

Brittany J. Creek, Diane Marks, Garret Newkirk, Terry Audley, Thomas Gvora, Sue Tillman, Heather Suarez Del Real and Lisa Bentzler

Department of Pharmacy, Froedtert & the Medical College of Wisconsin Community Memorial Hospital, Menomonee Falls 53051, Wisconsin, USA

Abstract: In 2012-2013, CMH (Community Memorial Hospital) had a 10.5% 30-day readmission rate from SNFs (skilled nursing facilities). The focus of the Connections of Care Coalition was to review the medication reconciliation process and to involve pharmacists in the transition of patients to SNFs. The objective of the project was to work as an interdisciplinary team to improve the communication during transitions of care from our hospital to local SNFs by identifying key issues and initiating pharmacy practice change. This quality improvement project had a pre-post study design. Patients older than 18 years of age discharged to SNFs and/or readmitted from SNFs within 30 days were included. Baseline data was collected, specific pharmacist interventions were identified, educated on and implemented, and post-implementation data was collected. The number of interventions made and documented by pharmacists for patients being discharged from CMH to local SNFs did not significantly change during this quality improvement study. Clinically significant interventions were made on high risk medications, such as warfarin. Finally, a newly redesigned SNF workflow was implemented to include pharmacy, nursing, social work/case management to improve patient care and safety for discharges to SNFs.

Key words: Transitions of care, skilled nursing facility, pharmacist, discharge.

1. Introduction

Transitions of care have been an evolving practice area in health care for several years. Pharmacists have been identified as key players in transitions of care due to their vast medication knowledge and ability to identify and intervene on mediation discrepancies [1]. Previous research has been done regarding medication error rates for patients admitted to SNFs (skilled nursing facilities). It has been shown in the literature that 71.4% of skilled nursing facility admissions contain at least one medication discrepancy [2]. Surgical patients have been shown to have more medication discrepancies than medical patients [3]. The most common medications involved in these discrepancies include cardiovascular agents, opioid analgesics, antipsychotics, hypoglycemics, antibiotics and anticoagulants, many of which are considered high risk medications [2, 3].

In addition. pharmacist involvement with medication reconciliation at care transitions between hospitals and long-term care facilities has been researched. In one study published in 2010, five articles were reviewed and it was concluded that medication errors do occur during transitions to long-term care facilities, however no one pharmacist intervention clearly improved the accuracy of patient medication lists [4]. Another review published in 2012 identified seven studies which looked at pharmacist involvement at various care transition points, however concluded that there was no evidence of the effectively pharmacists' interventions reducing medication discrepancies [5]. Finally, in 2013, Farley

Corresponding author: Brittany J. Creek, Pharm.D., research field: pharmacy.

et al. [6] researched two different levels of pharmacist involvement at discharge compared to a control group in order to improve communication between the hospital and primary care physicians in the community. The enhanced intervention group was found to have a statistically significant lower number of medication discrepancies 30 days after discharge, which suggested that pharmacist involvement helped to improve the accuracy of the patients' electronic medical record, which can be accessed throughout the hospital system [6].

Readmission rates are another measure that pharmacists may be able to impact through involvement with transitions of care. A recently published article in the American Journal of Health-System Pharmacy describes the effects of a hospital-wide pharmacy practice model change on readmission rates at an academic medical center [7]. Among other changes, the pharmacy practice model was initiated to focus on medication reconciliation at transitions of care. The patients were classified into two groups based on risk of readmission (high or non-high). A statistically significant difference in 30-day readmission rates was found in the high risk group. Interestingly, this study excluded patients discharged to skilled nursing facilities, although other literature states that these patients are at high risk for medication-related discrepancies and readmissions.

In 2012-2013, CMH (Community Memorial Hospital) had a 10.5% 30-day readmission rate from skilled nursing facilities. This is above the overall hospital 30-day readmission rate of 9.3% [8]. Decreasing readmission rates was identified as a strategic goal of the organization for the 2014-2015 fiscal year. The Connections of Care Coalition is a voluntary multidisciplinary team developed between Community Memorial Hospital and other community health care facilities that is united to collaboratively support the specific health care needs of the community. One area of focus of the Connections of Care Coalition was to review the medication

reconciliation process and to involve pharmacists in the transition of patients to skilled nursing facilities.

The purpose of this study was to work as a multidisciplinary team to improve both the discharge medication process and communication during transitions of care from Community Memorial Hospital to local skilled nursing facilities. This included collecting and comparing data on pharmacist interventions and readmission rates as part of a pharmacy residency project.

2. Methods

2.1 Study Oversight

This was a single center, pre/post intervention quality improvement study. The study protocol was deemed Institutional Review Board exempt and was approved by the Froedtert & the Medical College of Wisconsin Pharmacy Research Committee. The authors received no funding or sponsorship to conduct the study. The primary author, BC, collected and analyzed all data. Study oversight was provided by co-authors: DM, GN, TA, TG, ST, HSDR and LB. None of the authors have any conflict of interest to report.

2.2 Outcomes

The primary outcome of this study was the total number of discharge medication interventions made upon discharge to SNFs during the pre and post-intervention phases. Secondary outcomes included a decrease in 30-day readmission rates from SNFs due to medication related issues, an overall decrease in 30-day readmission rates from SNFs, the type of medication related discrepancies corrected during pharmacist discharge medication reconciliation, the number and type of medication related discrepancies caught at facility admission, and a comparison of pre/post survey results assessing facility satisfaction of discharge medication orders from CMH.

2.3 Patients

Patients were eligible for study inclusion if they were over the age of 18 years and discharged from CMH to a local skilled nursing facility or readmitted from a local skilled nursing facility within thirty days. Patients were excluded if they were less than 18 years of age and discharged from CMH to home or hospice and readmitted from home or hospice.

2.4 Data Collection

All data was collected using the electronic medical record. The study was broken into three distinct phases (pre-intervention, intervention and post-intervention), with data being collected during two and half months during the pre and post phases (Fig. 1). Data collected was summarized in a Microsoft Excel[©] spreadsheet.

2.5 Statistics

The sample size of this project was determined from previous hospital discharge data. In August and September 2014, an average of 25 patients per week are discharged from CMH to local skilled nursing facilities [9]. With the pre/post study periods being two and a half months long, this equaled a total of 250 patients per study period. In addition, around 10.5% of these discharges may be readmitted within thirty days, which equaled about twenty-five patients within each two and a half month phase. Statistical data analysis of the data collected was performed using MiniTab[©]. The chi-squared calculation was used for nominal variables and the *t*-test calculation was used for continuous variables.

3. Results

3.1 Pre-intervention Phase: From September 15, 2014 to January 15, 2015

The Connections of Care Coalition project team was formed, which originally consisted of pharmacists, a primary care physician, nursing leaders from two local skilled nursing facilities, and a member of the hospital quality department. The initial meeting was the General held using Electric Work-Out methodology (Appendix 1) in order to brainstorm which medication issues were being seen in the SNF discharge population and how pharmacy could become more integrated into the process. The full problem list that was developed by the project team can be found in Appendix 2. A graphic was developed that depicted the current SNF discharge workflow (Fig. 2). This showed members of the healthcare team working independently, with little communication between the various parties involved, especially between pharmacy and social work/case management. The group then identified several issues with the current workflow. These issues included requirements for discharge medication orders sent to SNFs, errors with high risk medications, electronic medical record utilization issues, and communication issues. These key issues were compiled into the Voice of the Customer graph (Table 1). In order to narrow the scope of the project, the project team chose to begin to work on errors with high risk mediations. This would be done by increasing pharmacy involvement in the SNF discharge process and by improving communication between healthcare providers by



Fig. 1 Study timeline.



Fig. 2 Current skilled nursing facility discharge workflow.

Tal	ble	1	Vo	ice	of	the	customer.
-----	-----	---	----	-----	----	-----	-----------

Customer	Voice	Key issues	Critical to quality
Skilled Nursing Facility	Significant time spent correcting medication issues at admission	Medication lists are printed before discharge medication reconciliation is complete	Discharge medication reconciliation completed, then one accurate medication list printed
Long-Term Care Pharmacist	Prescriptions missing required information	CMH pharmacists and hospital staff unaware of WI state and federal regulations	CMH pharmacist and hospitalist education and understanding of regulations
Primary Care Physician	Difficult to find final discharge medication list in EMR	Patient's hospitalization and discharge medication list are not communicated	Accurate pharmacy discharge progress note with final discharge medication list in EMR

redesigning the SNF discharge workflow. Plan Do Study Act principles (Appendix 3) were applied during the course of the project in order to ensure quality improvement.

Two nursing leaders of local skilled nursing facilities were shadowed in order to better understand their admission process and workflows. Several SNF policies were discussed, including the fact that antibiotic orders from the hospital have an automatic 7-day stop-date implemented if no stop date is specified and that "as needed" antipsychotic orders are not be given to patients unless there is also a scheduled dose ordered. Shadowing at the skilled nursing facility also provided the opportunity to speak with a long-term care pharmacist about the Wisconsin state regulations and federal laws that dictate nursing home medications. Specifically, one of these regulations requires that dosing parameters are provided for medication orders containing a range of doses, which was not part of the current discharge prescribing process at CMH [10]. Finally, two inpatient social workers/case managers were shadowed in order to observe how they prepare a patient for discharge to a skilled nursing facility. The project team learned that the social workers/case managers include a 3-day MAR (medication administration record), a MAR audit report for the entire hospitalization, and an AVS (after-visit summary) in the SNF discharge packets. It was also discovered that these documents are printed at various times during the day of discharge, often times earlier in the morning even though the patient does not leave the hospital until the mid-afternoon.

In order to gauge the satisfaction of several of the local skilled nursing facilities regarding admissions they receive from CMH, a pre-survey was developed, which was sent via SurveyMonkey[©] to six SNF representatives. The results of this survey are shown in Fig. 3.

From November 3, 2014 to January 15, 2015, data were collected on all patients discharged from CMH. There were a total of 1964 discharges, with 209 patients discharging to skilled nursing facilities in this phase (Table 2). The CMH pharmacists reviewed 187 of the SNF discharge medication reconciliations (89.5%). Ninety-three interventions were made and documented by the pharmacists during this time frame. These interventions were broken down into four key medication classes: narcotics and controlled antipsychotics-0, substances-4, antibiotics-12, anticoagulants-16, other-60. There was a total of nineteen (9.1%) 30-day readmissions for the patients in the pre-intervention phase, with four (1.9%) of these readmissions attributed to a medication-related cause. These medication-related causes included edema while on amlodipine, INR > 10 while on warfarin, gastrointestinal bleeding while on warfarin, and shortness of breath due to furosemide being held.

One local skilled nursing facility also offered to gather data on admission medication orders from CMH that required a call-back to the hospital for clarification. The data can be seen in Table 3. 3.2 Intervention Phase: From January 16, 2015 to February 22, 2015

In an effort to improve the skilled nursing facility discharge process, the project team decided to focus on improved communication between health care team members by redesigning the workflow (Fig. 4). This updated workflow was designed in a streamlined swim lane fashion, which allows different members to work on their assigned tasks at the same time, while also staying in communication with each other. An important change was that the social workers/case managers would not print and send the discharge medication list in the SNF discharge packet until the pharmacist review of the discharge medication reconciliation was completed.

In addition to the updated workflow, it became clear from the project team brainstorming session and the data collected by the skilled nursing facility that there were several classes of medications that were causing issues in this high risk for readmission patient population. These included narcotics and controlled antipsychotics, antibiotics, substances, and anticoagulants. Specific pharmacist interventions for these four key medications were identified (Table 4). Pharmacist and hospitalist education was provided regarding these new interventions during staff meetings and also by sending a Microsoft PowerPoint[©] presentation by email.

3.3 Post-intervention Phase: From February 23, 2015 to May 1, 2015

From February 23, 2015 to May 1, 2015, data were collected on all patients discharged from CMH. There were a total of 1757 discharges, with 250 patients discharging to skilled nursing facilities in this phase (Table 2). The CMH pharmacists reviewed 226 of the SNF discharge medication reconciliations (90.4%). Eighty-five interventions were made and documented by the pharmacists during this time frame. These interventions were again broken down into the four key medication classes: narcotics and controlled









20% (f) Question 6

30%

40%

50%

60%

0%

10%



(h) Question 8

Please list which medications you commonly need to call about regarding discrepancies or for clarification Pre: warfarin, supplements, prn medications, antipsychotics, antibiotics Post: warfarin, antibiotics, supplements, topical medications

(i) Question 9

Please provide other comments to help us improve the discharge process to your facility Pre: multiple medication lists with inconsistent formats are sent Post: document the last dose times on the MAR

(j) Question 10

Fig. 3 Pre/post survey.

substances-10, antipsychotics-0, antibiotics-23, anticoagulants-30, other-22. There was a total of twenty-four (9.6%) 30-day readmissions for these patients, with four (1.6%) of these readmissions attributed to a medication-related cause. These medication-related causes included acute kidney injury while on ibuprofen, gastrointestinal bleeding

while on warfarin, increased lethargy while on several central nervous system medications, and one patient who was given another patient's medications.

The post-survey for the local skilled nursing facilities was sent via SurveyMonkey[©] to the same six SNF representatives. The results of this survey are shown in Fig. 3.

Table 2Data collection results.

Items	Pre-intervention $n = 209$	Post-intervention $n = 250$	<i>p</i> -value
Total number of discharge medication interventions made by RPh	93	85	0.022
Narcotics/controlled Substances	4	10	0.196
Antipsychotics	0	0	-
Antibiotics	13	23	0.237
Anticoagulants	16	30	0.123
Other/not listed	60	22	-
Number of discharge medication interventions per patient			
1	35	32	-
2	15	11	-
3	2	3	-
4	3	4	-
5	2	0	-
Number of SNF discharge medication reconciliations reviewed by RPh	187 (89.5%)	226 (90.4%)	0.742
Total number of 30-Day SNF readmissions	19 (9.1%)	24 (9.6%)	0.852
Number of 30-Day SNF readmissions due to possible medication-related events	4 (1.9%)	4 (1.6%)	0.798

Table 3 Skilled nursingfacility data results.

Admission medication order discrepancy	Number $(n = 6)$
Printed prescriptions not sent	2
Indications for prn medications not present	6
Dose parameter for range doses not present	3
Duration for antibiotic therapy not present	2
Directions for INR follow-up not present	1



Fig. 4 Updated skilled nursing facility discharge workflow.

Medication class	Regulation/policy involved	Pharmacist intervention
Narcotics and controlled substances	Wisconsin Pharmacy Newscapsule March~April 2010 WI Chapter DHS 132.60	Ensure that dosing parameters are included on the printed and signed prescriptions
Antipsychotics	Federal F329 483.25 Local SNF policies	Ensure that the antipsychotic is prescribed appropriately, as well as including a scheduled dose if only an "as needed" dose is ordered
Antibiotics	Federal F329 483.25 Local SNF policies	Ensure that the specific end date for IV or PO antibiotics are listed, as well as instructions for any follow-up pharmacokinetics levels
Anticoagulants	Federal F329 483.25	Ensure that all patients who are to be discharged on an anticoagulant have the proper discharge order, as well as instructions for follow-up INR levels

Table 4 Pharmacist interventions.



Fig. 5 Redesigned skilled nursing facility discharge workflow.

4. Discussion

The primary outcome showed a statistically significant decrease in the number of discharge medication interventions made and documented by the pharmacists upon discharge to SNFs between the pre-intervention phase and the post-intervention phase. The documentation of the interventions by the pharmacists was voluntary, thus interventions may have been made and not documented. In addition, education regarding the Wisconsin State laws and federal regulations for skilled nursing facilities was provided to the hospitalists, who may have been proactive in changing their prescribing practices, which in turn could have led to fewer interventions in the post-intervention phase. Upon review, the interventions that the pharmacists made were clinically significant and had the potential to prevent readmissions, especially for interventions involving antibiotics and anticoagulants.

Regarding the secondary outcomes, there was no change seen for 30-day readmissions due to medication-related events, overall 30-day readmissions, or the specific interventions made on

446

the four key medication classes. The data collected by the skilled nursing facility on admission medication orders from CMH that required clarification helped the project team choose which interventions the pharmacists should focus on.

Some of the post-survey results were surprising to the project team. There were a smaller number of responses for the post-survey, which may have attributed to this. Additionally, it was discovered that two recent discharges to one of the skilled nursing facilities may have caused the post-survey responses to be skewed. Both of these discharges involved warfarin and resulted in readmissions to CMH. Upon review, the project team found that the early printing of the final medication list and the MAR by the social worker/case manager may have contributed to these two readmissions. Of note, one SNF missed the deadline for the post-survey, but was able to provide positive verbal feedback at a project team meeting. This positive feedback included statements that the CMH admissions orders are "much better" and that the SNF nurses have not had to call for clarification as often since the changes were implemented.

The project team decided to meet again to discuss these readmissions and to also include members from social work/case management, nursing and the information technology team in the discussion. Another updated SNF discharge workflow was developed (Fig. 5), which reinforced that social work/case management and nursing need to wait for the pharmacist discharge medication history progress note to be filed in the electronic medical record before printing any of the skilled nursing facility medication lists. It was also decided that the social workers/case managers would no longer print 3-day MARs or MAR audit reports for these patients. The nurses would be responsible for printing a 3-day MAR just prior to discharge so that it included all medications administered on the day of discharge. Education on this new workflow was provided to nursing, pharmacists, and social workers/case managers.

One strength of this quality improvement study included a good working relationship with the Connections of Care project team. The project team brainstormed excellent ideas for problem areas and potential projects, and also was supportive throughout the entire study. Also, the four medication classes identified for pharmacist intervention were similar to those identified in previous studies involving the skilled nursing facility patient population.

Limitations included a small sample size and the fact that the study was conducted at a single center. The project team noticed that there continued to be inconsistencies in the SNF discharge workflow, especially concerning the timing of printing the final medication list and MAR, continued communication gaps within the health care team, and the fact that late afternoon discharges to SNFs were not always reviewed by a pharmacist.

Other initiatives implemented using the results of this project included pharmacy department staffing changes to allow more pharmacists to be available in the late afternoon when patients discharge and increased efforts for pharmacists to perform discharge medication education. This was accomplished by adding pharmacist extenders (pharmacy students, interns, and trained technicians) to assist with admission medication histories and discharge education. Future directions include revisiting the initial problem list developed by the project team to identify future projects, such as working closer with long-term care pharmacists. In addition, there is the potential for the updated SNF discharge workflow and interventions from this project to be adopted at all three hospitals within the hospital system.

5. Conclusions

The number of interventions made and documented by pharmacists for patients being discharged from CMH to local skilled nursing facilities did not significantly change during this quality improvement study. However, clinically significant interventions were made on high risk medications such as warfarin. Finally, a newly-redesigned skilled nursing facility workflow was implemented to include pharmacy, nursing, social work/case management to improve patient care and safety for discharges to skilled nursing facilities.

References

- Conklin, J. R., Togami, J. C., Burnett, A., Dodd, M. A., and Ray, G. M. 2014. "Care Transitions Service: A Pharmacy-Driven Program for Medication Reconciliation through the Continuum of Care." *American Journal of Health-System Pharmacy* 71 (10): 802-10.
- [2] Tjia, J., Bonner, A., Briesacher, B. A., Mcgee, S., Terrill, E., and Miller, K. 2009. "Medication Discrepancies upon Hospital to Skilled Nursing Facility Transitions." *Journal* of General Internal Medicine 24 (5): 630-5.
- [3] Sinvani, L. D., Beizer, J., Akerman, M., Pekmezaris, R., Nouryan, C., Lutsky, L., et al. 2013. "Medication Reconciliation in Continuum of Care Transitions: A Moving Target." *Journal of American Medical Directors Association* 14 (9): 668-72.
- [4] Lamantia, M. A., Scheunemann, L. P., Viera, A. J., Busby-Whitehead, J., and Hanson, L. C. 2010. "Interventions to Improve Transitional Care between Nursing Homes and Hospitals: A Systematic Review." *Journal of American Geriatrics Society* 58 (4): 777-82.
- [5] Chhabra, P. T., Rattinger, G. B., Dutcher, S. K., Hare, M.

E., Parsons, K. L., and Zuckerman, I. H. 2012. "Medication Reconciliation during the Transition to and from Long-Term Care Settings: A Systematic Review." *Research in Social and Administrative Pharmacy* 8 (1): 60-75.

- [6] Farley, T. M., Shelsky, C., Powell, S., Farris, K. B., and Carter, B. L. 2014. "Effect of Clinical Pharmacist Intervention on Medication Discrepancies Following Hospital Discharge." *International Journal of Clinical Pharmacy* 36 (2): 430-7.
- [7] Anderegg, S. V., Wilkinson, S. T., Couldry, R. J., Grauer, D. W., and Howser, E. 2014. "Effects of a Hospitalwide Pharmacy Practice Model Change on Readmission and Return to Emergency Department Rates." *American Journal of Health-System Pharmacy* 71 (17): 1469-79.
- [8] Severe, R., and Tillman, S. 2013. "WB/MF Community Based Readmission Reduction Initiative—Readmission Data Review." Presented at the Connections of Care Coalition Meeting, Menomonee Falls, Wisconsin, USA.
- [9] Community Memorial Hospital. 2014. Acute Patient Discharges Aug/Sept 2014. Report ran October 14, 2014.
- [10] Wisconsin Department of Health Services. 2010.
 Wisconsin Pharmacy Newscapsule March-April 2010.
 Madison: Wisconsin Department of Health Services.
- [11] Wisconsin Department of Health Services. 2015. Chapter DHS 132.60. Nursing Homes Subchapter VI—Services-Resident Care. Madison: Wisconsin Department of Health Services.
- [12] Nursing Home. 2012. Federal Requirements: F329 483.25 Unnecessary Drugs. New York: The Long Term Care Community Coalition.



Appendix A: General electric work-out process.

http://www.citadelgroup.com.au/ourcapabilities/business-strategy

Appendix B: Work-out problem list.

After visit summary/discharge summary discrepancy Discrepancy between prior to admit medications and discharge medications (populated into summary) Medications listed as PO when resident has a PEG tube Medication list does not match discharge instructions given to patient Last minute "medication tinkering" after summary already faxed/printed AVS and discharge summary contain different medication information AVS already faxed to facility for admission approval and changes are made at discharge Too many medication lists (prior to admit, inpatient, discharge, written prescriptions) Patient education No explanation given why a medication was started, stopped, or changed Patients not filling prescriptions Patients unable to follow AVS for taking medications More than one medication list sent with patient Patient unaware that they have new medications Patient unaware of reason for new medications Patient unaware of importance of medications (stop taking before treatment should be completed) No current defined medication education process for patients transferring to facilities Facility policy/procedures Rules/procedures for skilled nursing facilities unknown to pharmacy Rules/procedures for assisted living facilities unknown to pharmacy New medications need to be provided in written format (quantity, refills, diagnosis) Need lead time for new medications to get filled and brought to facility No diagnosis for medications on AVS (CMS requirements) Timing of medication list needed by facility vs optimized medication list not equal Resident arrives without signed discharge summary or medication list (on weekends) Timing of discharges (after 3:30, weekends) Medication reconciliation Inaccurate home medication list (not updated at clinic, ER, discharge) Only a medication list is sent when the patient is readmitted, we need MAR Patients do not always report herbal medications or OTC Patient safety issues present due to medication errors Therapeutic interchange process causes a lot of confusion at admit and discharge Patient's "usual" medications not restarted at discharge Duplicate medications are on the AVS (different doses or combo products) IV antibiotic dose changed on the day of discharge Medications are discontinued that interact with new inpatient medications and then not addressed at discharge Electronic health record issues Confusing to order sliding scale insulin Confusing to order steroid tapers What is visible to/entered by the ordered physician does not always populate into the AVS

Anticoagulation information is ordered on paper but not transferred into EHR

Communication between providers

Patients not discharged on medications recommended by specialists (ID, cardiology)

Info that is sent to the ER is not always transferred to the floor with the patient at admission

Hard to get ahold of the specific person who provided care/discharged patient

PCP does not know everything that happened during admission

PCP does not know reasons for new medications started

Too many phone calls to coordinate post-discharge follow-ups (warfarin, insulin)

Inpatient RPh does not communicate with LTC RPh

No good way to pass admission history issues to the next transition (patient noncompliant)

No opportunity to request feedback on this process until now

Written prescriptions

Patients discharged from hospital with prescriptions (narcotics, antipsychotics)

Prescriptions contain different information than AVS

Missing medication-related information

No duration for PO/IV antibiotics

Other medication stop times/taper instructions are missing

Follow-up labs not communicated (vancomycin levels, INR)

Incomplete sigs/incorrect sigs

No doses associated with medications (ex: aspirin daily)

Appendix C: Plan do study act process.



http://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx

450