Title
Medication Discrepancies during Hospital to Skilled Nursing Facility Transitions

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Medication Discrepancies during Hospital to Skilled Nursing Facility Transitions

A dissertation submitted in partial satisfaction of the

requirements for the degree

Doctor of Nursing Practice

by

RoseMarie Lara

2021

ABSTRACT OF THE DISSERTATION

Medication Discrepancies during Hospital to Skilled Nursing Facility Transitions

by

RoseMarie Lara

Doctor of Nursing Practice

University of California, Los Angeles

Professor Mary Cadogan, Co-Chair

Professor Janet Mentes, Co-Chair

Background: The literature has shown that at least one medication discrepancy occurs in 75% of hospital-to-skilled nursing facility (SNF) admissions. Medication discrepancies are responsible for over 1.5 million adverse drug events costing the United States health care system over $3.5 billion. The use of an electronic health record (EHR) to minimize medication discrepancies lends one of many avenues for further studies to evaluate means of reducing these discrepancies thereby improving patient care and outcomes. **Objectives**: This pre and post study design project evaluated the efficacy of an EHR on decreasing medication discrepancies during transition of care (TOC) of patients from the hospital to the SNF. **Methods:** Evaluation of the impact of a

practice change (implementing the new EHR) focused on comparing medication discrepancies on patients admitted to one SNF from two related Los Angeles area hospitals. The pre-EHR group was compared to the post-EHR group for number and type of medication discrepancies. Documents reviewed included the hospital discharge (DC) summary, the hospital interfacility transfer summary, and finally the SNF admission orders for accuracy of medication lists. **Results:** Four types of medication discrepancies were significantly lower in the post-EHR sample compared to the pre-EHR sample. Specifically, discrepancies were lower post-EHR for omissions (p = .03), additions (p = .004), incorrect doses (p = .04), and missing frequencies (p = .01). Although the chi square analysis was not statistically significant at the p=.05 level, from a clinically significant standpoint two times as many post-EHR patients (34.1% versus 16.3%) had no medication discrepancies compared to pre-EHR patients. These results provide an indication that further projects exploring the implementation of an EHR to reduce medication discrepancies may be a valuable tool to aid in and improve patient care and outcomes specifically in relation to maintaining accurate medication lists. **Conclusion:** An EHR implemented into routine SNF care can reduce medication discrepancies on patients being admitted to the SNF from the hospital when used by SNF nurses to input newly admitted patient medication lists.
Keywords: skilled nursing facility, medication errors, transition of care, medication reconciliation.

The dissertation of RoseMarie Lara is approved.

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2021

In dedication to my late father who was the inspiration for me returning to school. “You got your doctor Daddy!”

To my two children, Jake and Jill, never give up. Thanks for believing in me when I wanted to quit. I love you always. You are my inspiration!

“You will get there when you are meant to get there and not one moment sooner…so relax, breathe, and be patient.” -Mandy Hale

“Sometimes adversity is what you need to face in order to become successful.” -Zig Ziglar

Philippians 4:13 “I can do all things through Christ who strengthens me.”

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Next, I would like to thank Fireside Health Care Center in Santa Monica for hosting me as my primary place of employment. During my 9 years there, I have seen many changes in staff members, patients, and leadership; however, the overall environment remained a warm and friendly home for many to recover and rehabilitate from injuries and illnesses. This facility was the setting for my project and has inspired me to improve health care situations for our older adult community.

Dr. Mary Cadogan, thank you for the many Zoom sessions throughout the pandemic in order to complete my manuscript. Your feedback and suggestions for improving this document to the final product made the overwhelming experience much more manageable. I appreciate your work behind the scenes in coordinating the committee for the review of my manuscript and for attending my oral defense. Thank you Dr. Mentes, Song, and Robbins for your feedback and input to further clarify my project and outcomes to a much more presentable final product.

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What a wild ride this has been working in the epicenter of the pandemic of the United States! Not only was this project implemented in Los Angeles County but at a skilled nursing facilities, the primary clinical type setting where the majority of Covid-19 deaths were occurring. Thanks be to God that I was kept safe and healthy and never carried the virus, though my loved ones and patients exposed me to this horrid disease on more than one occasion. By God's grace, I never contracted the virus and was able to complete this project in His time, not mine. Praise be His name, now and forever, and to Him all the glory…

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CHAPTER ONE: INTRODUCTION

Improving communication between the acute care hospital and the skilled nursing facility (SNF) is a key factor for achieving optimum patient outcomes (Dizon, Zaltsmann, & Reinking, 2017). Developing a partnership between these two settings would ensure a smooth transition for the patient. SNF services are integral for the care of patients not ill enough for a hospital bed but too disabled to return home. More than five million people transfer from the hospital to the SNF annually (King et al., 2013). Improving patient outcomes is vital to maintaining the health and well-being of this rather large number of individuals utilizing SNF services as an alternative to the direct discharge home. Several areas of communication are available for improvement during this crucial period of transferring care, but this intervention will focus primarily on communication related to the reduction of medication errors on patients transitioning from the hospital to the SNF.

Previous literature has shown that at least one medication discrepancy, such as medication omissions or inconsistencies, occurs in 75% of hospital-to-SNF admissions (Kerstenetsky, Birschbach, Beach, Hager, & Kennelty, 2018). Poor communication and rushed transitions between the hospital and the SNF staff increases the likelihood of medication discrepancies, missed lab tests or imaging studies, and higher readmission rates due to voids in information (Gadbois et al., 2018). According to Kerstenetsky et al. (2018), medication discrepancies are responsible for over 1.5 million adverse drug events which cost the United States health care system over $3.5 billion and approximately 40% of these discrepancies are thought to be related to inadequate medication reconciliations during the transition of care (TOC) period. Given the high costs associated with medication discrepancies, and the high numbers of medication discrepancies that occur during TOC, this clinical problem is an important topic that

needs to be addressed especially by a Doctor of Nursing Practice (DNP) nurse in this specialty focus using leadership, collaboration, and research skills to implement process changes.

Using national Medicare data, out of 1,530,824 discharges between September 2009 and August 2010, 321,709 or 21% patients were readmitted to the hospital from the SNF within 30 days (Neuman, Wirtalla, & Werner, 2014). The 2010 Affordable Care Act (ACA) established penalties of ~0.74%, which in dollars is an average cost of $13,800, for hospitals with higher than expected readmission rates for Medicare patients (Clark, Baron, Tynan-McKiernan, Britton, Minges, & Chaudhry, 2017). Reducing medication errors is one aspect in the TOC period that can aid in improving patient outcomes and reducing readmission rates while simultaneously saving valuable health care dollars. Practitioners in different settings work independently from one another and do not ever have complete knowledge of services and medications provided in previous settings and therefore this communication during TOC is vital to relaying lifesaving and valuable health care information (Desai, Williams, Greene, Pierson, & Hansen, 2011). The following PICO question provided focus for the project. Do SNF patients transferred from an acute care hospital whose admission medication list is entered into an EHR have fewer medication discrepancies compared to patients who receive usual care?

CHAPTER TWO: THEORETICAL FRAMEWORK

Avedis Donabedian's conceptual model was an appropriate focus for the implementation of this study. This framework is a model to evaluate the quality of health care using the triad of structure, process, and outcome. Donabedian (1988) clearly and thoroughly described the three components of his conceptual model by dividing them into categories. First, "structure" was described as the material resources such as settings and equipment, human resources such as the

number and qualifications of providers, and organizational structure such as administrative systems through which patient care is provided. Next, "process" was defined as the components of care being delivered to the patient, specifically what is being done in giving and receiving care. For patients, this would be the process involved in seeking care and carrying out the care that is provided. For providers, the process would involve making the diagnosis, recommending care, and providing the care. Lastly, "outcome" was considered to be the survival, recovery, and restoration of function in Donabedian's triad. The outcome would specifically be the patient and population effects from the care that was given.

The change in today's health care system will require adaptation of both health care providers and patients alike to adjust to a new form of extended patient care to improve outcomes. The older population of patients are more likely to necessitate a step down unit such as a SNF placement after an inpatient hospital stay. The first part of Donabedian's model, listed as the "structure" for evaluating health care quality, was the hospital and the SNF in this case. Further descriptors of Donabedian's "structure", relevant to this enhanced medication communication intervention included the hospital discharge nurses and SNF nurses caring for the patient. The last portion of Donabedian's definition of "structure" in this particular setting was the administrative systems from both the hospital and SNF involved in the TOC of the older adult patient. The "process" portion of Donabedian's conceptual model, defined as the components of care delivered, in this instance was the medication lists transferred with the patient from the hospital to the SNF. An accurate review of this list of medications was another component of the "process" portion of Donabedian's model which ensured that medications would be properly administered to the patient in order to provide optimum patient outcomes. The "outcome" of this proposal, according to Donabedian's model, was the recovery, restoration of

function, and survival. Relating his model to this proposal, the "outcome" was the number of medication discrepancies both before and after implementation of the intervention using the interfacility transfer summary list of medications.

Using Donabedian's model provided a structured method to review the outcomes of this proposal's intervention. Structure, process, and outcomes were solid measurable entities involved in this research project. Evaluating the quality of health care before and after implementation provided the necessary feedback to determine the impact of this intervention in improving patient outcomes by reducing medication discrepancies. Reproducing this intervention at other institutions will be strengthened if this framework is utilized to evaluate the implementation of this process and will be especially valuable if the outcomes for all involved are positive.

CHAPTER THREE: REVIEW OF LITERATURE

The literature review was conducted using PubMed and CINAHL databases. The keywords and phrases used for the Boolean search included the following terms: "skilled nursing facility or assisted living or nursing home", "medication errors", and "transitions of care". Initially, thousands of articles were revealed when search terms were viewed separately. When the search terms were combined into one search, CINAHL provided 11 articles and PubMed had 66 articles that were relevant to the topic.

The search was narrowed by adding limitations to the last 10 years, human species, and English language. These articles were then reviewed for their relevance to the DNP project which focuses on interfacility communication from the hospital to the SNF and the medication errors that occur during TOC from the hospital to the SNF. Of these articles, nine were included

in this review of literature because of their relevance to the topic of medication errors and the need for improved communication during TOC from the hospital to the SNF. The other articles were relevant for background information but not included in this review of literature as they were not as relevant to medication errors and communication during transition of care but had other foci such as reducing readmission rates and specifying the categories of medication errors that occurred most frequently during TOC.

Anderson and Ferguson (2020) crafted a study where a nurse practitioner (NP) led medication reconciliation, on each admission to a single SNF-during a one month time period was performed to determine if readmission rates would decrease with the given intervention. The results did show a decrease in readmission rates though the Chi-square analysis was not statistically significant, due to the short period of time and the small sample size. The study did show that nurse practitioners have the necessary education and skills to improve quality measures and provide quality care in SNF settings. Through medication reconciliations performed repeatedly on newly admitted patients at the SNF, readmissions were reduced. These results demonstrated the need for further studies such as enhanced communication from hospital nurse to SNF nurse by reviewing medication lists as a means of improving patient outcomes and reducing medication errors. In the study by Anderson and Ferguson, of readmissions to the hospital, the cause was found to be related to medication errors or the medication reconciliation process further strengthening the message that reducing medication errors can improve patient outcomes.

The study by Clark et al. (2017) sought to gain perspective from clinicians working at the SNF. These clinicians were questioned as to what they considered to be the main factors leading patients towards being readmitted to the hospital from the SNF. A structured interview tool was

used to interview 28 SNF clinicians who cared for the readmitted patients from 15 different SNFs to one hospital. Amongst the responses by these clinicians, poor communication was a common theme blamed for patient readmissions, in particular poor communication between the SNF and the hospital. For example, discrepancies between discharge summaries and patient instructions were cited as possible causes for readmissions to the hospital. The limitations of this study were the fact that only one hospital was used and that no one intervention was listed as a solution. Because of these gaps, further research is needed to develop interventions and measure which interventions are successful at reducing readmissions.

One study by Desai, Williams, Greene, Pierson, & Hansen (2011) described medication errors that occurred during TOC to nursing homes. These study patients transitioning their care into a nursing home were found to be at an increased risk for medication errors. The researchers analyzed medication errors in North Carolina nursing homes that were reported to the Medication Error Quality Initiative (MEQI) from 2007 through 2009. The results of this study found that the communication among staff members, order transcription discrepancies, availability of a given medication, issues with the pharmacy, and name confusion were pertinent aspects contributing to the development of medication errors during TOC to a nursing home for the older adult patient. Medication errors, in this study, were found to more frequently involve registered nurses rather than physicians, physician assistants, pharmacists, and pharmacy technician.

Gadbois et al. (2019) also illustrated the need for improved communication during TOC for the patient transferring from the hospital to the SNF. This research team processed interviews of patients, their families, and hospital and SNF staff to determine the barriers to smooth transfers of care. The patients, families, and staff members all claimed chaotic transfers, rushed

transfers, and poor communication from one facility to the next. The overall theme of this study was to include the patients and the families in the TOC and to improve the communication from the hospital to the SNF. There was no mandated form of direct communication from the hospital to the SNF but rather a nurse to nurse telephone report, a written discharge summary from the hospital, and an interfacility transfer summary were the main components used for communication during TOC. These methods are often skeletal, incorrect, missing crucial health care details, or not updated on current clinical conditions for the patient. The limitations of this study was the fact that the patients included in the study were the individuals who were willing to participate and may not be generalizable.

King et al. (2013) further reiterated poor quality discharge communication as a major barrier for quality patient care. In this study, 27 nurses from five Wisconsin SNFs were interviewed regarding their perceptions of how they transition patients into the SNF from the hospital. Difficult hospital to SNF transitions were considered the norm by these nurses. Multiple inadequacies and deficiencies were noted by these nurses in the written discharge information provided to them by the hospital. Repeated phone clarifications were needed from the hospital staff by the SNF nurses creating frustrations and delays in care. The need for quality communication (including clear medication orders and opioid prescriptions, thorough patient psychosocial/functional history, and accurate information regarding the patient's current health status) during transition of care was a highlight of this research study focusing on the care of patients admitted from the hospital to the SNF, further strengthening and supporting the need for studies and research to resolve this critical clinical problem.

One study by Kreckman et al. (2018) convincingly found that reviewed medication lists during TOC, using a registered nurse led intervention, reduced medication errors during hospital

admission, hospital discharge, and at the ambulatory care post-hospital follow up visit. These researchers utilized a TOC team devised solely of registered nurses who were responsible for overseeing the medication reconciliation process. These nurses reviewed ambulatory medication lists at the time of admission and compared the list to the hospital medication list on a select group of patients, engaging the patient and their family as well as other care providers and pharmacists. Next, these same nurses in the TOC team reviewed the discharge medication list within 24 hours of discharge from the hospital and compared this to the hospital medication list. Lastly, the nurses reviewed the medication list at the hospital follow up visit to verify medications and provide optimum patient continuity of care. The percentage of medications with error after implementing the TOC team was reduced from 131/386 (33.9%) to 147/787 (18.7%) at the time of hospital admission, 81/354 (22.9%) to 42/834 (5.0%) at the time of discharge from the hospital and 43/337 (12.8%) to 6/809 (0.7%) at the follow-up visit after discharge from the hospital. The percentage of charts without any medication errors increased at time of hospital discharge from 8/31 (25.8%) to 46/70 (65.7%) and at the time of hospital follow up visits from 16/31 (51.6%) to 64/70 (91.4%). The results of this study pointed most precisely to the specific role that nurses could play in reducing medication errors for patients who are in the process of TOC and that providing ownership to this task would leave a much clearer understanding of who routinely would be responsible for overseeing this process. Also, the continuity of care and the flow of the medication reconciliation process allowed more accuracy in keeping records of the patients' medication lists more accurately than what was originally being done.

Further work by Lane, Troyer, Dienemann, Laditka, and Blanchette (2014) evaluated the structure and process related factors which contributed to medication errors and the resulting

patient harm from these errors that occurred during transitional periods for patients at a SNF. Their results concluded that SNF chain affiliation was associated with a reduced number of errors during the transition period. One third of all reported transition medication errors occurred during the medication administration phase of the medication process, where dose omissions were most common. Dose omissions caused less harm, however, than wrong dose errors. Prescribing errors were not as common as medication administration errors but were far more likely to cause patient harm. These results point to the fact that nursing plays an important role in reducing medication errors in patient care during TOC. The study also concluded that medication errors during TOC could be minimized by improving both prescribing and transcription processes as well as the actual documentation of orders. This conclusion coincides with the goal and purpose of this proposal which is to minimize medication errors by improving both the transcription processing of medication orders as well as the documenting process of medications specifically in regards to the nursing profession who are ultimately highly responsible for the accurate administration of patient medications. The above mentioned study points to the need for further research on improving the processes involved in transcription and documentation, specifically related to nursing.

Further research related to the etiology of patient medication errors during TOC was performed by Sinvani et al. (2013). In this study, randomized chart reviews were performed using electronic medical records and paper chart medication reconciliations. Medication records were evaluated at three time points including hospital admission to discharge, hospital discharge to SNF placement, and SNF admission to discharge home or long term care. These researchers demonstrated the wide spread number of medication discrepancies at all three time points of TOC. Out of 1,696 medications reviewed in the transition period of 44 patients, 1,002

discrepancies were identified. For study related purposes, Sinvani et al. (2013) defined discrepancies as any medication omission, duplication, or failure to change medication regimen back to original regimen when indicated. The conclusion of this study, which specifically looked at medication reconciliations and medication records, was that the current reconciliation process for medications needs to be revised and reevaluated in order to provide optimum patient care to the older adult patient as they transition throughout the health care system. Adding a nurse to nurse review of the medication list when patients transition from the hospital to the SNF is one method to aid in the refining of the medication reconciliation process as suggested by this study and as addressed by this proposal with the end goal of reducing patient medication errors.

Ward et al. (2008) formulated a protocol to aid in medication administration related to the TOC of patients transferring from the hospital to the SNF. Their protocol was to have the medication orders transmitted to the SNF pharmacy before the patient's arrival to the SNF. Though an intervention was sought to improve the administration of medications at the SNF and to avoid omission of medications, the implementation was not successful as the actual orders were not transmitted to the SNF pharmacy prior to the patient's arrival. The implication of this study, which allowed for an actual attempt at an intervention to improve medication administration and patient outcomes at the SNF while decreasing the delay in medication administration, was unsuccessful but displays the need for some form of intervention to reduce delays in patient care specifically in regards to medication errors. This study was chosen in the review of literature as it is yet another attempt using staff outside of nursing and pharmacy to assist in elimination of the errors that occur in medication administration at the SNF. The frequent turnover of key health care professionals at the SNF proved to be a major barrier to the

successful implementation of the intervention. Further interventions developed to combat medication errors will need to survive the ever changing staff turnover rate at the SNF level.

Synthesis of Literature Review

The articles in the literature review focused on interfacility communication during transitions of care and medication errors. A common theme in the literature resulting in medication errors was miscommunication, or complete lack of communication, regarding the patient upon discharge from the hospital and upon admission to the SNF. Clark et al. (2017) concluded through SNF clinician interviews that lack of coordination and limited information exchange between the SNF and the hospital were thought to be root causes contributing to patient readmissions. Their study was not primarily focused on medication errors but rather the evidence that medication errors were consequences of chaotic TOCs. Desai et al. (2011) concluded, similarly to Clark et al. (2017), that effective communication processes were vital during TOCs to improve patient outcomes and reduce medication errors. The difference in the two studies was the fact that Desai et al. (2011) described the actual medication errors that occurred during TOC to compare characteristics of these errors and to evaluate the impact of these errors on patient outcomes. Gadbois et al. (2019) utilized interviews of hospital and SNF staff but also included the patient perspective via interviews in regards to TOC from the hospital to the SNF. Their conclusions from the interview results displayed four problematic areas, one of them being problems with timing of medication administration. Programs to address the areas of inefficiencies were mentioned by staff in the interviews but no clarification regarding the exact nature or evaluations of these programs were described. King et al. (2013) again found communication as a common barrier to the smooth TOC for patients coming into the SNF from the hospital. In this particular study, interviews were again conducted but solely involving SNF

nurses unlike the other studies in the review of literature. Kreckman and colleagues' study (2018) implemented a method to reduce medication errors. Similar to King et al. (2013), nurses were the focus, and these nurses were used in the intervention. The nurses served as the TOC team to oversee the medication reconciliation process. The percentage of medication errors was successfully decreased following the intervention using this TOC team at three different time points that were all TOC time points. These time points included admission to the hospital, discharge from the hospital, and outpatient hospital follow up appointment. Lane et al. (2014) had a slightly different focus that evaluated structure and process related to medication errors. Unlike the Kreckman et al. (2018) study, no intervention was implemented but rather characteristics of medication errors were described. Similarly, Sinvani et al. (2013) evaluated medication errors during TOC at three different time points, hospital admission to hospital discharge, hospital discharge to SNF admission, and SNF discharge to home or long term care facility, similar to Kreckman et al. (2018).

Gaps in the literature evolve around finding a direct intervention to impact the number of medication errors that exist when a patients transitions from the hospital to the SNF and evaluating this intervention for the effectiveness. The limitations when studying a specific intervention include correlation from factors that affect the number of medication errors such as number of medications, accuracy of medication reconciliation, accuracy of medication list prior to transition, patient cognition, experience of staff reviewing the medication list, and involvement of family members or friends of the patient who are well informed about the patients' medication list. Because these numerous factors all may play a role in causality for medication errors, determining if a potential intervention or the listed factors helped to reduce the errors would be difficult to ascertain in future research. Implications from the studies listed

above display the need for and evaluation of interventions to reduce medication errors during TOC. Future research involving the nursing profession seems to be implicated as feasible for reducing medication errors during TOC. The state of the science as evidenced by the literature is still in the phase of evaluating root causes for errors and gaining perspective from clinicians, nurses, families, and patients to the perceived causes for these errors. Scarce availability for interventions proven to reduce the errors is available but seems to point to nursing and communication during the TOC periods for patients.

CHAPTER FOUR: METHODS

This study was originally designed as a pre-post study design using an enhanced communication tool, the interfacility transfer summary medication list, to evaluate if medication discrepancies decreased during TOC as a result of nurses using this tool during telephone report. However, as a result of the 2020 Covid-19 pandemic, the original intervention was not implemented due to the heightened stress that occurred at the SNF level. Administration at the project site needed to focus on the impact of the Covid-19 pandemic and implementing the new medication communication process for nurses was not permitted. During this already stressful period of the pandemic, a new electronic health record (EHR) was introduced to the staff nurses at the SNF. This EHR was utilized to input medications into the computer then printouts of these medications were placed into the paper charts as admission orders. An opportunity to modify the original DNP project became available. The newly introduced EHR replaced the initially planned intervention of the interfacility transfer summary for comparison purposes of medication discrepancies before and after the introduction of this new system. The revised DNP project evaluated the impact of a practice change focused on direct input of medications into the EHR.

The pre-EHR group was compared to the post-EHR group for medication discrepancies. The following PICO question provided focus for the project. Do SNF patients transferred from an acute care hospital whose admission medication list is entered into an EHR have fewer medication discrepancies compared to patients who receive usual care? The usual care, prior to introduction of the EHR, was the SNF nurse receiving telephone report from the hospital nurse then reviewing the DC summary and the interfacility transfer summary medication lists, then manually entering medications into SNF admission orders without an organized program or EHR.

Sample and Setting

Data for this practice change project were obtained through medical abstraction of medication documents associated with discharge from the acute care hospital and admission to the SNF. Records associated with SNF admissions for eighty-eight patients were determined to be an adequate sample size by using a G*power analysis in order to detect statistical significance. However, 87 charts were ultimately reviewed due to the lack of availability of pre-EHR records at the SNF. By the time of the review, many SNF medical records been moved to offsite storage and were unavailable. All charts used for each review were independent and did not track specific residents over time.

The SNF is a 66 bed facility located on the Westside of Los Angeles. Approximately 50% or greater of the census at the SNF are from the two related Los Angeles area hospitals. Of this population, the majority are short term residents residing at the SNF admitted for rehabilitation services such as physical, speech, and/or occupational therapy. The average length of stay for residents in this sample and at this SNF is 24 days. All records collected in the data

sample were from the patient population admitted from these two related Los Angeles area hospitals.

Procedure

This practice change project examined the prevalence of medication discrepancies before and after the introduction of a new process for SNF nurses to input medication information received from the hospital directly into the EHR. Full exemption from the UCLA Institutional Review Board (IRB) was obtained prior to initiating the medical records review.

The three TOC medication documents included for review pre and post-EHR were:

1. Hospital DC summary medication list
2. Interfacility transfer summary medication list
3. SNF admission orders medication list

The hospital DC summary is the narrative note, written by the discharging hospital clinician, summarizing the patient's hospital stay and includes a medication list that the patient was taking during the hospital stay and on the day of discharge. The interfacility transfer summary is a compact document summarizing the patient's stay in the hospital. This document includes a discharge list of medications that the patient was taking while in the hospital and includes medications that have been started, stopped, and will continue after discharge from the hospital (see Appendix A). The interfacility transfer summary typically has the most updated list of medications to be taken by the patient once out of the hospital. The SNF admission orders is the list of tasks to be performed once the patient is residing at the SNF and includes the list of medications to be taken while the patient is at the SNF.

Medical records for all patients were assigned a number without any identifying data to maintain compliance with confidentiality of medical records. The SNF admission orders

medication list was compared to the hospital DC summary medication list and the interfacility transfer summary medication list. During this process, the medication name, dose, route, frequency, start date, and end date were reviewed for each patient in the sample. The priority document, or document for final review, was the SNF admission orders in which the medication discrepancies were noted when comparing to the two hospital documents (the hospital DC summary and the interfacility transfer summary). An example of a medication discrepancy that occurred during the review process was that if a medication occurred on the hospital DC summary and on the hospital interfacility transfer summary and this particular medication was missing on the SNF admission orders, then this would be an example of a medication omission.

At baseline, medication lists from the hospital discharge summary, interfacility transfer summary, and the written SNF admission orders were all compared for accuracy. Through this process, the presence or absence of medication discrepancies were identified. After initiation of the EHR, the process was again conducted to evaluate the number and types of medication discrepancies. Medication discrepancies, for purposes of this study, were defined as omissions of medications, additions of unnecessary or unwarranted medications, incorrect dosages, missing dosages, incorrect or missing routes, duplicate medications, incorrect or missing frequencies, missing stop dates-when warranted, and missing start dates-when needed. These types of discrepancies were quantified per chart, then totaled from all charts in an Excel spreadsheet format (see Appendix B). See table below for description of medication errors.

Table 1: *Description of Medication Errors*

Incorrect / Missing Dosage	Wrong or absent strength of medication.
Incorrect / Missing Frequency	Wrong or absent number of times medication to be administered.

Incorrect / Missing Start Date	The date to begin the medication is wrong or absent.
Incorrect / Missing End Date	The last date of medication administration is incorrect or missing where applicable.
Incorrect / Missing Route	The location for medication administration is incorrect or missing.
Duplicate	Same medication listed more than once.
Omission	Missing medication on the list.
Addition	Extra medication that should not be on the list.

Analysis

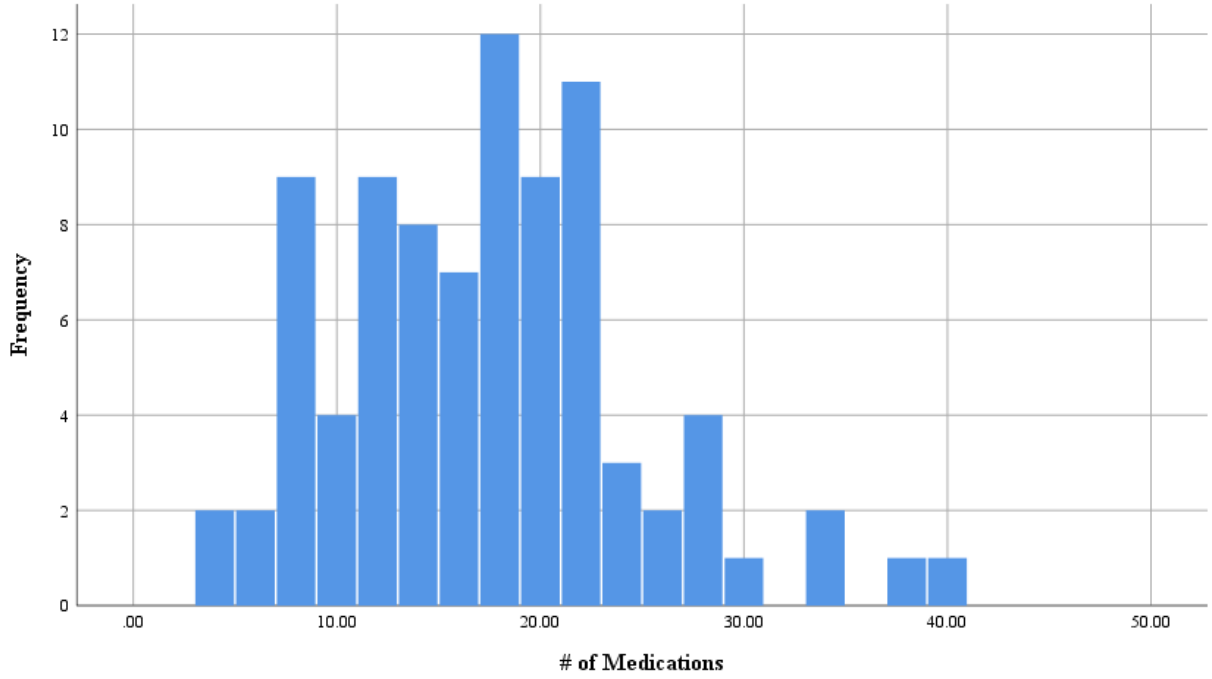
Data were analyzed using descriptive statistics, Mann-Whitney tests, and Spearman correlations. The descriptive statistics involved summarizing the data for the number of medications, types of medication discrepancies, and total number of medication discrepancies per patient's chart. Thirteen types and frequencies of medication discrepancies were quantified in a table and labeled as: 1) omissions, 2) additions, 3) incorrect doses, 4) missing doses, 5) incorrect routes, 6) missing routes, 7) duplicates, 8) missing or incorrect start dates, 9) missing or incorrect end dates, 10) missing frequencies, 11) incorrect frequencies, 12) missing indications, or 13) incorrect indications. Mann-Whitney analyses to compare differences in types of medication discrepancies pre and post-EHR were conducted. Chi Square analysis was conducted to compare differences in total number of medication discrepancies per chart pre and post-EHR. Spearman Correlation analysis was done to examine the relationship between number of medications and type of medication discrepancies. A p-value <0.05 was considered statistically significant for the Mann-Whitney and Spearman Correlation analyses.

CHAPTER FIVE: RESULTS

The purpose of this practice change project was to evaluate differences in medication discrepancies before and after introduction of a new EHR process for SNF nurses to enter medication information during transitions from the hospital to the SNF. Results are organized in the following tables. First, the number and range of medications presented in Figure 1 provides context for the subsequent presentation of data related to frequency and types of medication discrepancies. Frequencies of medication discrepancies for the entire sample are presented in Table 2. A series of Mann-Whitney analyses comparing pre-EHR to post-EHR medication discrepancies were conducted with statistically significant results by type of discrepancy shown in Table 3. Following the analyses that compared individual discrepancies, a separate analysis was done to examine total discrepancies within charts. Table 4 shows the distribution of number of discrepancies and Table 4 shows comparison of total discrepancies pre-EHR and post-EHR.

Finally, results of a Spearman Correlation analysis that examined type of discrepancies by number of medications is described.

Figure 1: *Histogram for Number of Medications per Patient Given*



Note n = 87.

Figure 1 displays the histogram for number of medications prescribed to SNF patients on TOC. Number of medications per patient ranged from 4 to 39 with a mean of *M* = 17.00 (*SD* = 7.32).

Table 2: *Descriptive Statistics for Medication Discrepancy Types*

Variable	*M*	*SD*	Low	High
Number of incorrect frequencies	0.60	0.97	0.00	4.00
Number of omissions	0.59	1.60	0.00	13.00
Number of additions	0.49	1.51	0.00	9.00
Number of incorrect doses	0.47	0.82	0.00	3.00
Number of missing frequencies	0.14	0.46	0.00	3.00
Number of duplicate medications	0.10	0.53	0.00	1.00
Number of missing/incorrect end dates	0.08	0.27	0.00	1.00

Number of incorrect routes	0.03	0.18	0.00	0.00
Number of missing doses	0.02	0.15	0.00	0.00
Number of incorrect indications	0.01	0.11	0.00	1.00
Number of missing/incorrect start dates	0.00	0.00	0.00	
Number of missing routes	0.00	0.00	0.00	
Number of missing indications	0.00	0.00	0.00	

Note. n= 87.

Table 2 displays the descriptive statistics for each of the 13 discrepancy types. Number of medications given ranged from 4 to 39 with a mean of *M* = 17.00 (*SD* = 7.32). Highest means among the 13 discrepancy types were for number of incorrect frequencies, or timing of medication administration (*M* = 0.60), number of omissions (*M* = 0.59), number of additions (*M* = 0.49), and number of incorrect doses (*M* = 0.47). Three types of discrepancies were not found in any chart. Specifically, these types were missing routes, missing/incorrect start dates, and missing indications.

Table 3: *Mann-Whitney Tests Comparing Frequency of Pre-EHR and Post-EHR Discrepancies*

Indicator	Time	*n*	*M*	*SD*	*z*	*p*
Omissions frequency					2.12	.03
	Pre-EHR	43	5.07	9.16		
	Post-EHR	44	1.76	3.86		
Additions frequency					2.87	.004
	Pre-EHR	43	8.98	26.96		

	Post-EHR	44	0.43	1.67		
Incorrect doses frequency					2.08	.04
	Pre-EHR	43	4.58	8.19		
	Post-EHR	44	1.47	3.23		
Missing frequencies frequency					2.47	.01
	Pre-EHR	43	1.58	4.61		
	Post-EHR	44	0.15	1.01		

Note. n = 87.

A series of 13 Mann-Whitney analyses were done to compare differences between pre-EHR and post-EHR medication discrepancies. Four types of medication discrepancies were significantly lower in the post-EHR sample compared to the pre-EHR sample. Specifically, discrepancies were lower post-EHR for omissions (p = .03), additions (p = .004), incorrect doses (p = .04), and missing frequencies (p = .01).

Table 4: *Frequency Distribution of Total Number of Discrepancies per Chart*

Discrepancies	*n*	%
0	22	25.3
1	22	25.3
2	15	17.2
3	11	12.6
4	3	3.4

5	6	6.9
6	1	1.1
7	2	2.3
11	1	1.1
12	1	1.1
14	1	1.1
16	1	1.1
21	1	1.1

Note. *n = 87*.

Note. Number of Discrepancies: *M* = 2.54 (*SD* = 3.59).

Table 4 displays the frequency distribution for the total number of medication discrepancies per chart. The number of discrepancies ranged from 0 to 21 (*M* = 2.54, *SD* = 3.59). Twenty-five percent of charts reviewed had no medication discrepancies. Seventy-five percent of charts reviewed had at least one medication discrepancy, and twenty percent had four or more discrepancies.

Table 5: *Chi-Square Test Comparing Total Number of Discrepancies Pre and Post-EHR*

	Pre-EHR		Post-EHR	
Number of Discrepancies	*n*	%	*n*	%
None	7	16.3	15	34.1
One Error	11	25.6	11	25.0

Two errors	6	14.0	9	20.5
Three errors	6	14.0	5	11.4
Four or more errors	13	30.2	4	9.1

Note. χ^2 (4, N = 87) = 8.35, p = .08. Cramer's V = .310.

Table 5 displays the chi-square test comparing number of discrepancies with time period pre-EHR versus post-EHR. Although the chi square analysis was not statistically significant at the p=.05 level, from a clinically significant standpoint two times as many post-EHR patients (34.1% versus 16.3%) had no medication discrepancies compared to pre-EHR patients. In addition, pre-EHR patients were three times more likely (30.2% versus 9.1%) to have four or more medication discrepancies.

Additional Analysis

As an additional set of exploratory analyses, each of the 13 discrepancy types were correlated with the number of medications using Spearman correlations to determine if the number of medication discrepancies increased with higher number of medications. No table is included for this analysis. Spearman correlations were used instead of the more common Pearson correlation due to positively skewed data for many of the variables. The correlational analysis was done three times: entire sample (N = 87), pre-EHR sample only (n = 43) and post-EHR sample only (n = 44).

In the entire sample, number of medications was positively related to number of incorrect frequencies (r_s [85] = .34, p = .002). In the pre-EHR only sample, none of the 13 discrepancy types were related to the number of medications. However, in the post-EHR only sample, the

number of medications was positively related to the number of incorrect doses (r_s [42] = .36, p = .02) and to the number of incorrect frequencies (r_s [42] = .40, p = .007).

CHAPTER SIX: DISCUSSION

Medication discrepancies are prevalent during transitions of care from the hospital to the SNF. Reducing these discrepancies will inevitably improve patient care. Communication has been found to be at the core of these existing discrepancies and one form of conveying, communicating, or relaying the medications from the hospital to the SNF involves entering these medications into an EHR. Ways to improve on patient care and decrease medication discrepancies using an EHR have only begun to be explored. As communication has been found to be key in multiple studies, improving this communication from the hospital to the SNF leaves much room for future explorations for methods to enhance this communication, including use of the EHR. Also, since the majority of discrepancies both before and after implementing this practice change were medication omission and incorrect dosing, further exploration focusing on these two areas would be helpful for further interventions. An example of a recurrent medication discrepancy that occurred on SNF admission orders was the inadvertent entering of an incorrect dose of acetaminophen. The original required dose was 1000 milligrams every six hours as needed on the interfacility transfer summary and DC summary from the hospital, yet the SNF nurse entered this into the computer on admission orders as 500 milligrams every six hours as needed, then this was counted as a medication discrepancy during the data collection.

Reduction in medication discrepancies would be an expected finding after integrating this EHR as one more step in the TOC to enhance patient safety during the process. Of course, the level of nurse competence and experience will have an effect on medication knowledge in

relation to doses, frequency, and indications. The more experienced nurse may tend to have less medication discrepancies due to their knowledge of medications despite the use of this EHR. As a result of the in-service provided to the nurses in this particular setting, nurses may have had a heightened alert to medication components necessary to prevent discrepancies during the process of entering admission medication lists.

The types of discrepancies that decreased significantly after the introduction of the EHR to the SNF nurses included medication omissions, medication additions, incorrect medication doses, and missing frequencies. Further exploration into these specific types of medication discrepancies during TOC from the hospital to the SNF appears useful in determining whether or not these improvements were directly or indirectly related to implementation of the EHR at the SNF. Determining methods for reducing other forms of medication discrepancies that were not significantly reduced after introduction of the EHR would assist in future ideas to specifically decrease the different types of discrepancies that were not affected by introduction of the EHR.

Implementing new methods for decreasing medication discrepancies during the transfer from the hospital to the SNF will be a vital role that the Doctor of Nursing Practice (DNP) nurse will be well equipped to develop. As many aspects are involved in formulating an accurate medication list on admission to the SNF, the DNP nurse will be able to touch upon each aspect of this process in order to reduce these discrepancies while presumably improving patient outcomes. Because many aspects are involved, using evidence based literature in formulating future projects to reduce medication discrepancies will be key for the DNP nurse to develop future interventions and gather the data necessary to prove the positive outcomes of the interventions. Leadership and interprofessional collaboration skills characteristic of the DNP

nurse will aid in the altruistic approach to these important projects to protect patients during their transitions from the hospital to the SNF.

Limitations

The patient population, chosen by convenience sampling, may not represent all SNF admissions as a whole. The results may not be reproducible in other SNFs depending on the EHR used at the SNF and the competency of the nurses inputting the admission medications at the SNF. Patients with less medications and less diagnoses may present with a less complicated list of medications to review and therefore the possibility of having less medication errors is present in this patient population. Those patients with multiple medications and multiple diagnoses may pose a more complicated review of medication lists than their counterparts potentially skewing the results to having more medication errors than their counterparts. Nurses' level of education, length of time as a nurse, length of time working in the SNF setting, and length of time working at this particular SNF were not measured in this project so the impact of these factors is unknown. Also, level of experience with the EHR in use may also affect the outcome of medication errors.

Clinicians caring for the patients in the hospital may have varying levels of efficiency when performing medication reconciliations. Furthermore, different medical departments in the hospital may prioritize medication reconciliations during TOC more than other medical departments. Further research replicated in other facilities on many more patients will be necessary to conclude the adequacy of the EHR in improving and minimizing the number of medication discrepancies that occur during the TOC period. Perhaps collecting data on which patients, how many medications, how many diagnoses, which medical departments in the hospital, what level of nurse and nurse experience have the majority of medication discrepancies

will provide further insight into decreasing medication discrepancies during TOC from the hospital to the SNF.

The short duration of this study may limit the results. The use of one single SNF and two related Los Angeles area hospitals will limit generalizability. One potential threat to external validity will be the fact that the SNF providers have access to the medical records on the patients admitted from the two Los Angeles area hospitals. The generalizability to other SNFs and hospitals may be limited by the fact that providers may limit these medication discrepancies by having access to the patient's hospital records and can readily correct discrepancies with improved access to hospital information. Some SNF clinicians may not have access to the hospital records of their SNF patients. With the increased development of EHRs and access to these EHRs by both clinicians and patients, this limitation will be minimized as other SNF clinicians may also have access to hospital records.

The newly incorporated EHR had some safety features that appeared to be capable of reducing medication errors regardless of the user's efficiency. First of all, medications entered into the EHR on admission were required to have a medication name, dose, route, frequency, and start date. Due to these new requirements incorporated into the EHR's safety features, the possibility of having a **missing** dose, frequency, or route was lower post-EHR. Although these safety features were present, the possibility of an **incorrect** dose, frequency, or route were still possible if input incorrectly by the SNF nurse. Other safety features to this new EHR could assist in reducing **incorrect doses** as the system would prompt the user if a dose for a particular medication were highly inappropriate or not feasible due to unavailable medication formularies. Duplicate medications were another type of medication discrepancy that was nearly impossible to have happen with the new EHR system. The new system would not allow the exact same

medication to be entered by the nurse without giving a notification to the nurse to review. Omissions of patient medications and additions of unnecessary medications were still discrepancies that could occur with the new system incorporated into the entering of admission medications as the new system was not linked to any history of the patient's most current hospital medication list.

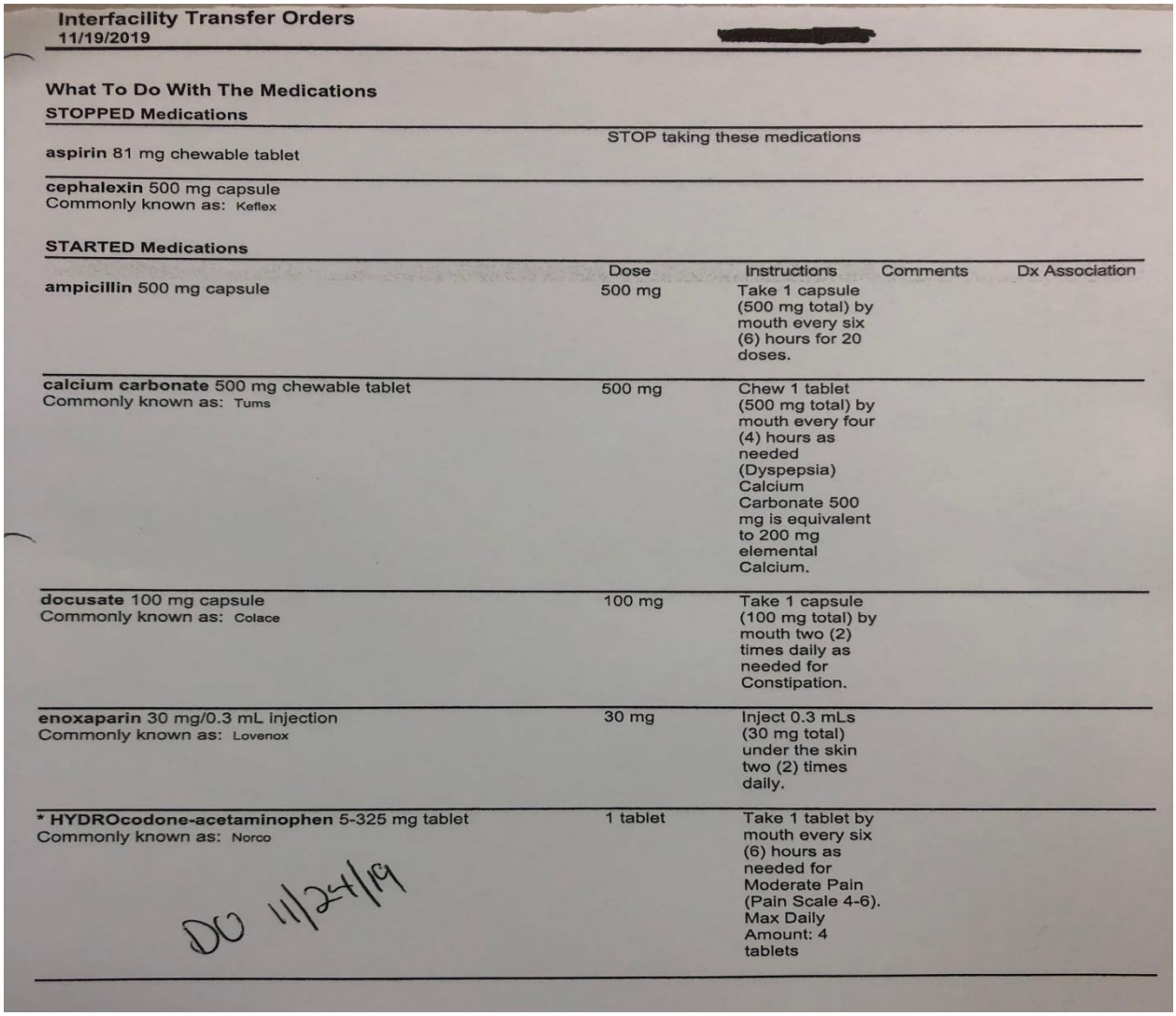
The Covid 19 pandemic also caused a major limitation to this study as the originally planned intervention could not be implemented. However, as noted in the literature review, direct nurse to nurse communication during patient transition from the acute care hospital to the SNF remains an important focus to improve patient safety and quality of care.

CONCLUSION

In conclusion, the results of this project suggest that the EHR is a valuable component to aid in reduction of medication discrepancies during TOC from the hospital to the SNF. The literature validates the high incidence of medication discrepancies during TOC and their resultant high cost to health care institutions as well as their negative impacts on the quality of patient care. Financial constraints at the SNF level may be a hindrance to these health care settings in purchasing a high quality EHR. However, the cost savings by improving patient care, satisfaction, and outcomes would be a valuable benefit to explore in persuading the use of an EHR in the SNF setting. Ultimately, the SNF nurses would likely be more satisfied with implementing an EHR, as less time would foreseeably be spent correcting SNF medication discrepancies as their numbers are reduced.

APPENDICES

Appendix A



Interfacility Transfer Orders
11/19/2019

[redacted]

What To Do With The Medications

STOPPED Medications

STOP taking these medications

aspirin 81 mg chewable tablet

cephalexin 500 mg capsule
Commonly known as: Keflex

STARTED Medications

	Dose	Instructions	Comments	Dx Association
ampicillin 500 mg capsule	500 mg	Take 1 capsule (500 mg total) by mouth every six (6) hours for 20 doses.		
calcium carbonate 500 mg chewable tablet Commonly known as: Tums	500 mg	Chew 1 tablet (500 mg total) by mouth every four (4) hours as needed (Dyspepsia) Calcium Carbonate 500 mg is equivalent to 200 mg elemental Calcium.		
docusate 100 mg capsule Commonly known as: Colace	100 mg	Take 1 capsule (100 mg total) by mouth two (2) times daily as needed for Constipation.		
enoxaparin 30 mg/0.3 mL injection Commonly known as: Lovenox	30 mg	Inject 0.3 mLs (30 mg total) under the skin two (2) times daily.		
* **HYDROcodone-acetaminophen** 5-325 mg tablet Commonly known as: Norco	1 tablet	Take 1 tablet by mouth every six (6) hours as needed for Moderate Pain (Pain Scale 4-6). Max Daily Amount: 4 tablets		

DO 11/24/19

Appendix B

	Patient Identifier	001	002
A	# of Medications	16	13
B	# ommisions	1	0
C	# additions	0	0
D	# incorrect doses	0	0
E	# missing doses	0	0
F	# incorrect routes	0	0
G	# missing routes	0	0
H	# duplicate medications	0	0
I	# missing/incorrect start dates	0	0
J	# missing/incorrect end dates	0	0
K	# incorrect frequencies	0	0
L	# missing frequencies	0	0
M	# missing indications	0	0
N	# incorrect indications	0	0
	Total errors / discrepancies	1	0

Table of Evidence

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Anderson, R. & Ferguson, R. (2020). A nurse practitioner led medication reconciliation process to reduce hospital readmissions from a skilled nursing facility. *Journal of the American Association of Nurse Practitioners, 32*(2), 160-167. doi: 10.1097/JXX.0000000000000264	To determine whether an NP-led medication reconciliation on admission would reduce hospital readmissions from a SNF.	37 patients admitted to a 90-bed for-profit SNF in rural Tennessee during March 2018.	Pre and post implementation data collected included chart review for age, gender, number of diagnoses among the top 10 reported by the facility, admission and discharge date, and discharge disposition. Post-intervention data added whether or not medication reconciliation was done within 24-72 hours of admission. NP completed stabilization visits with medication reconciliation on each admission.	Hospital readmission rate 19.2% preimplementation , 13.5% post implementation, a 29.7% decrease in a 30-day period when NP-led medication reconciliation was instituted. Chi-square analysis revealed no statistically significant difference (x2 (1,N= 89)= 0.50; p = .48) between no medication reconciliation done vs a medication reconciliation done.	Small sample size over small period of time, though readmissions reduced. No readmissions due to medication errors/ medication reconciliation process. Lack of medical providers and processes for accountability and adequate medication reconciliation with resultant medication changes are a serious concern. Further research needed to improve this process. Because each facility has different dynamics, results may not be generalizable.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Clark, B. W., Baron, K., Tynan-McKiernan, K., Britton, M., Minges, K. E., & Chaudhry, S. I. (2017). Perspectives of clinicians at skilled nursing facilities on 30-day hospital readmissions: A qualitative study. *Journal of Hospital Medicine, 12*(8), 632-638. doi: 10.12788/jhm.2785	To understand the perspectives of clinicians working at SNFs regarding factors contributing to readmissions.	Consecutive readmissions from 15 skilled nursing facilities (SNFs) to a single tertiary-care hospital in the general internal medicine service were reviewed. 28 SNF clinicians who cared for the readmitted patients (pts) were interviewed about root causes of readmissions using structured interview tool.	Qualitative study, prospectively identified consecutive readmissions from SNFs to single tertiary-care hospital. Admissions/ readmissions to general medicine. SNF clinicians who cared for readmitted patients identified/ interviewed about causes of readmissions using structured interview tool. Transcripts of interviews analyzed with grounded theory methodology.	Common theme was a lack of coordination between emergency departments (EDs) and SNFs with limited information between SNF and hospital, and SNF process/cultural factors.	SNF clinicians identified a broad range of factors contributing to readmissions. Addressing these may lower patients' risk of readmission from SNFs to hospitals. Improved communication during transition of care was seen as a common thread to improve patient outcomes. A multi-faceted approach is needed to reduce readmissions.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Desai, R., Williams, C. E., Greene, S. B., Pierson, S., & Hansen, R. A. (2011). Medication errors during patient transitions into nursing homes: Characteristics and association with patient harm. *The American Journal of Geriatric Pharmacotherapy*, *9*(6), 413-422. doi: 10.1016/j.amjopharm.2011.-10.005	To describe medication errors that occur during transition of care (TOC) to nursing homes, to compare characteristics of transition errors with errors not involving a transition, and to evaluate the impact of these errors on patient (pt) harm.	Medication error incidents reported by 394 North Carolina nursing homes to the Medication Error Quality Initiative (MEQI) from 2007-2009.	Cross-sectional analysis. Data collected for type of error, medications involved, possible causes, whether error was repeat error, whether error occurred within 7 days of transition to nursing home. Defined medication error during a transition as one that occurred within 7 days of transition to the nursing home.	27,759 errors over 3 years. 11% involved transition to nursing home. Errors in transitions have higher odds of harm than errors not in transition (odds ratio=1.85; 95% CI. Staff communication, order transcription, medication availability, pharmacy issues, and name confusion were important contributors to errors ($P<0.05$).	Effective communication and transcription processes are vital during care transitions. The accuracy of the information needed to ensure a smooth transition is vital for improving pt outcomes. Tools to help ensure efficient communication of pt information across care settings are needed. Medication reconciliation is a tool that has been shown to work well in reducing medication errors in transition. The limitations of this study are that the medication errors are self-reported by nursing homes and not monitored or verified.

CITATION	PURPOSE	SAMPLE/ SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Gadbois, E. A., Tyler, D. A., Shield, R., McHugh, J., Winblad, U., Teno,J. M., & Mor, V. (2019). Lost in transition: A qualitative study of patients discharged from hospital to skilled nursing facility. *Journal of General Internal Medicine, 34*(1), 102-109. doi: 10.1007/s11606018469 5-0	To understand the experiences of patients (pts) transitioning from the hospital to the skilled nursing facility (SNF).	138 staff in 16 hospitals and 25 SNF's in 8 markets across the country were interviewed, and 98 newly admitted, previously community dwelling SNF pts and/or their family members in 5 of those markets were interviewed. Research team included 5 PhDs and 1 MD, and included 1 geriatrician, 1 cultural anthropologist, 1 political scientist, and 1 gerontologist, with levels of experience from new junior faculty to highly senior investigators. All members participated in most aspects of the research, including data analysis.	Qualitative study with semi-structured interviews to understand transition between hospital and SNF. Interviews included all aspects of the discharge (DC) process & SNF placement process: who involved, how decisions made, pts' experience, hospital-SNF communication, & programs to improve transition. 64 with hospital staff, 74 with SNF staff, 98 with SNF pts and/or pts' families. Interviews analyzed for overarching concepts/theme.	Pts' perspectives include 4 problematic areas of hospital-SNF transitions: pts rushed in making SNF decisions, did not feel prepared about hospital-SNF transition or educated about post-acute needs, experienced chaotic transitions including problems with timing and medications. Hospital & SNF staff had similar opinions. Staff at some facilities reported programs to address these issues but efficacy unknown.	Hospital and SNF staff reported perspectives that programs to address problems were successful though impact unknown. Hospital staff did not seem to adequately prepare pts for transition to SNF. Inadequate communication with pts and their families and between hospital and SNF. Medication discrepancies are highly prevalent in transition from hospital to SNF. More room for studying impact and success of programs implemented to address these problems. A structured instrument to measure domains of care needed.

CITATION	PURPOSE	SAMPLE/ SETTING	METHODS (Design, Intervention, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
King, B. J., Gilmore-Bykovski, A. L., Roiland, R. A., Polnaszek, B. E., Bowers, B. J., & Kind, A.J. (2013). The consequences of poor communication during transitions from hospital toskilled nursing facility: A qualitative study . *Journal of the American Geriatric Society, 61,* (7), 1095-1102. doi: 101111/JGS.12328	To examine how SNF nurses transition patients (pts) admitted from the hospital, the barriers they encounter, and different outcomes with varying quality of transitions of care.	5 Wisconsin SNFs in 3 counties, 27 registered nurses	Qualitative study using ground dimensional analysis (GDA). In-depth interviews collected individually or in groups.	Difficult hospital to SNF transitions are normal. Poor discharge (DC) communication is a major barrier. Information needed by nurse is missing, inaccurate, inconsistent, incomplete. Nurses reported problems with medications (including lack of opioid prescriptions). Inaccurate DC information results in care delays, increased workload, risk for rehospitalization, pt/family dissatisfaction, negative SNF image. Nurses developed a list of information necessary for a safe TOC.	This study evaluated SNF nurses' work processes. A limited number of hospitals were used in this study with similar geographical regions. For profit nursing homes were not utilized. No demographics were collected on nurses interviewed. Further research needed to quantify the effects of poor communication at time of discharge on pt outcomes.

CITATION	PURPOSE	SAMPLE/ SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Kreckman, J., Wasey, W., Wise, S., Stevens, T., Millburg, L., & Jaeger, C. (2018). Improving medication reconciliation at hospital admission, discharge and ambulatory care through a transition of care team. *BMJ Open Quality, 7*(2), e000281. doi:10.1136/bmjoq-2017-000281	To evaluate a method to improve the medication reconciliation process, utilizing a Transition of Care (TOC) Team composed of registered nurses (RNs) to oversee the medication reconciliation process.	Family Medicine Hospitalist Service (FMHS) at a 500-bed tertiary-care in Illinois. Transition of Care Team composed of registered nurses. Team engaged patient (pt) and family, contacted pts' pharmacies and their providers, reconciled the pts' hospital medication list with ambulatory list at hospital admission and within 24 hours of discharge (DC), and attended the hospital follow-up visit to verify medications and provide continuity of care. 70 pts included in the study.	Chart reviewed preintervention data. TOC team of RNs. Pre-post design, convenience sampling. Two-proportion tests to determine differences in medications with errors comparing those without errors. Team did ambulatory medication reconciliation at admission, DC, and hospital follow up. Pt and pt's family engaged to address discrepancies. Within 24 hours of DC, team reviewed reconciled ambulatory record against DC record.	% of medications errors reduced at admission, DC, and follow-up. Admission errors reduced 33.9% to 18.7% (two-proportion test, $p<0.001$). At DC, errors reduced 22.9% to 5.0% (two-proportion test, $p<0.001$). % errors at follow-up reduced from 12.8% to 0.7% (two-proportion test, $p<0.001$). % of charts without any errors improved at hospital DC from 25.8% to 65.7% (two-proportion test, $p<0.001$) and at hospital follow-up visit from 51.6% to 91.4% (two-proportion test, $p<0.001$.	The success of this RN led intervention was as effective as pharmacy-led interventions. FMHS reframed medication reconciliation into a single continuous process beginning at admission and continuing through DC and the follow-up visit. Results cannot be generalized since only a single institution was used. Further research should be aimed at ownership of the medication reconciliation process and continuity from admission to post discharge follow up for medication reconciliations.

CITATION	PURPOSE	SAMPLE/ SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Lane, S. J., Troyer, J. L., Dienemann, J. A., Laditka, S. B., & Blanchette, C. M. (2014). Effects of skilled nursing facility structure and process factors on medication errors during nursing home admission. *Health Care Management Review, 39*(4), 340-351. doi:10.1097/-HMR.-0000000000000000	To evaluate structure and process related factors that contribute to medication errors and harm during transition periods at a skilled nursing facility (SNF).	The Medication Error Quality Initiative (MEQI) data for North Carolina nursing homes was used. MEQI data are statutorily mandated self-reported medication errors and potential errors for all SNFs licensed in North Carolina. Only medication errors reported as occurring during the first 7 days of admission were used. The dataset contained only non-government-owned SNFs (i.e., not-for-profit and for profit SNFs).	Data for medication errors/potential errors during 7-day transition for residents entering North Carolina SNFs collected from Medication Error Quality Initiative - Individual Error (MEQI-IE) October 2006-September 2007. Variables were type of medication error, phase in medication process, personnel involved, and causes of errors. Types of errors in 7 categories: wrong pt, wrong drug, omission, wrong dose, wrong administration, wrong follow-up, and other.	138 SNFs reported 581 errors. 1/3 during administration phase, omissions most common. Rate of errors for chain-affiliated SNFs was ~2/3 the rate of errors in non-chain SNFs (IRR = 0.67; 95% confidence interval [CI]. The rate of errors in chain for-profit SNFs was < errors in non-chain, for-profit SNFs (IRR = 0.68; 95% CI. SNFs with >151 beds had more than 2x the medication errors (Model 1, IRR = 2.12; Model 2, IRR = 2.11) in SNFs with < or =100 beds.	Limitations of this study were that the first 7 days of admission were examined but study did not identify which of the 7 days the error occurred or where resident was admitted from. Also, errors were self-reported. Transition periods of differing lengths, resident acuity, or whether error was repeated were data not identified. Chain affiliation reduced errors. Interpersonal climate and organizational culture can contribute to openness to discuss errors. Limitations were small sample size and timeframe.

CITATION	PURPOSE	SAMPLE/ SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Sinvani, L. D., Beizer, J., Akerman, M., Pekmezaris, R., Nouryan, C., Lutsky, L., . . . Wolf-Klein, G. (2013). Medication reconciliation in continuum of care transitions: a moving target. *Journal of the American Medical Directors Association, 14*(9), 668-672. doi:10.1016/j.jamda.-2013.02.021	To study and evaluate medication discrepancies and errors during clinical transitions across a large health care system.	Subacute patient (pt) medication records reviewed through 3 transition care points at a large health care system, including hospital admission to discharge (DC; time I), hospital discharge to skilled nursing facility (SNF; time II) and SNF admission to discharge home or long term care (LTC; time III). Average age was 71.4 years and 68% were female. Median hospital stay was 5.5 days and 14.5 SNF days. Total medications at hospital admission, hospital discharge, SNF admission, and SNF discharge were 284, 472, 555, and 392, respectively.	Randomized chart review of electronic medical records and paper chart medication reconciliations across 3 transitions of care. Medication discrepancies identified and categorized by principal investigator and pharmacist. Discrepancies defined as unexplained documented change in pts' medication lists between sites and unintentional discrepancies defined as omission, duplication, or failure to change back to original regimen when indicated.	Medication discrepancies=357 (time I), 315 (time II), and 330 (time III). All pts experienced discrepancies, 86% had at least 1 unintentional discrepancy. The average number of medications per pt increased at time I from 6.5 to 10.7 ($P < .001$), increased at time II from 10.7 to 12.6 ($P < .0174$), and decreased at time III from 12.6 to 8.9 ($P < .001$). Pts, on average, had 8.1, 7.2, and 7.6 medication discrepancies at times I, II, and III, respectively.	This study demonstrated the widespread prevalence of medication discrepancies at all 3 transition of care points. Outcomes of the current reconciliation process need to be reexamined to ensure safe delivery of care to the complex geriatric pt during transition of care throughout health care systems.

CITATION	PURPOSE	SAMPLE/ SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Ward, K. T., Bates-Jensen, B., Eslami, M. S., Whiteman, E. Dattoma, L., Friedman, J. L., … Moore, A. A. (2008). Addressing delays in medication administration for patients transferred from the hospital to the nursing home: A pilot quality improvement project. *The American Journal of Geriatric Pharmacotherapy, 6*(4), 205-211. doi: 10.1016/j.amjopharm.-2008.10.001	To develop, implement, and evaluate the impact of a pilot intervention to improve patient (pt) safety by reducing delays in administration and omission of medications (meds) among patients discharged (dc'd) from the hospital to a nursing home (NH).	Patients aged ≥65 years discharged from 2 university-affiliated hospitals to a single proprietary NH. 10 patients from each of the hospitals were dc'd to the NH were included.	A dc protocol was developed by hospital MD residents, hospital dc planners, and NH staff. The protocol was to ensure med orders were transmitted to NH pharmacy before pts' arrival. This was compared with standard protocol. Outcomes were time between arrival to NH and administration of meds; # of omitted meds; # of pts experiencing med omissions; and # of pts with omitted meds that had potential for negative consequences.	None of the med orders were transmitted to the NH pharmacy before pts' arrival at NH.17 pts with meds ordered to be administered in the evening had ≥1 dose omitted after arrival at the NH. The mean (SD) delay from arrival at the NH to administration was 12.5 (7.45) hours. Mean # of doses of different meds omitted per pt was 3.4 (2.60). 67 doses of meds were omitted; 53 involved 1 dose of a med. 33% of omitted involved meds with highest potential for negative consequence.	The intervention was not successfully implemented. Orders were not transmitted to the NH pharmacy before pt arrival to the NH. Frequent turnover of key health care professionals at the NH served as a major barrier to successful implementation of the intervention. There is a need for further research into the reasons for and possible solutions to delays in med administration during transitions to the NH, as well as the impact of delays on pt outcomes, including adverse drug events, emergency department visits, and rehospitalizations.

REFERENCES

Anderson, R. & Ferguson, R. (2020). A nurse practitioner led medication reconciliation process to reduce hospital readmissions from a skilled nursing facility. *Journal of the American Association of Nurse Practitioners*, 32(2), 160-167.doi: 10.1097/JXX.0000000000000264

Clark, B. W., Baron, K., Tynan-McKiernan, K., Britton, M., Minges, K. E., & Chaudhry, S. I. (2017). Perspectives of clinicians at skilled nursing facilities on 30-day hospital readmissions: A qualitative study. *Journal of Hospital Medicine* 12(8), 632-638. doi: 10.12788/jhm.2785

Desai, R., Williams, C. E., Greene, S. B., Pierson, S., & Hansen, R. A. (2011). Medication errors during patient transitions into nursing homes: Characteristics and association with patient harm. *The American Journal of Geriatric Pharmacotherapy*, 9(6), 413-422. doi:10.1016/j.amjopharm.2011.10.005

Dizon, M. L., Zaltsmann, R. & Reinking, C. (2017). Partnerships in transitions: acute care to skilled nursing facility. Professional Case Management, 22(4), 163-173.doi: 10.1097/NCM.0000000000000199

Donabedian, A. (1988). The quality of care: How can it be assessed? *The Journal of the American Medical Association*, 260(12), 1743-1748. doi: 10.1001/jama.1988.03410120089033

Gadbois, E. A., Tyler, D. A., Shield, R., McHugh, J., Winblad, U., Teno, J. M., & Mor, V. (2019). Lost in transition: A qualitative study of patients discharged from hospital to skilled nursing facility. *Journal of General Internal Medi*cine, 34(1), 102-109. doi: 10.1007/s11606-018-4695-0

Kerstenetzky, L., Birschbach, M. J., Beach, K. F., Hager, D. R., & Kennelty, K. A. (2018). Improving medication information transfer between hospitals, skilled-nursing facilities, and long-term-care pharmacies for hospital discharge transitions of care: A targeted needs assessment using the Intervention Mapping framework. *Research in Social and*

Administrative Pharmacy, 14(2), 138-145. doi:10.1016/j.sapharm.2016.12.013

King, B. J., Gilmore-Bykovski, A. L., Roiland, R. A., Polnaszek, B. E., Bowers, B. J., & Kind, A.J. (2013). The consequences of poor communication during transitions from hospital to skilled nursing facility: A qualitative study . *Journal of the American Geriatric Society, 61*(7), 1095-1102. doi: 101111/JGS.12328

Neuman, M. D., Wirtalla, C., & Werner, R. M. (2014). Skilled nursing facility quality and hospital readmissions. *The Journal of the American Medical Association*, 312(15), 1542-1551. doi: 10.1001/jama.2014.13513

Ward, K. T., Bates-Jensen, B., Eslami, M. S., Whiteman, E. Dattoma, L., Friedman, J. L., … Moore, A. A. (2008). Addressing delays in medication administration for patients transferred from the hospital to the nursing home: A pilot quality improvement project. *The American Journal of Geriatric Pharmacotherapy*, 6(4), 205-211. doi: 10.1016/j.amjopharm.2008.10.001