health care provider(s) to resolve medication discrepancies	.69
When unable to talk with health care provider during the <u>first visit</u> , left a message for provider with a number where I could be reached	.65
Resolved medication discrepancies <u>on the first visit</u> with assistance from available sources (e.g., patient/family, healthcare providers)	.64
Documented the correction of medication discrepancies corrected, including current actions taken, and any medication reconciliation follow up needed in subsequent visits and shared relevant information during handoff/report to other care providers	.81
Communicated- verbally and in writing to the patient/family the reconciled medication list (including time, dosage, precautions), AND discrepancies in the process of being corrected	.78
Verified patient/family understood changes to the medication regimen	.81
Verified patient/family understood importance of keeping an up to date list of medications the patient is actually taking daily and on an as needed basis	.61

Internal Consistency Reliability. Internal consistency for the MR Processes Scale was .862, a very good level of reliability for a new scale (Nunnally & Bernstein, 1994).

The new 13-item Home Health Care Medication Reconciliation Processes Scale assessed organization- and patient-level medication reconciliation processes. Processes assessed included: creating the best possible medication history, identifying medication discrepancies, rectifying, documenting and communicating medication discrepancies,

confirming resolved medication discrepancies among providers, and communicating with patients/families changes regarding medication regimens. Respondents were asked to rate the extent to which they completed, in the past month, the MR activity described in each item on a 5-point Likert scale from 1 = never to 5 = always. Total scores possible for the instrument ranged from 13 to 65, with a higher score reflective of more positive MR processes.

Data Protection and Security Plan

The study was submitted to the Institutional Review Board of Rutgers, The State University of New Jersey and was deemed exempt from review (Appendix B). The de-identified data resulting from the parent study were downloaded into SPSS for analyses. The computerized, de-identified files were password protected, and password access would only be available to the principal investigator (PI) and dissertation chairperson. Data were backed up onto a flash drive and kept in a locked cabinet in the PI's office accessible only to the PI. All computer files and backup drives will be destroyed after completion of the research study, and in compliance with the mandatory six-year IRB maintenance period.

Data Analysis Procedures

A statistical database was created by the PI using the IBM Statistical Package for the Social Sciences (SPSS, version 25). The PI uploaded demographic data and participant de-identified responses to study instruments into the SPSS database. Data were inspected and checked for invalid and missing values and outliers. As the online survey in the parent study was setup where participants could not skip answering questions as they moved through the survey, there were no missing values in the data.

Inspections of frequencies and mean scores for study variables revealed no inconsistencies outside of the value range. There were also no extreme values for any predictor variables that might have undue influence on the outcome variable.

Prior to scoring study measures or instruments for data analyses, negatively worded items on the Workload subscale of the IWPS-R, the Work Pressure and Pace Scale, and the Over Perceptions of Quality and Safety Scale were reverse coded according to reverse scoring procedures. In addition, items on these scales coded as “9”, representing “don’t know or does not apply” responses were recoded as zero so that the “9” rating would not contribute to the total scores. A coded data set with all data transformations was stored in an electronic spreadsheet with copies of raw and cleaned data sets, descriptive statistics, correlations, regression analyses, and syntax/output files.

The distribution of study variable scores was examined for symmetry, approximation to normal distribution, and extreme skewness. Skewness (evidence of central tendency) and kurtosis (evidence of tail heaviness relative to the total variance in the distribution) statistics were used to examine the distribution of study variables. Fisher’s standard Z-scores (skewness/standard error of skewness) were computed for each study variable to assess any skewness of variable scores. Z-statistic values between +1.96 and -1.96 would indicate that the distribution of scores for study variables was not significantly different than normal distribution (Polit & Beck, 2010). A codebook, copies of the original data set and the cleaned data set, basic descriptive data, correlations, regressions, syntax and output, as well as PI notes were generated to document analyses.

Data analysis procedures employed for hypothesis testing are listed in Table 7.

Table 7

Study Hypotheses and Data Analysis Plan

Hypotheses	Data Analyses
1. RN patient visits per day are negatively associated with medication reconciliation (MR) processes.	- The correlation matrix was examined to determine if home health agency nurse workload, MR systems, MR facilitators, MR barriers, and patient safety culture variables were significantly associated with MR processes.
2. RN caseload is inversely associated with MR processes.	
3. RN workload is negatively associated with MR processes.	
4. Presence of MR systems is positively associated with MR processes.	- The strength of the correlation relationships among predictor variables were reviewed.
5. Home health agency (HHA) organization barriers are inversely associated with inadequate MR processes.	
6. HHA organization facilitators are positively associated with adequate MR processes.	- For any predictor variable that was highly correlated with another predictor (i.e., $r \geq +.80$ or $r \geq -.80$), only one would be used for multivariate analyses
7. Patient safety culture (PSC) variables are positively associated with MR processes.	
8. In an adjusted model that controls for the individual effects of each predictor variable on MR processes, RN structures: (a) number of patient visits/day; (b) caseload; (c) perception of workload, organizational structures: (d) MR systems; (e)MR facilitators; (f) MR barriers; (g) patient safety culture will be significantly associated with RN MR processes in home health agencies.	- To test the adjusted effects of the predictor variables on medication reconciliation practices, all predictor variables that were significantly related to the outcome variable in bivariate analyses were entered simultaneously into a regression model.

<p>9. RN workload, MR system types, MR facilitators, and MR barriers will have significant indirect effects on MR processes through their effects on patient safety culture in home health agencies.</p>	<p>- A series of ordinary least squares path analyses with bootstrap samples was conducted to determine the direct and indirect effects of nurse workload, MR systems, and MR facilitators and barriers on MR practices (Hayes, 2013). Bootstrap confidence intervals for the indirect effect of predictor variables on the outcome variable were examined to determine statistically significant mediator effects.</p>
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Prior to regression analyses, assumptions for linear regression were tested (Tabachnick and Fidell, 2013). The first assumption was that there was a substantial ratio of cases-to-predictor variables. The sample size for this study was based on power analysis for multiple regression, therefore, that assumption was met. The second assumption was that there was an absence of outliers. Univariate outlier analysis was conducted with a plan to delete any extreme outliers. The third assumption was that there was an absence of multicollinearity. For any two predictor variables that were highly correlated (i.e., $r \geq +.80$ or $r \geq -.80$), only one of the predictor variables would be entered into the adjusted regression model. Final assumptions were that data would be normally distributed; relationships between the predictor variables and outcome variable(s) would be linear and there would be an absence of homoscedasticity. The pre-analysis data screening procedures, i.e., examination of residual scatterplots, histograms, skewness, and kurtosis of study variables, were conducted. If any variables were extremely skewed or heteroscedastic, the need for data transformations were explored.

Summary of methods. Based on hypothesis testing and the empirical literature, the PI anticipated that study findings would be in the theoretically expected direction, that

is, (a) higher number of patient visits/day, caseloads, and perception of workload; (b) absence of an organized system for medication reconciliation in the HHA; (c) low ratings for HHA patient safety culture dimensions or factors would be significantly associated with low impaired medication reconciliation processes structures. In multivariate analyses, the PI anticipated that all predictor variables would be significant predictors of medication reconciliation processes. Lastly, the PI anticipated that patient safety culture variables would have a mediating role in the relationship between HHA organizational structures and medication reconciliation processes by RNs who worked in these agencies.

Chapter 4

DATA ANALYSIS

The purpose of this study was to examine the relationships among home health agency structures, work environment factors, and nurse-reported medication reconciliation processes in patients transitioning from hospitals to home health agencies. This study was a secondary analysis of de-identified data from a parent psychometric study conducted in a sample of nurses who worked in home healthcare agencies.

Sample Demographics

Characteristics of the study sample are presented in Table 8. The final sample of nurses, whose de-identified data was used for analysis, consisted of 117 participants, ages ranging from 27 to 72 years ($M = 48.6$, $SD = 11.8$). Females comprised the largest group of participants (96.6%). Most were White (89.7%), baccalaureate prepared (53%), who had an average of 22-years of experience ($SD = 12.5$) working as an RN, and a mean of almost 10 years of experience ($SD = 9.3$) in home health agency nursing. All home health RNs noted they worked in an accredited home health agency; most agencies (63.2%)

were for-profit, proprietary, and freestanding. Hospital-owned agencies (12%) that functioned as a separate entity were the second most frequent type of agency worked in by RNs. Most RNs worked in one home health agency (91.5%) without Magnet status designation (58.1%). A majority of nurses (61.5%) worked 33 hours or greater per week. Most RNs (95.7%) noted that after an initial MR, per agency policy, MR was performed at each subsequent visit. Most RNs (91.5%) also agreed there was an agency policy for how to deal with medications found in the patient's home but not represented on the medication list a patient received upon discharge from the hospital. All but one RN in the sample identified as being the person who should communicate and resolve medication discrepancies with the hospital and/or a patient's health care provider. However, approximately 58% of RNs noted they advised the patient to contact their primary care provider or pharmacist regarding which medications to continue when medications remained in the home that were not on the patient's discharge medication list.

Table 8

MR Study Sample Demographics

Variable	Mean	Standard Deviation
Age	48.6	11.8
Years as registered nurse (RN)	21.5	12.5
Years worked in home health care	10.6	9.3
Variable	<i>n</i>	%
Gender		
Female	113	90
Male	3	2
Transgender	1	1
Initial education when RN licensure		
Diploma	28	23.9
Associate degree	52	44.4
Baccalaureate degree	37	31.6

Graduate	0	0
Highest level RN education		
Diploma	10	8.5
Associate	34	29.1
Baccalaureate	62	53
Masters	11	9.4
Doctorate in Nursing Practice (DNP)	0	0
Research Doctorate Degree (PhD or DNSc)	0	0
Number of agencies worked in per month		
One	107	91.5
Two	10	8.5
Three	0	0
Four	0	0
Hours worked in primary home health agency		
1-4 hours/week	2	1.7
5-16 hours/week	15	12.8
17-24 hours/week	10	8.5
25-32 hours/week	18	15.4
33-40 hours/week	34	29.1
41 or > hours/week	38	32.4
Home health agency type		
Hospital-based agency, part of a hospital	9	7.7
Hospital-based agency, owned by hospital, but function as a separate entity	14	12
Based in a rehabilitation facility	0	0
Based in a skilled nursing facility	1	0.9
Visiting Nurse Association (VNA)-freestanding, voluntary non-profit organization	9	7.7
Public or government agency operated by city, county or state government	0	0
Combination Agency- government and voluntary agency properties	1	0.9
For-profit, proprietary, freestanding	74	63.2
Private, not-for-profit, freestanding	8	6.8
Other	1	0.9
Agency Certification		
Medicare-certified	115	98.3
Non-Medicare certified	2	1.7
Agency Status		
Seeking Magnet	27	23.1
Magnet-designated	22	18.8
Not Magnet-designated	68	58.1

Note. $N = 117$

Description of Study Variables

In this section, descriptive statistics for study variables are discussed and presented in tabular form (Table 9). Approximately 80% of nurses reported a patient caseload; the mean caseload was 15.92 ($SD = 8.99$), range = 2 to 41. The mean number of patient visits on the last day worked was 4.97 ($SD = 1.84$), range = 1 to 13. The mean workload score was 10.27 ($SD = 3.42$), range = 5 to 19 and reflected a moderate level workload overall. Approximately 77% of RNs noted using computer-based MR systems; 21% used a combination of computer and paper-based systems. Only 2% reported using a paper-based MR system. The mean MR facilitator score for the sample was 24.94 ($SD = 3.97$), which indicated that nurses strongly agreed that there were a high number of MR facilitators in their agencies. On average, the MR barriers score ($M = 27.87$, $SD = 6.03$) reflected a moderate level of barriers to performing MR, as reported by RNs. Four dimensions of patient safety (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings of quality and patient safety) were examined in this study. The mean overall teamwork score was 16.37, $SD = 2.99$, which reflected moderate level ratings by RNs for the contribution of teamwork as part of patient safety culture. The mean work pressure and pace score was 9.5, $SD = 2.62$, which indicated a low level of perceived work pressure and pace by RNs. The mean overall perception of safety and quality score was 15.3, $SD = 3.46$ reflecting, on average, high ratings of home health RNs' perception of safety and quality in their agency. Similarly, mean ratings by nurses on overall quality and patient safety in their agencies was 19.58, $SD = 3.63$, reflecting nurses' perceptions of high quality and patient safety in home health agencies.

Outcome Variable. For the outcome variable MR processes, the mean score reflected a high level of engagement in MR processes ($M = 61.64$, $SD = 4.88$).

Table 9

Descriptive Statistics for Study Variables

Variable	<i>N</i>	%	
Registered nurse (RN) caseload			
1 to 10 patients	29	24.9	
11 to 20	41	35	
21 to 30	19	16.4	
31 to 41 patients	4	3.6	
Number of patient visits on last day worked			
1 to 3 visits	26	22.2	
4 to 6	73	62.4	
7 to 9	17	14.6	
10 to 13 visits	1	0.9	
Medication reconciliation (MR) system type(s)			
Computer-based	90	76.9	
Paper-based	2	1.7	
Computer/Paper	25	21.4	
Variable	Mean	Standard Deviation	Range
MR facilitators	24.94	3.97	14-30
MR barriers	27.87	6.03	13-47
MR processes	61.64	4.88	30-65
Perceived workload	10.27	3.42	5-19
Teamwork	16.37	2.99	7-20
Work pressure and pace	9.5	2.62	3-15
Overall perception of patient safety culture	15.3	3.46	4-20
Overall ratings on quality and patient safety	19.58	3.63	10-25
Overall ratings on quality and patient safety	<i>N</i>	%	
Patient-centered			
Excellent	34	29.1	
Very good	51	43.6	
Good	27	23.1	
Fair	5	4.3	
Effective			
Excellent	26	22.2	
Very good	56	47.9	
Good	28	23.9	
Fair	7	6	
Timely			
Excellent	28	23.9	
Very good	53	45.3	

Good	21	17.9
Fair	13	11.1
Poor	2	1.7
Efficient		
Excellent	23	19.7
Very good	49	41.9
Good	32	27.4
Fair	9	7.7
Poor	4	3.4
Equitable		
Excellent	58	49.6
Very good	40	34.2
Good	15	12.8
Fair	3	2.6
Poor	1	0.9

Reliability of Study Instruments

Internal consistency reliability coefficients for study instruments are presented in Table 10. All instruments, newly developed and established, exhibited higher than satisfactory reliability coefficients (Polit & Beck, 2010), indicating items in each scale were internally consistent and, therefore, measured the same concept of interest.

Table 10

Reliability of Study Instruments

Instrument	Cronbach Alpha Coefficient
Individual Workload Perception Sub-Scale	.795
Medication Reconciliation Barriers	.783
Medication Reconciliation Facilitators	.768
Medication Reconciliation Processes	.862
Overall Perception of Patient Safety	.804
Overall Ratings on Quality and Patient Safety	.864
Teamwork	.608
Work Pressure and Pace	.780

Distribution of Study Variables

The distribution of variable scores were examined for symmetry, approximation to normal distribution, and extreme skewness. The distribution of scores for all study variables were examined by assessing skewness (evidence of central tendency) and kurtosis (evidence of tail heaviness relative to the total variance in the distribution) statistics (Table 11). Fisher's standard Z-scores (skewness/standard error of skewness) were computed for each study variable to assess any skewness of variable scores. A Z-statistic value between +1.96 and -1.96 indicated that the distribution of scores for a study variable was not significantly different than a normal distribution (Tabachnik & Fidell, 2007).

As shown in Table 11, the Fisher's Z-score for the outcome variable, MR processes, indicated a non-normal distribution with an extreme negative skew ($z = -14.28$). Log transformations were not attempted since the transformed scores would be hard to interpret, with potential relationships lost in transformations and subsequent statistical computations (Tabachnik & Fidell, 2007). Instead the MR Processes Scale item scores were dichotomized into 0 = never, rarely or sometimes ratings, and 1 = very often to always ratings. That dichotomized MR processes outcome variable was used in multivariate analyses and several bivariate analyses. Instead of linear regression as originally planned, binary logistic regression was used for multivariate analyses since it does not require (a) a linear relationship between the predictor and outcome variables; (b) the residuals to be normally distributed; (c) homoscedasticity (Tabachnick & Fidell, 2007).

Scores for predictor variables are reviewed below. RN caseload, MR facilitators, teamwork, work pressure and pace, overall safety perception, and overall ratings on

safety and quality were found to have a slight negative skew. Scores for MR barriers and individual workload perception were found to have a slight positive skew. Scores for MR system types were moderately and positively skewed. Z-scores for number of patient visits per day, MR barriers, and individual workload perception scores indicated that these variables were normally distributed.

Data transformations for non-normally distributed predictor variables were not carried out since Tabachnick and Fidell (2007) suggested that data transformation for mild to moderately skewed variables was not universally recommended because transformed data may be more difficult to interpret. However, MR documentation system types, a nominal level variable with four response choices (computer-based, paper-based, combination of computer- and paper-based, no documentation system) was transformed. In this study, RNs responded to three of the four choices; no nurse reported that there was no documentation system for MR in their home health agency. Therefore, the MR system types variable was dummy coded into three variables for hypothesis testing: computer-based MR system, paper-based MR system, and combination computer/paper MR system. The first item response choice, computer-based MR system was dummy coded 1 for this choice and 0 for all other MR system choices. Paper-based MR system was dummy coded 1 for this choice and 0 for all other MR system choices. A combination of computer- and paper-based MR systems was dummy-coded 1 for this choice and 0 for all other choices.

Table 11

Distribution of Z-Scores for MR Study Variables

Variable	Skewness	S. E. Skewness	Kurtosis	S. E. Kurtosis	Fisher's Skewness Coefficient (Z-score)
MR Processes	-3.198	.224	15.396	.444	-14.28
Caseload	.540	.250	.081	.495	2.16
Number of patient visits	.280	.224	2.07	.444	1.25
MR systems	1.35	.224	-.113	.444	6.02
MR Facilitators	-.528	.224	-.483	.444	-2.35
MR Barriers	.093	.224	.508	.444	.42
Individual Workload Perception	.265	.224	-.536	.444	1.18
Teamwork	-.948	.224	.548	.444	-4.23
Work Pressure and Pace	-.451	.224	-.191	.444	-2.01
Overall Safety Perception	-1.227	.224	1.721	.444	-5.48
Overall Quality Ratings	-.471	.224	-.243	.444	-2.10

Results from Hypothesis Testing

Prior to hypothesis testing, Spearman correlation analysis was conducted to determine if the continuous demographic variables: age, number of years worked as a RN, and number of years worked in a home health agency were significantly correlated with medication reconciliation processes (Table 12). Two additional nominal level demographic variables, current role in agency and hours worked per week, were dichotomized prior to bivariate analyses. Current role in the agency was recoded to reflect full-time versus per diem role. The roles of admission nurse, full-time staff nurse, and nurse case manager were recoded as “1”; the role of per diem nurse was recoded as “0.” In addition, hours worked per week was recoded to reflect part-time versus full-time hours. Thus, working one to 32 hours per week was recoded as “0”; working 33 hours or more per week was recoded as “1.” Chi-square analyses were conducted to examine

relationships between RN current role (part-time role versus full-time role), hours worked per week (full-time hours versus part-time hours) and the dichotomized medication reconciliation processes variable. Bivariate analyses revealed that current role (full-time versus part-time) was significantly related to medication reconciliation processes. This demographic variable was entered in multivariate binary logistic regression models.

Table 12

Correlations between Demographic Variables and MR Processes

Demographic Variable	Correlation Coefficient (<i>p</i> value)
Age	.132 (.157)
Number of years worked as RN	.072 (.440)
Number of years worked in home health agency	.093 (.319)
Demographic Variable	Chi-square statistic (<i>p</i> value)
Current role (per diem/full-time)	7.15 (.007)
Hours worked per week (part-time/full-time)	3.32 (.068)

Since the outcome variable MR processes was not normally distributed, Spearman's correlation coefficient tests were used to examine relationships between most predictor variables and the outcome variable in this study. There is no requirement for normality with this statistical test (Tabachnick & Fidell, 2007). To test hypotheses one through seven, Spearman correlation non-parametric analyses with two-tailed tests of significance set at .05 and chi-square analyses were conducted to examine postulated relationships between home health agency nursing structures (RN caseload, number of patient visits on last day worked, nurse workload); organizational structures (MR system types, MR facilitators, MR barriers); patient safety culture variables (teamwork, work pressure and pace, overall perceptions of quality and safety, overall ratings of quality and safety); and MR processes by RNs working in Medicare-certified home health agencies.

Correlation coefficients and chi-square statistics for bivariate relationships between study predictor variables and the outcome variable are presented in Table 13.

Table 13

Correlations between Predictor Variables and MR Processes

Predictor Variable	Spearman Rho Correlation Coefficient (<i>p</i> value)
Number of patient visits on last day worked	.096 (.303)
Number of patients in caseload	.142 (.174)
Perceived workload	.102 (.275)
MR Facilitators	.371 (.000)
MR Barriers	-.091 (.332)
Teamwork	.116 (.214)
Work pressure and pace	-.004 (.967)
Overall perceptions of patient safety and quality	.038 (.687)
Overall ratings on patient safety and quality	.192 (.038)
Medication Reconciliation Systems	Chi-Square statistic (<i>p</i> value)
Computer-Based	.657 (.418)
Paper-Based	.001 (.971)
Combination of computer and paper	.675 (.411)

Hypothesis 1

For Hypothesis 1, it was postulated that RN caseload was inversely associated with medication reconciliation (MR) process. As shown in Table 13, RN caseload was not significantly associated with MR processes. Therefore, hypothesis 1 was unsupported.

Hypotheses 2

Hypothesis 2 indicated that RN patient visits per day was inversely associated with MR processes. As shown in Table 13, RN patient visits per day was not significantly associated with MR processes. Therefore, hypothesis 2 was unsupported.

Hypothesis 3

Hypothesis 3 indicated RN workload was inversely associated with MR processes. As shown in Table 13, total scores for individual workload perception were not significantly associated with MR processes. Therefore, hypothesis 3 was unsupported.

Hypothesis 4

Hypothesis 4 indicated the presence of MR systems was positively associated with MR processes. As shown in Table 13, MR systems were not significantly associated with MR processes. Therefore, hypothesis 4 was unsupported.

Hypothesis 5

Hypothesis 5 indicated that home health agency organization barriers were inversely associated with MR processes. As shown in Table 13, MR barriers was not significantly associated with MR processes. Therefore, hypothesis 5 was unsupported.

Hypothesis 6

Hypothesis 6 indicated home health agency organization facilitators were positively associated with MR processes. As shown in Table 13, MR facilitators ($r_s = .371, p = .01$) were significantly associated with MR processes. Therefore, hypothesis 6 was supported.

Hypothesis 7

Hypothesis 7a indicated that teamwork was positively associated with MR processes. As shown in Table 13, teamwork was not significantly associated with MR processes. Therefore, hypothesis 7a was unsupported.

Hypothesis 7b indicated that work pressure and pace was inversely associated with MR processes. As shown in Table 13, work pressure and pace were not significantly associated with MR processes. Therefore, hypothesis 7b was unsupported.

Hypothesis 7c indicated that overall perceptions of patient safety and quality were positively associated with MR processes. As shown in Table 13, overall perceptions of patient safety and quality were not significantly associated with MR processes. Therefore, hypothesis 7c was unsupported.

Hypothesis 7d indicated that overall ratings on quality and patient safety were positively associated with MR processes. As shown in Table 13, overall ratings on quality and patient safety ($r_s = .192, p = .038$) were significantly and positively associated with MR processes. Therefore, hypothesis 7d was supported.

Hypothesis 8

Hypothesis 8 stipulated that, in an adjusted model that controls for the individual effects of each predictor variable on MR processes, RN caseload, number of patient visits per day, nurse workload, MR systems, MR facilitators/barriers and patient safety culture variables (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings of patient safety and quality) would be significantly and independently associated with RN MR processes in home health agencies. Since only MR facilitators and overall ratings of patient safety and quality were significantly related to MR processes in bivariate analyses, they were the only predictor variables entered into the logistic regression model. MR facilitators was significantly related to overall ratings of patient safety and quality in bivariate analyses ($r_s = .415, p = .01$), but the relationship was not collinear ($r \geq .70$) and did not violate the regression assumption of collinearity.

The MR facilitators and overall safety ratings total score variables were dichotomized at the median prior to binary logistic regression analysis to facilitate comparing odds ratios for these variables to a reference group. MR facilitators scores were recoded to “0” = score of 23 or less, and “1” = score of 24 or greater. Overall safety ratings scores were recoded to “0” = score of 19 or less, and “1” = score of 20 or greater. Since current role (part-time role versus full-time role) was significantly related to medication reconciliation processes in bivariate analysis, this demographic variable was also entered into the logistic regression model. This variable was not collinear with either MR facilitators ($r_s = .104, p = .264$) or overall ratings of patient safety and quality ($r_s = -.066, p = .481$).

As noted in Table 14, high MR facilitators in home health agencies was significantly and independently associated with 3.48 higher odds of always completing MR by RNs compared to home health agencies with a lower level of MR facilitators. On the other hand, a high level of positive ratings on patient safety and quality was not independently associated with higher odds of medication reconciliation completion when the effects of MR facilitators and current roles were controlled. The Nagelkerke R-squared for the model was .20, indicating that the three variables in the model accounted for 20% of the variance in medication reconciliation processes. Hypothesis 8 was partially supported.

Table 14

Odds of MR Facilitators, Overall Safety Ratings, and Full-time Role Predicting MR Processes

Predictor Variable	Odds Ratio (95% Confidence Interval)	P-value
High MR facilitators (versus lower level)	3.48 (1.44, 8.37)	.005

High overall ratings of patient safety and quality (versus lower ratings)	1.51 (.646, 3.54)	.341
Full-time role (versus per diem role)	3.39 (1.37, 8.34)	.008

Hypothesis 9

Hypothesis 9 postulated that RN caseload, number of patient visits per day, workload, MR system types, and MR facilitators/barriers will have significant indirect effects on medication reconciliation processes through their effects on patient safety culture variables (teamwork, work pace and pressure, overall perceptions of patient safety and quality, overall ratings for patient safety and quality) in home health agencies. A series of six mediation analyses were conducted, one for each predictor variable, using the Conditional Process Modeling method of mediation developed by Hayes (2013). These analyses estimated the total and individual mediator (teamwork, work pressure and pace, overall perceptions of safety, overall ratings of safety) effects for each of the six predictor variables on the odds of completion of MR processes. Using 5,000 bootstrap samples, a mediation effect was positive if the bootstrap confidence interval did not cross zero and was either completely above or below zero. As shown in Table 15, all total and individual confidence intervals crossed zero, indicating that the four patient safety variables did not mediate indirect effects of the six predictor variables on MR processes. Therefore, hypothesis 9 was not supported.

Table 15

Total and Individual Indirect Effects of Predictor Variables on MR Processes through PSC Variables

Predictor Variables and Mediators	Effect	Bootstrap Confidence Interval
# Patient Visits/Day		

Total	.0017	-.0676, .0074
Teamwork	.0054	-.0410, .0744
Work pressure/pace	-.0021	-.0367, .0317
Overall safety perceptions	.0000	-.0313, .0279
Overall safety ratings	-.0017	-.0637, .0559
Caseload		
Total	-.0032	-.0284, .0175
Teamwork	.0009	-.0158, .0172
Work pressure/pace	-.0009	-.0160, .0077
Overall safety perceptions	-.0013	-.0177, .0084
Overall safety ratings	-.0019	-.0141, .0118
MR Systems		
Total	.0089	-.2165, .2155
Teamwork	.0148	-.0807, .1163
Work pressure/pace	.0472	-.1309, .2338
Overall safety perceptions	-.0127	-.1782, .1155
Overall safety ratings	-.0403	-.1879, .0932
Perceived Workload		
Total	-.0742	-.2036, .0269
Teamwork	.0110	-.0453, .0632
Work pressure/pace	-.0117	-.1270, .0930
Overall safety perceptions	-.0174	-.1037, .0593
Overall safety ratings	-.0562	-.1446, .0098
MR Facilitators		
Total	-.0222	-.1184, .0402
Teamwork	-.0290	-.1140, .0245
Work pressure/pace	-.0081	-.0437, .0178
Overall safety perceptions	-.0217	-.1031, .0403
Overall safety ratings	.0366	-.0135, .1015
MR Barriers		
Total	-.0046	-.0528, .0338
Teamwork	.0047	-.0176, .0335
Work pressure/pace	.0133	-.0185, .0484
Overall safety perceptions	.0016	-.0420, .0459
Overall safety ratings	-.0242	-.0681, .0050

Summary of Hypothesis Testing

In summary, of the nine hypotheses tested, two were fully supported (Hypothesis 6 and 7d), and one (Hypothesis 8) was partially supported. Home health agency MR facilitators was significantly and positively associated with MR processes. In addition, RN overall positive ratings on their home health agency's safety and quality was

significantly and positively associated with MR processes. Lastly, MR facilitators were independently associated with a higher odd of completion of MR in multivariate analysis.

Chapter 5

DISCUSSION OF THE FINDINGS

Study Findings and Interpretations

In this study, relationships among home health agency nursing structures (RN caseload, number of patient visits per day, nurse workload); organizational structures (MR facilitators, MR barriers, MR system types); patient safety culture dimensions (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings of quality and safety); and MR processes by RNs serving patients in Medicare-certified home health agencies were analyzed. To date, this is among the first studies examining relationships of potential challenges to medication management, of which MR is a part, for patients transitioning from hospitals to home health agency care (Nasarwanji et al., 2015 & Sheehan et al., 2018). Findings of this study were discussed in light of the theoretical frameworks, the Nursing Organization and Outcomes Model or NOOM (Aiken, et al., 2002) and the Patient Safety Culture (PSC) Framework (AHRQ, 2012a) that guided the study. Based on the NOOM, organizational structures and the quality of the work environment affect care processes for patients and eventual outcomes for those patients. Patient safety culture is an important component of a high-quality work environment. Positive patient safety culture was theorized to facilitate positive outcomes for patients.

Home Health RN Reported MR Processes

MR has been described as a formal, iterative process, whereby patients' information on their medications are placed in a list and that list is kept up to date to

assist providers in making care decisions for patients and decrease chances of medication errors and adverse effects. In this study, MR processes were operationalized as a range of RN scores on the MR Processes Scale from never to always completing MR. The variability in MR processes scores in this study was small, and the scores were extremely skewed. The mean score for this variable was 61 (possible range = 13 to 65), which indicated that most nurses reported completion of MR very often or always on first visit to a patient's home after discharge from a hospital. The high level of MR completion in this study likely reflected compliance of home health agencies with the Center for Medicare and Medicaid Services (CMS) MR regulations stipulated in the 2014 *Improving Medicare Post-Acute Care Transformation (IMPACT) Act* (American Healthcare Association, 2014 & U.S. Centers for Medicare and Medicaid Services, 2018). Specifically, the IMPACT Act mandates collection and reporting of specific information, including MR activities by post-acute care facilities such as home health agencies. In addition, the Joint Commission (2016), an organization through which HHAs may be credentialed, advocates medication management as one of the seven pillars for safe, quality care transitions, and calls MR a starting point for medication management. In 2018, the Joint Commission highlighted MR in its home care version of the National Patient Safety Goals. Undoubtedly, the finding from this study, that most home care RNs completed MR on the first visit to patients' homes was encouraging and consistent with CMS and Joint Commission mandates. The safe use of medicines by patients begins with creation of an accurate, current list of medications the patient is taking and proceeds with communication and ongoing maintenance of that list. The importance of and steps for MR in the home health setting was underscored within toolkits targeting the home health

audience (Institute for Safe Medication Practices Canada, 2015). Empirical data that supported MR completion in HHAs was provided in this study. However, the empirical assessment of MR processes should be replicated in a larger sample of RNs and home health agencies to validate the findings from this study.

Registered Nurse Daily Patient Visits, Caseload, Workload

Number of patient visits on the last day worked, RN caseload, and RN workload were nursing structures examined in this study. There was a range of variability in RN caseload in this study, a finding that may point to caseload as a potential valid indicator of staffing in HHAs. Ninety-three of 117 RNs reported a mean caseload of approximately 16 patients, and the range of patients in a caseload, as reported by RNs, was 2 to 41 patients.

The mean number of patient visits made on the last day worked, as reported by RNs, was approximately 5 visits, with the range of visits per day as 1 to 13. Fifty percent of nurses reported 5 visits per day; 35% reported 6 visits per day. Hence, the total number of patient visits by HHA RNs on the last day worked clustered around 5 to 6 visits, with only 15% of nurses reporting the number of patient visits on last day worked above or below this cluster. Thus, there was little variability in the number of patient visits on the last day worked, as reported by RNs, suggesting that this variable may not be a good indicator of RN staffing in home health agencies. Future research is needed with a larger RN sample to determine if the lack of variability in this variable among HHA RNs is replicated. In addition, future explorations are needed to determine valid measures of daily RN-to-patient staffing in HHAs.

Workload as a nursing structure is conceptualized differently from RN staffing (e.g., number of patients per nurse). It is defined as the extent to which pressure and urgency dominate the work environment and is reflected in the ability of RNs to take a break during the workday, monitor changes in patient status, and RNs' perceptions of the extent to which their workload is reasonable (Cox et al., 2006). Therefore, conceptually RN workload can be high despite differences in caseload and number of patient visits per day at the nurse-level. For the present study, mean workload, as reported by RNs was moderate at 10.2 with a possible range of scores from 5 to 20. While workload was significantly correlated with caseload ($r_s = .23, p = .03$) and approached significance with number of patient visits per day ($r_s = .17, p = .06$), the low magnitude of the correlation supported the theoretical premise that workload was conceptually distinct from caseload and the patient visits per day variables among RNs in HHAs.

Theorized relationships between home health agency nursing structures and MR processes were examined in this study. None of these nursing structures were significantly associated with MR processes. Since this was among the first empirical examination of associations between nursing structures and MR in HHAs, the apriori magnitude of the effect of nursing structures on MR processes was not known. The magnitude of the correlations between nursing structures and MR processes in this study (range .10 to .14) suggested a small effect. The study was likely underpowered to detect minor but statistically significant bivariate effects. Future research is needed to elucidate these important relationships in a larger sample of RNs.

Notably, while not a major study variable, full-time status was significantly associated with completion of MR processes in both bivariate and multivariate analyses

in this study. Nurses who worked full-time were three times more likely to complete MR on the first visit to a patient's home after hospital discharge compared to nurses who worked part-time. These findings have implications for HHAs regarding the type of nurses (full-time versus part-time) who are assigned to patients for the first visit after hospital discharge. Replication studies are needed to validate this finding.

HHA Structures: MR Systems, MR Facilitators, and MR Barriers

MR system types, MR facilitators, and MR barriers were HHA structures in this study. Theorized relationships between these organizational characteristics and MR processes were examined. MR system types was operationalized as responses to the survey item "Select the system that is used by your home health agency for documenting medication reconciliation of your patients' medications in their homes." Responses included computer-based MR systems, paper-based MR systems, or a combination of paper-based and computer MR systems. Most nurses (75%) reported the use of computer-based systems, and 21% reported the use of both paper- and computer-based systems. Only 2% of nurses reported the use of paper-based MR systems. This was the first study that examined and quantified the type of MR documentation systems that nurses use in HHAs, and it is notable that electronic documentation of MR is the system used by most nurses. Even though HHAs do not receive direct financial incentives promoting use of electronic health information systems (Hassol, et al., 2014), the use of electronic documentation for MR processes by RNs in this study is consistent with the implementation of electronic health records in hospitals and ambulatory physician practices mandated by Affordable Care Act legislation in 2014 (Buntin, Jain, & Blumenthal, 2010; Murphy, 2010). HHAs use of computerized electronic health systems

facilitates collection and reporting of OASIS data required by CMS. OASIS data on medication-related questions is represented on the CMS Home Health Compare website used by patients and others to review home health agency outcomes. Three outcomes derived from OASIS data collected by HHA RNs related to MR processes included: *“How often the home health team taught patients (or their family caregivers) about their drugs; how often patients got better at taking their drugs correctly by mouth; how often physician-recommended actions to address medication issues were completed timely”* (U.S. Centers for Medicare and Medicaid Services, 2019). The use of computerized MR systems in HHAs also lays the foundation allowing for easier participation in Health Information Exchanges (HIEs), as in some states HHAs are invited to participate in such programs. Also, a more complete list of current medications a patient is taking can be established through use of computerized MR systems, as those systems can interface with multiple pharmacy medication databases where patients have filled a prescription. Ultimately, use of electronic MR systems supports more efficient, comprehensive, MR process completion. This may support decreases in medication errors and discrepancies. The widespread use of computer-based MR documentation systems reported by nurses in this study and the concomitant lack of MR system variability in this study, however, likely accounted for the insignificant association ($r_s = .076, p = .417$) between MR system types and MR processes.

MR facilitators were operationalized as a score on the Home Health Care Medication Reconciliation Facilitators Scale. The mean score for the MR Facilitators Scale was 24.9 with a range of scores from 14 to 30. The mean score reflected agreement among most RNs who responded to the survey that there were many MR

facilitators present in their HHA. Examples of MR facilitators listed on the scale were “Medication reconciliation training is provided in the home health care agency where I work” and “The time-frame for medication reconciliation is clearly communicated in the home care agency where I work.” In order, the three top rated facilitator items were (1) “Medication safety is an important or integral part of the culture of the home care agency where I work”; (2) “There is a standard process for medication reconciliation in the home care agency where I work”; (3) “Administrative leadership in the home care agency where I work supports our medication reconciliation process.” The lowest rated HHA MR facilitator was “The medication reconciliation documentation forms and/or system (e.g., computer and/or paper-based charting) in the home care agency where I work makes it easier to verify, clarify, and reconcile my patients’ medications during home health visits.” MR facilitators ($r_s = .371, p = .01$) exhibited a significant association with MR processes in bivariate analyses. In multivariate analysis a higher level of HHA MR facilitators compared to lower levels of facilitators, as reported by nurses, was significantly and independently associated with an almost 3.5 times higher odds of MR processes being performed. Most research that has explored MR facilitators in health care settings was qualitative in nature and illuminated health care providers’ descriptions of factors that enabled MR processes. This study appears the first to have quantified MR facilitators in HHAs and examined bivariate relationships between MR facilitators in HHAs and MR processes by RNs. The findings supported the theorized premise that presence of MR facilitators in HHAs are a necessary requisite for and antecedent to RNs completing MR on the first visit after a patient is discharged from the hospital. Future research is needed to validate these findings.

MR barriers were operationalized as a score on the Home Health Care Medication Reconciliation Barriers Scale. The mean score for the MR Barriers Scale was 27.8 with a range of scores from 13 to 47. This descriptive finding indicated that nurses, on average, perceived a moderate level of barriers to completing MR in their HHAs. The top five items reported as barriers to MR by RNs were (1) “Facility (e.g., hospital, skilled nursing, inpatient rehabilitation) discharge medication lists have inconsistencies (e.g., different drug dosage between hospital and home health plan of care list) or incomplete medication information (e.g., missing drug names, dose, frequency, route, time for administration or purpose of medications)”; (2) “Patients and/or families are unaware of medications they are taking (e.g., names, frequencies, doses)”; (3) “It is difficult to obtain medication information from outside providers, such as the patient’s pharmacy or primary care physician (e.g., lack of callbacks, poor communication between primary care physicians and hospitalists or specialists)”; (4) “Patients and/or families have low health literacy and/or language barriers”; (5) “Family or caregivers are not available in the home if needed for the medication reconciliation process.” Bivariate associations between the presence of medication reconciliation barriers and MR processes were insignificant ($r_s = -.091, p = .332$). Unlike the moderate association between MR facilitators and MR processes in this study, the magnitude of the association between MR barriers and MR processes was small. These findings suggested that the presence of HHA MR facilitators compared to HHA MR barriers may have a bigger effect on MR completion by HHC RNs. Home health agency administrators may wish to place more emphasis on ensuring the presence of facilitators for RNs completing MR, rather than focusing on the presence and removal of MR

barriers. However, the top barriers to MR reported by nurses suggested that, from a larger perspective, future medication safety efforts should focus on improving patients' medical and medication literacy, as well as, supporting improvements to standardize discharge medication lists.

Patient Safety Culture

To improve patient safety, the Institute of Medicine (2004) recommended that all healthcare facilities across the continuum of care develop and maintain a culture of safety. Four dimensions of patient safety culture in HHAs: teamwork, work pressure and pace, overall perceptions of patient safety and quality, and overall ratings of quality and patient safety were examined in this study. Nurses' ratings on these dimensions suggested that a culture of safety is maintained in their HHAs. On average, RN responses reflected a high level of teamwork ($M = 16.4$, range 7 to 20), a high level of disagreement that there were heightened work pressure and pace ($M = 9.5$, range = 3 to 15), overall perceptions of a high level of quality and patient safety ($M = 15.3$, range = 4 to 20), and overall positive ratings for quality and patient safety, translated to agreement of the presence of a high patient safety culture ($M = 19.6$, range = 10-25) in their HHAs. The positive patient safety ratings in this study were consistent with favorable pre- and post-perceptions of overall patient safety culture ratings by staff (70% versus 76.8%, respectively) in a Canadian intervention study in an assisted living facility designed to increase patient safety perception and leadership support for patient safety (Ganaden & Mitchell, 2018).

In bivariate analyses, teamwork, work pressure and pace, and overall perceptions on patient safety and quality were not significantly associated with MR processes.

Conversely, overall ratings of quality and patient safety by RNs was associated with high MR processes ($r_s = .192$, $p = .038$) in bivariate analysis. However, this relationship was not significant in multivariate analysis when the effects of MR facilitators and full-time work status on MR processes was controlled for (OR = 1.51, 95% CI [.646 – 3.54], $p = .341$).

A premise of the Nursing Organization and Outcomes Model is that high quality work environments may serve as a mediator between organizational structures and care processes. The four patient safety culture dimensions (HHA work environment variables in this study) were tested as mediators. Mediation analyses were not significant. These negative findings point to a need to explore other possible operant pathways, such as, nursing practice environment support for the effects of organizational structures on MR processes in HHAs.

Usefulness of NOOM and PSC Frameworks for Understanding HHC MR Processes

The Nursing Organization and Outcomes Model (NOOM) and Patient Safety Framework (PSC) postulated that organizational structures and high-quality work environments are associated with care process. Most of the theorized relationships examined in this study were not significant. These findings are not consistent with the body of studies guided by the NOOM that have found significant associations among examined nursing structures, work environment support, and care processes or practices across health care settings. One study limitation that may have contributed to insignificant findings was the sample size. Since this study was the first to quantify and examine interrelationships among nursing and organizational structures, patient safety culture dimensions and MR processes, the apriori effects of RN caseload, number of

patient visits per day, RN workload, MR system types, MR facilitators, MR barriers, and patient safety culture on MR processes in HHAs was not known. The negative findings in this study may have occurred because the effects of predictor variables on MR processes found to be insignificant were small. Also, the study sample size ($N = 117$) may have yielded a lack of sufficient power to detect significant, yet small effects. In addition, the lack of substantial variability in MR processes scores, number of patient visits per day, and MR system types may explain some insignificance for theorized relationships. Future research and replication studies are needed to confirm or refute the empirical adequacy of the NOOM for explaining MR processes in HHAs.

Chapter 6

SUMMARY, CONCLUSIONS, LIMITATIONS, IMPLICATIONS, DIRECTIONS

FOR FUTURE RESEARCH

Summary

The Nursing Organization and Outcomes Model (Aiken, 2002) and the Agency for Healthcare Research and Quality Patient Safety Culture Framework (AHRQ, 2012a) were utilized to help examine relationships among home health agency nursing structures (RN workload, number of patient visits per day, RN caseload); organizational structures (MR systems, MR facilitators, MR barriers); patient safety culture dimensions (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings of quality and safety); and MR processes in Medicare-certified home health agencies. These relationships were analyzed using anonymous survey data reported by HHA RNs in a parent psychometric study to determine the factor structure, reliability, and validity of the home health care MR facilitators, MR barriers, and MR processes scales. Hypotheses examined in this study were as follows.

- RN caseload is inversely associated with medication reconciliation (MR) process.
- RN patient visits per day is inversely associated with MR processes.
- RN workload is inversely associated with MR processes.
- Presence of MR systems is positively associated with MR processes.
- Home health agency organization barriers are inversely associated with MR processes.
- Home health agency organization facilitators are positively associated with MR processes.
- Overall perceptions of patient safety culture dimensions are positively associated with MR processes.
 - Teamwork is positively associated with MR processes.
 - Work pressure and pace is negatively associated with MR processes.
 - Overall perceptions of patient safety and quality are positively associated with MR processes.
 - Overall ratings of quality and patient safety are positively associated with MR processes.
- In an adjusted model that controls for the individual effects of each predictor variable on MR processes, RN caseload, number of patient visits per day, nurse workload, MR systems, MR facilitators, MR barriers, and patient safety culture (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings on quality and patient safety) will be significantly and independently associated with MR processes by RNs in home health agencies.

- RN caseload, number of patient visits per day, workload, MR system types, MR facilitators, and MR barriers will have significant indirect effects on MR processes through their effects on patient safety culture (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings on quality and patient safety) in home health agencies.

The analytic sample in this study was comprised of de-identified parent study survey responses from 117 US home health agency RNs or field nurses working directly with patients in their homes. Survey items from the parent study, of relevance to this study included home health registered nurses' responses to the newly created instruments by the principal investigator, including the MR Processes Scale, which is based on established steps for engaging in the medication reconciliation process (Institute for Safe Medication Practices Canada, 2015); and the MR Facilitators and Barriers Scale. Additionally, responses to other relevant items were shared by RNs- age, gender, race, highest education as an RN, years as an RN in home health care, number of home health agencies worked in, type of home health agency, HHA Magnet status, number of patients in their caseload, number of patient visits on the last day worked, and MR documentation systems in their HHA. Respondents also submitted answers on items from two established instruments: The Medical Office Survey on Patient Safety Culture (teamwork, work pressure and pace, overall perceptions on patient safety and quality, overall ratings of safety and quality) and the revised Individual Workload Perception Scale (Workload subscale).

The mean age of RNs in the sample was 49.35 (SD = 12.15) years. The majority of the sample were female (96.6%) and White (89.7%). The highest level of education

by RNs was reported as baccalaureate degree (53%) followed by associate degree (29.1%). The approximate mean number of years RNs worked in home health nursing was 10. Most RNs worked in one home health agency (91.5%). Most RNs reported working in for profit, proprietary, freestanding agencies (n = 74, 63.2%). Twelve percent (n = 14) worked in a hospital-based, hospital-owned agency that functioned as a separate entity. RNs identified all agencies worked in as accredited. Fifty-eight percent of agencies (n = 68) did not have Magnet status, 23.1% (n = 27) were seeking Magnet status, and 18.8% (n = 22) had Magnet status. Most RNs (n = 112; 95.7%) noted that after an initial MR, per agency policy, MR is performed at each subsequent visit. Most RNs (91.5%) also agreed there was an agency policy for how to deal with medications found in the patient's home but not represented on the medication list a patient received upon discharge from the hospital. All but one RN in the sample identified as being the person who should communicate and resolve medication discrepancies with the hospital and/or patient's health care provider. However, approximately 58% of RNs noted they advised the patient to contact their primary care provider or pharmacist for which medications to continue when medications remained in the home that were not on the patient's discharge medication list.

The relationship theorized in hypothesis 1 was not statistically significant. RN caseload was not significantly associated with MR processes. For hypothesis 2, RN patient visits per day were not significantly associated with MR processes. For hypothesis 3, RN workload was not significantly associated with MR processes. For hypothesis 4, MR system types was not significantly associated with MR processes. For hypothesis 5, home health agency organization barriers were not significantly

associated with MR processes. For hypothesis 6, home health agency organization facilitators were positively and significantly associated with MR processes. For hypothesis 7a, teamwork was not significantly associated with MR processes. For hypothesis 7b, work pressure and pace were not significantly associated with MR processes. For hypothesis 7c, overall perceptions of patient safety and quality was not significantly associated with MR processes. For hypothesis 7d, overall ratings on quality and patient safety was positively and significantly associated with MR processes. For hypothesis 8, MR facilitators, overall ratings of patient safety and quality, and full-time versus part-time work status were entered simultaneously into a logistic regression model. Only a higher level of MR facilitators and full-time work status were significantly associated with higher odds of MR completion. For hypothesis nine, patient safety culture variables (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings of safety and quality) did not mediate the relationship between HHA nursing and organizational structures (RN caseload, number of patient visits per day, RN workload, MR system types, MR facilitators, MR barriers) and MR processes.

Conclusions

Results from this study partially support the relationships theorized between HHA nursing and organizational structures (RN workload, number of patient visits per day, RN caseload, MR systems, MR facilitators and MR barriers); patient safety culture dimensions (teamwork, work pressure and pace, overall perceptions of patient safety and quality, overall ratings of safety and quality); and MR processes. One of the six organizational structures, presence of MR facilitators was significantly related to MR

processes in both bivariate and multivariate analyses. In addition, overall ratings on quality and patient safety were significantly and positively related to MR processes in bivariate analysis.

Limitations

Limitations of this study include cross-sectional design and the convenience sample employed in the parent study. Cross-sectional data represents event(s) at a certain time point (Abate & Blommel, 2013). The analytic sample data analyzed in this study came from RN-reported information about MR practices on the first visit to a patient's home after hospital discharge. Information on iterative aspects of HHA RN MR practices was not obtained in the cross-sectional, psychometric parent study.

The size of the analytic sample was also a study limitation. The small sample of nurses and resulting low number of responses limit external validity or generalizability of study results. In addition, the small analytic sample limits the extent to which the RN data in the study is representative of HHA RNs in the general population.

Statistically significant correlations discovered after data manipulation and analyses in this study do not equate with causation. Certain predictor and demographic variables are associated in the test environment, but those associations may not be accurate in the real-world environment, specifically for RNs in different HHAs than those sampled.

Implications for Home Health Nursing

Home health agency leadership may wish to focus on placement and maintenance of facilitators compared to barriers to increase the likelihood of RNs performing MR processes for patients transferring care from hospitals to home health. Further, assigning

a full-time HHA RN to a patient discharged from the hospital may increase the likelihood of MR processes being done at the start of the first RN visit.

Directions for Future Research

This study revealed that home health RNs reported engaging in medication reconciliation processes “very often” to “always” on their first visit to patients transitioned from hospitals to home health agencies’ care. The presence of MR facilitators increased the likelihood of RNs completing MR processes at an initial visit to patients discharged from hospitals to home health agencies. Directions for future research are listed below:

- Replication of this study in a larger sample of RNs.
- HHA-level analysis of effects of HHA nursing and organizational structures, work environment factors, care processes, and patient outcomes (medication safety, rehospitalization, emergency department use) after hospital discharge.
- Extent of home health registered nurses’ engagement in MR processes over time while patients remain under care of home health agencies, and impacts on the patient outcomes: rehospitalizations and/or emergency room visits.
- Relationships between HHA nurse practice environment support, MR processes, and 30-day rehospitalization and ED visit outcomes of patients after a hospital discharge.
- A comparison of freestanding HHAs compared to hospital-based HHAs, structures and processes and effects on registered nurse MR processes.

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Appendix A

Chapter 2 - Evidence Tables

Table 1

Summary of Studies that Examined Relationships between Organizational Characteristics and Care Processes

Study Reference	Design and Sample	Major Findings
Bekelman, D., Rabin, B., Nowels, C., Sahay, A., Heidenreich, P., Fischer, S., & Main, D. (2016). Barriers and Facilitators to Scaling Up Outpatient Palliative Care. <i>Journal of Palliative Medicine</i> , 19(4), 456-459.	<ul style="list-style-type: none"> • Cross-sectional, qualitative study • Veterans Affairs Administration (VHA) health care providers, regional and national VHA leaders (n = 17 of 23) 	<ul style="list-style-type: none"> • Informants noted lack of performance measures and incentives as barriers to patient-centered care processes for outpatient palliative care
Cabin, W. Himmelstein, D. U., Siman, M. L., & Woolhandler, S. (2014). For-profit Medicare home health agencies' costs appear higher and quality appears lower compared to nonprofit agencies. <i>Health Affairs</i> , 33(8), 1460-1465.	<ul style="list-style-type: none"> • Cross-sectional, retrospective data analysis from two databases (2011 Medicare Home Health Compare and 2010 Medicare Home Health Costs) on the nature of care in for-profit and non-profit home health agencies 	<ul style="list-style-type: none"> • Majority of home health agencies caring for Medicare patients were for-profit agencies. • For-profit or proprietary agencies (n = 7,249) compared to non-profit (n = 1,291) resulted in lower mean scores for care processes (85.99% versus 87.37%; $p < .0001$) and quality of care (77.18% versus 78.71%; $p < .0001$)

<p>Clement, J. Bradley, C., & Lin, C. (2009). Organizational characteristics and cancer care for nursing home residents. <i>Health Services Research</i>, 44(6), 1983-2003.</p>	<ul style="list-style-type: none"> • Retrospective data analysis (Michigan Tumor Registry, Medicaid and Medicare data and Medicaid cost files) • Dually eligible (Medicaid and Medicare) nursing home residents (n1316) with first time cancer diagnosis while at one of 399 nursing homes 	<ul style="list-style-type: none"> • Residents in nursing homes with a high Medicaid load were less likely to receive pain medication compared to residents in nursing homes with a higher percentage of Medicare patients (Robust Standard Error = -.004, $p < .001$)
<p>Ettner, S., Thompson, T., Stevens, M., Mangione, C., Kim, C., Neil Steers, W., . . . Narayan, K. (2006). Are physician reimbursement strategies associated with processes of care and patient satisfaction for patients with diabetes in managed care? <i>Health Services Research</i>, 41(4 Pt 1), 1221-1241.</p>	<ul style="list-style-type: none"> • Cross-sectional, multi-site survey and secondary data analysis (medical records reviews) • Subjects of interest: managed care diabetes patients (n = 6,194) 	<ul style="list-style-type: none"> • Direct MD salary models were associated with higher probabilities of assessments for glycemic control and proteinuria assessments, eye and foot exams, advice to take aspirin and influenza administration compared with models in which most compensation comes from capitation (RRs 1.13-1.23, $p < .05\%$) or fee-for-service.

<p>Tubbs-Cooley, H., Pickler, R., Mara, C., Othman, M., Kovacs, A., & Mark, B. (2017). Hospital Magnet(R) designation and missed nursing care in neonatal intensive care units. <i>Journal of Pediatric Nursing</i>, 34, 5-9.</p>	<ul style="list-style-type: none"> • Cross-sectional survey (secondary analysis) • Certified neonatal nurses (n = 230) involved in direct patient care in hospitals with Magnet vs. non-Magnet designation 	<ul style="list-style-type: none"> • Of 35 missed care items, there were no significant differences in odds of nurses reporting missed nursing care by Magnet designation for 34 items. (OR range 0.25 to 2.48, $p > .05$) • Reasons for missing care differed by Magnet designation. Compared to nurses in Non-Magnet hospitals, nurses in Magnet hospitals were less likely to report missing care due to staff communication issues, lack of knowledge regarding policy/procedures, and lack of support from colleagues
<p>Ward, M., Yankey, J., Vaughn, T., BootsMiller, B., Flach, S., Welke, K., . . . Doebbelin, B. (2004). Physician process and patient outcome measures for diabetes care: relationships to organizational characteristics. <i>Medical Care</i>, 42(9), 840-850.</p>	<ul style="list-style-type: none"> • Cross-sectional survey and chart reviews • Veterans Affairs Medical Centers (n = 109) survey of quality care managers and administrators involved in guideline implementation in hospital's primary care clinics 	<ul style="list-style-type: none"> • VAMC organizational characteristics including level of support for guideline efforts ($\beta = 2.57$, $p = .02$), regional office leadership for guidelines ($\beta = 1.24$, $p = .02$), hospital use of guideline performance data ($\beta = 1.77$, $p = .02$), and hospital culture ($\beta = 1.93$, $p = .02$) were independent predictors of provider diabetes care processes

Table 2

Summary of Exemplar Studies that Examined Relationships between Nursing Structures and Nursing Care Processes

Study Reference	Design and Sample	Relevant Findings
Ausserhofer, D., Zander, Busse, R., Schubert, M., De Geest, S., Rafferty, A. M., . . . Schwendimann, R. (2014). Prevalence, patterns and predictors of nursing care left undone in European hospitals: Results from the multicountry cross-sectional RN4CAST study. <i>BMJ Qual Saf</i> , 23(2), 126-135.	<ul style="list-style-type: none"> • Cross-sectional, survey • 33, 659 RNs from 488 hospitals in 12 countries in Europe 	<ul style="list-style-type: none"> • Significant association of hospitals with better work environments and less nurse-reported care left undone ($\beta = -2.19, p = .0001$) • Significant association of lower patient to nurse ratio and less nurse-reported care left undone ($\beta = .09, p = .0001$)
Ball, J. Griffiths, P. Rafferty, A., Lindqvist, R., Murrells, T., & Tishelman, C. (2016). A cross-sectional study of 'care left undone' on nursing shifts in hospitals. <i>Journal of Advanced Nursing</i> , 72(9), 2086-2097.	<ul style="list-style-type: none"> • Cross-sectional survey • RNs in 79 hospitals in Sweden working on medical/surgical wards (n = 10,174) 	<ul style="list-style-type: none"> • Odds of care left undone cut by more than half when RN to patient ratio 6:1 or less compared with shifts where RNs patient ratio 10:1 or higher (OR .4666, $p < .001$)
Ball, J., Murrells, T., Rafferty, A. M., Morrow, E., & Griffiths, P. (2014). 'Care left undone' during nursing shifts: Associations with workload and perceived quality of care. <i>BMJ Qual Saf</i> , 23(2), 116-125.	<ul style="list-style-type: none"> • Cross-sectional, survey • 2,917 RNs in medical/surgical wards from 46 National Health Service Hospitals in England 	<ul style="list-style-type: none"> • 86% RNs reported one or more needed tasks left undone on their last shift due to not enough time • Patient-to-nurse ratio significantly associated with missed care ($p < .001$)

<p>Castner, J., Wu, Y.W., & Dean-Barr, S. (2015). Multi-level model of missed nursing care in the context of hospital merger. <i>West J Nurs Res</i>, 37(4), 441-461.</p>	<ul style="list-style-type: none"> • Cross-sectional, survey • 553 RNs participating in direct patient care or unit-level management in a Northeast US 5-hospital system undergoing a merger of two of its hospitals 	<ul style="list-style-type: none"> • Unit factors, including workload responsible for remainder % attributed to individual RN factors • Positive correlation with workload and missed nursing care Study models reveals greater than 1/3 variation in missed care likely due to nursing unit factors as oppose to individual RN factors
<p>Cho, S. H., Mark, B. A., Knafl, G., Chang, H. E., & Yoon, H. J. (2017). Relationships between nurse staffing and patients' experiences, and the mediating effects of missed nursing care. <i>Journal of Nursing Scholarship</i>, 49(3), 347-355.</p>	<ul style="list-style-type: none"> • Cross-sectional, survey • 23 nurse managers, 362 RNs and 210 patients on 23 inpatient units across six hospitals in South Korea 	<ul style="list-style-type: none"> • Patient perceptions of positive staffing significantly associated with reductions in missed communications and missed basic care • Patient-to-nurse ratio not significantly associated with missed care • Nurse-perceived staffing adequacy showed a significant inverse relationship with missed communication ($\beta = -.58$, $p = .029$) but a nonsignificant relationship with missed basic care ($\beta = -.69$, $p = .088$). • Each 1-point increase in nurse perceptions (e.g., from insufficient to sufficient) was associated with a .58-point decrease in missed communication. • Patients' perceptions of nurse staffing to be very sufficient (vs. very insufficient, insufficient, or sufficient) was associated with a .69-point decrease in missed communication ($p < .001$) and a 0.82-point decrease in missed basic care ($p = .004$)

<p>Cho, E., Lee, N. J., Kim, E.Y., & Yoon, H. J. (2016). Nurse staffing level and overtime associated with patient safety, quality of care, and care left undone in hospitals: A cross-sectional study. <i>International Journal of Nursing Studies</i>, 60, 263-271.</p>	<ul style="list-style-type: none"> • Cross-sectional, survey, correlational design • Sample comprised of 3037 bedside RNs from 51 hospitals in South Korea 	<ul style="list-style-type: none"> • 82% RNs noted leaving one or more (average 3 of 12) necessary task undone on the last shift worked. The average number of tasks left undone was 3 of 12 activities. An increase of one patient per nurse was significantly associated with a 3% increase in the predicted odds of care left undone due to time constraints (OR = 1.03, 95% CI [1.01-1.05])
<p>Cho, S. H., Kim, Y. S., Yeon, K. N., You, S. J., & Lee, I. D. (2015). Effects of increasing nurse staffing on missed nursing care. <i>International Nursing Review</i>, 62(2), 267-274.</p>	<ul style="list-style-type: none"> • Cross-sectional, correlational design • Sample comprised of 115 RNs in high-staffing nursing units (seven patients/RN) and 117 RNs in low-staffing units (seventeen patients/RN) 	<ul style="list-style-type: none"> • RNs in high staffing units had a significantly lower overall score for missed nursing care ($M = 1.39$) compared to RNs in low staffing units ($M = 1.51$), $p < .003$ • Compared to low staffing units, high staffing units were associated with a .136 decrease in missed nursing care, controlling for effects of RN educational level and years worked as an RN

<p>Dabney, B. H., & Kalisch, B. J. (2015). Nurse staffing levels and patient-reported missed nursing care. <i>Journal of Nursing Care Quality</i>, 30(4), 306-312.</p>	<ul style="list-style-type: none"> • Cross-sectional, survey • Sample comprised of 729 patients from 20 units in 2 hospitals; patients mainly from medical (n = 420) and surgical (n = 255) units • RNHPPD, NHPPD, and RN skill mix collected from administrative databases that corresponded temporally to patient surveys 	<ul style="list-style-type: none"> • Patients reported a mean level of 1.82 for overall care missed on a scale of 1 = never to 5 = always. • Lower RN nursing hours per patient day ($r = -.41, p < .01$), overall nursing hours per patient day ($r = -.09, p < .05$) and a lower RN skill mix ($r = -.13, p < .01$), were significantly associated with missed timeliness of care, but not overall missed care, basic care, or communication. RN skill mix was a significant predictor of missed timeliness of care; RN hours per patient day and nursing hours per patient day were not significant predictors.
<p>Thomas-Hawkins, C., Flynn, L., & Clarke, S. P. (2008). Relationships between registered nurse staffing, processes of nursing care, and nurse-reported patient outcomes in chronic hemodialysis units. <i>Nephrology Nursing Journal</i>, 35(2), 123-130, 145; quiz 131.</p>	<ul style="list-style-type: none"> • Cross-sectional, correlational design • Sample comprised of 422 RNs working in chronic hemodialysis settings 	<ul style="list-style-type: none"> • Higher patient-to-RN ratios (i.e., less RN staffing) were significantly associated with higher numbers of necessary nursing tasks left undone on the RNs' last shift worked. ($r = .28, p < .001$)
<p>Wang, J., Simmons, S. F., Maxwell, C. A., Schlundt, D. G., & Mion, L. C. (2018). Home health nurses' perspectives and care processes related to older persons with frailty and depression: A mixed method pilot study. <i>J Community Health Nurs</i>, 35(3), 118-136.</p>	<ul style="list-style-type: none"> • Qualitative, direct observation and interview content analysis 	<ul style="list-style-type: none"> • Nurse-reported delivery of care processes related to depression management in older adults negatively impacted by lack of education for RNs to assess depression, high patient load, and lack of interdisciplinary collaboration

Table 3


*Summary of Studies that Examined Relationships between Work Environment Factors**(Support and Patient Safety) and Care Processes*

Study Reference	Design and Sample	Major Findings
Brown, D., & Wolosin, R. (2013). Safety culture relationships with hospital nursing sensitive metrics. <i>Journal for Healthcare Quality</i> , 35(4), 61-74.	<ul style="list-style-type: none"> • Correlational • Non-profit, urban hospitals in California (n = 9) part of Collaborative Alliance for Nursing Outcomes 	<ul style="list-style-type: none"> • A positive hospital safety culture was significantly associated with fall protocol usage by nurses and accounted for 62% of the variance in that care process ($R^2 = .624$, $p < .01$). • Safety culture was not associated with pressure ulcer risk assessment, physical restraint use, falls risk assessment, and pressure ulcer prevention activities by nurses.
Jarrín, O. F., Kang, Y., & Aiken, L. H. (2017). Pathway to better patient care and nurse workforce outcomes in home care. <i>Nurs Outlook</i> , 65(6), 671-678. doi:10.1016/j.outlook.2017.05.009	<ul style="list-style-type: none"> • Observational, cross-sectional survey of home health registered nurses (n = 871); greater than 50% from Medicare-certified home health agencies (n = 462) and half of the Medicare-certified agencies being for-profit 	<ul style="list-style-type: none"> • Home health agencies' healthiest work environments were positively related with better care processes, such as better quality of patient care and less missed nursing care

<p>Pickering, C., Nurenberg, K., & Schiamberg, L. (2017). Recognizing and responding to the "toxic" work environment: Worker safety, patient safety, and abuse/neglect in nursing homes. <i>Qualitative Health Research</i>, 27(12), 1870-1881.</p>	<ul style="list-style-type: none"> • Qualitative, grounded theory • Certified nursing assistants working in Florida nursing homes (n = 22) 	<ul style="list-style-type: none"> • CNAs described that a toxic nursing home work environment devoid of trust led to modification of care strategies including not providing care 1) as well as it could be, 2) in a timely manner; 3) or not at all.
<p>Rea, D., & Griffiths, S. (2016). Patient safety in primary care: incident reporting and significant event reviews in British general practice. <i>Health & Social Care in the Community</i>, 24(4), 411-419.</p>	<ul style="list-style-type: none"> • Qualitative, descriptive • Semi-structured interviews of general practitioners in Britain (n = 17 of 78) 	<ul style="list-style-type: none"> • A supportive and open working environment facilitated the practice by general practitioners of discussion and reporting of incidents.

Appendix B

IRB Approval for the Present Study

	Arts & Sciences IRB - New Brunswick 335 George Street Suite 3100, 3rd Floor New Brunswick, NJ 08901 Phone: 732-235-2866	Health Sciences IRB - New Brunswick/Piscataway 335 George Street Suite 3100, 3rd Floor New Brunswick, NJ 08901 Phone: 732-235-9806	Health Sciences IRB - Newark 65 Bergen Street Suite 511, 5th Floor Newark, NJ 07107 Phone: 973-972-3608
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DHHS Federal Wide Assurance Identifier: FWA00003913
 IRB Chair Person: Cheryl Kennedy
 IRB Director: Carlotta Rodriguez
 Effective Date: 12/7/2018

eIRB Notice of IRB Determination

STUDY PROFILE

Study ID: [Pro2018002317](#)
 Title: Medication Reconciliation Processes in Patients Transitioning from Hospitals to Home Health Care

Principal Investigator:	Maria Saimbert		
Co-Investigator(s):	Charlotte Thomas-Hawkins	Review Type:	Non-Human Determination

CURRENT SUBMISSION STATUS

Submission Type:	Request for Determination of Non-Human Subject Research (including Quality Assurance/Quality Improvement)	Submission Status:	Approved
Determination Date:	12/4/2018		