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Medication Discrepancies upon Hospital to Skilled Nursing Facility Transitions

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ABSTRACT

Background: Failure to reconcile medications across transitions in care is an important source of harm to patients. Little is known about medication discrepancies upon admission to skilled nursing facilities (SNFs).

Objective: To describe the prevalence of, type of medications involved in, and sources of medication discrepancies upon admission to the SNF setting

Design: Cross-sectional study

Participants: Patients admitted to SNF for subacute care

Measurements: Number of medication discrepancies, defined as unexplained differences among documented medication regimens, including the hospital discharge summary, patient care referral form and SNF admission orders.

Results: Of 2,319 medications reviewed on admission, 495 (21.3%) had a medication discrepancy. At least one medication discrepancy was identified in 142 of 199 (71.4%) SNF admissions. The discharge summary and the patient care referral form did not match in 104 of 199 (52.3%) SNF admissions. Disagreement between the discharge summary and the patient care referral form accounted for 62.0% (n=307) of all medication discrepancies. Cardiovascular agents, opioid analgesics, neuropsychiatric agents, hypoglycemics, antibiotics and anticoagulants accounted for over 50% of all discrepant medications.

Conclusions: Medication discrepancies occurred in almost 3 out of 4 SNF admissions and accounted for 1 in 5 medications prescribed on admission. The discharge summary and the patient care referral forms from the discharging institution are often in disagreement. Our study findings underscore the importance of current efforts to improve the quality of inter-institutional communication.

Keywords: medication discrepancies, skilled nursing facilities, medication reconciliation, discharge summary; transitions of care

INTRODUCTION

Medication discrepancies, defined as unexplained differences among documented regimens across different sites of care, are an important contributor to adverse drug events (ADEs) and are the focus of national quality of care efforts to improve patient safety.¹⁻³ Patients are particularly vulnerable upon transitions from the community to the hospital and upon hospital discharge.⁴⁻⁶

Little is known about the prevalence of medication discrepancies upon admission to skilled nursing facilities (SNF) for subacute care. Best estimates come from studies of patients at the time of hospital discharge, and these studies estimate that up to 40-70% of patients had an actual or potential unintentional discrepancy upon hospital discharge.^{7, 8} A recent study of medication discrepancies among hospitalized patients found that 41% percent of discharges had at least one unintentional medication discrepancy, and 55% were at risk for unintentional discrepancies involving incomplete or omitted prescription drug records.⁹

Medication discrepancies are particularly important upon admission to SNFs since this population is medically complex. Nearly 60% of SNF patients had five or more comorbidities, more than one-third were cognitively impaired, and about one-half had one or more impairments of their activities of daily living.¹⁰ Given the ongoing pressure to shift patients out of the hospital into SNF¹¹ for subacute care, it is important to understand medication discrepancies and opportunities for medication reconciliation upon SNF admission. The specific aims of this study were to: 1) describe the prevalence of medication discrepancies in the SNF setting; 2) describe the sources of those discrepancies; and 3) describe the classes of medications with discrepancies on admission to SNF.

METHODS

Study Design, Setting, and Participants

Participants for this cross-sectional study were drawn from the pre-intervention group in a pre-post intervention trial conducted from March 1 through June 30, 2007 at two community-based SNFs within long-term care facilities in Central Massachusetts. The parent study examined the impact of a nurse-education intervention for reconciling medications. Both facilities had Joint Commission (formerly the Joint Commission on the Accreditation of Healthcare Organizations) accreditation and were located in suburban locations. Facilities differed in ownership (non-profit corporation and for-profit ownership) but had similar bed capacity (164 and 152 beds, respectively). Patient admissions were eligible for inclusion in the study if the admission immediately followed an acute inpatient hospitalization or stay at another skilled nursing facility, and if the length of stay in the SNF was greater than 48 hours. The study was conducted on the subacute unit within each facility. Approval was obtained from the University of Massachusetts Medical School Institutional Review Board.

Measurements.

The main outcome for this study was the number of medication discrepancies per patient admission. Medication discrepancies have been previously defined as unexplained differences among documented regimens.¹ Discrepancies include omissions of a medication in its entirety, omissions of individual elements including dose, administration frequency, or administration route, or differences in individual prescribing elements between different sources. The sources of documented regimens upon SNF admission for this study included the hospital discharge summary, the hospital patient care referral form, and pre-hospital medications either from home or previous SNF admission's medication administration record (MAR). The patient care referral form is an inter-institutional communication document typically completed on the day of

discharge which describes the interdisciplinary care plan, including prescribed discharge medications. The discharge summary is a clinical overview of the events of the hospitalization which also includes prescribed discharge medications. However, either because of anticipated delays in transcription that may delay discharge or because of last minute changes in patient condition which may cancel a planned discharge, the discharge summary may be completed hours to days before the actual discharge.

Medication discrepancies for this study were identified using a structured medication reconciliation tool adapted from the Children's Hospital San Diego Medication Coordination Form.¹² Medication reconciliation is the process of comparing drugs that the patient was taking before the time of admission to a new setting with drugs that the health institution is about to prescribe.² In this process, two trained nurse practitioner abstractors followed a protocol to use all available sources of information from the inter-institutional transfer documents and documented regimens available in the SNF admission record. Both abstractors had extensive experience in the skilled nursing facility setting. Using the study protocol, the abstractors recorded all medications listed on the patient care referral form, the hospital discharge summary, prior MAR (if SNF readmission), and, when available, the home medication list on the medication reconciliation form. This list was then compared to all available documentation (the SNF admission orders, the discharge summary, the patient care referral form, and the previous MAR (when available) or the home medication list) to determine if all elements (i.e. drug name, dose, frequency, route) of the prescribed medication matched from each source. Any differences in the prescribed drug, dose, route, or frequency noted between the sources of documentation were defined as a medication discrepancy; if elements were present but different between sources, this was also considered a discrepancy. This process is illustrated in **Figure 1**. For the

purpose of our analysis, we omitted discrepancies based solely on differences between the home medication list or prior MAR, since these may have been intentional omissions based on the patient's hospital course. For example, it is possible that a hypertension medication was discontinued due to hypotension; this would have been listed in the prior medication list but not on the discharge summary or patient care referral form. The abstractors reviewed 100 sequential admissions at each of the two SNFs.

When a medication discrepancy was identified, the abstractor recorded the medication name and, for each regimen source, whether the entire drug was omitted entirely or was discrepant in the administration route, administration frequency, or dose. In addition, abstractors recorded whether the discrepancy was reconciled within 24, 48, or 72 hours of admission, whether the inpatient hospitalization was managed by a hospitalist or primary care provider, whether the discharging hospital was university-affiliated or community-based, and the day of the week of the admission. Abstractors recorded patient characteristics including age, sex, race, and diagnoses.

Data Analysis

We used descriptive statistics to describe the demographic and health characteristics of the study population and to determine the prevalence of medication discrepancies. Student's t-test and Chi-square tests were used to evaluate unadjusted associations between patient and facility characteristics and medication discrepancies. All analyses were performed in STATA SE version 10.0 (Stata Corporation, College Station, TX).

RESULTS

Patient Characteristics

A total of 199 records from the two SNFs were included in the study; 1 case was dropped for incomplete data. The mean patient age was 75.4 years (standard deviation [SD] 12.9) with a range from 33 to 99 years. Of the sample population, 60.9% (n = 120) were female and 95% (n = 189) were white. (Table 1) The mean number of diagnoses each patient had was 8.8 (SD 3.8) with a range from 1-23. For 199 patient admissions at baseline, the total number of medications prescribed on admission ranged from 2 to 24, with a mean of 11.7 (SD of 4.5). Approximately 87% (n = 173) of the patients were managed by hospitalists in the hospital. One-hundred sixty (80.5%) admissions were from university-affiliated hospitals, 34 (17.0%) from community hospitals, and 5 (2.5%) from another SNF. A minority (n = 25 [12.5%]) of the admissions occurred on the weekend.

Medication Discrepancies

Of 2,319 admission medications reviewed, we identified 495 (21.3%) medication discrepancies. At least one medication discrepancy was identified in 142 of 199 (71.4%) SNF admissions. The range of discrepant medications per patient admission ranged from 0 to 12 (0% to 100%) with the mean number per admission of 3.5 (SD 2.6). The discharge summary and the patient care referral form did not match for at least one medication in 104 of 199 (52.3%) SNF admissions. Disagreement between the discharge summary and the patient care referral form accounted for 62.0% (n=307) of all medication discrepancies; SNF medication orders disagreed with discharge medications listed in the discharge summary and patient care referral form in the remaining 188 cases.

Both the dose and the route of administration were frequently omitted or discrepant (n = 210 [42.4%] and n=208 [42.0%], respectively). The drug name (n=145 [29.3%]) and the frequency of administration (n= 151 [30.5%]) were discrepant with similar frequency. Several

medications included more than one type of prescribing omission. In most cases, the medication was continued after medication reconciliation (n= 333 [67.3%]). Less frequently, the medication was discontinued (n=58 [11.7%]) or modified (n = 104 [21.0%]). The majority (86.7%) of medications discrepancies were reconciled within 24 hours.

Cardiovascular agents, opioid analgesics, neuropsychiatric agents, hypoglycemics, antibiotics and anticoagulants accounted for over 50% of all discrepant medications. (Table 2) Gastrointestinal agents accounted for almost 1 in 7 medication discrepancies, of which the majority (n=48) were stool softeners, anti-diarrheals, stool bulking agents or laxatives. “As needed” drugs ordered on a *prn* basis comprised 91 (18.4%) of the discrepant medications, of which the majority (n=57) were for analgesics (e.g. hydrocodone/acetaminophen, oxycodone/acetaminophen). The drug name was omitted or completely illegible in 6 of the 495 noted medication discrepancies.

In unadjusted bivariate analysis, there was no association between having a medication discrepancy and patient gender, patient age, type of discharging facility, or whether the discharging physician was a hospitalist or PCP. We did observe that those with discrepancies had more admitting diagnoses (mean 9.2, SD 4.0) vs (mean 7.7 SD 3.1) with $p = 0.01$; also those with medication discrepancies had more medications on admission (mean 12.6, SD 4.2) compared to those without discrepancies (mean 9.1, SD 4.4), $p < 0.001$.

DISCUSSION

In this study, we identified at least one medication discrepancy in 3 out of 4 admissions to a SNF for subacute care. This represented over one-fifth of all medications prescribed on SNF admission. Disagreement between the discharge summary and patient care referral form

occurred in over 50% of admissions and accounted for over 60% of all medication discrepancies. Our findings have important implications for patient safety and hospital practice.

Upon transfer between institutions, a discharging institution typically lists the discharge medication regimen on two documents: the discharge summary and the patient care referral form. In some cases, a copy of the medication administration record from the discharging facility is also provided. In our study, we found that the medication regimens did not match between the discharge summary and patient care referral form in over 50% of all SNF admissions. This is partially explained by dictation and transcription errors known to occur in discharge summaries.¹³ Although they are meant to be reviewed, corrected, and signed prior to transmission, this often does not occur. However, apart from transcription errors, discharge summaries often contain missing or incorrect medication information, with one review estimating the prevalence of errors ranging from 2-40% (median 21%).¹⁴ Hospital physicians should take care to ensure that the medication information contained in the discharge summary is correct at the time of discharge.

The inpatient clinical workflow may also explain some of discrepancies between the discharge summary and the patient care referral form. While the patient care referral form is typically completed on the day of actual discharge, the discharge summary may be completed in anticipation of a discharge, in some cases up to 24 hours in advance. Further, cancelled or delayed discharges due to deterioration in a patient's condition necessitate that a previously dictated discharge summary be updated prior to the actual discharge. In such cases, hospital physicians should exercise great care to update the discharge medication list as well as the hospital course. Whether intentional or not, any disconnect in the timing of the completion of the discharge summary and the patient care referral form likely contributes to discrepancies

between them. Changing the clinical workflow to coordinate the completion of the patient care referral form with the discharge summary can enhance their consistency.

The prevalence of medication discrepancies observed in our study is comparable to findings of discrepancies in the inpatient setting upon discharge, with other studies reporting a range of 40-70% medication discrepancies in the discharge summary.^{7, 8, 15} One study of 253 hospitalized patients found 99 drug-therapy inconsistencies and omissions requiring pharmacist intervention prior to discharge.¹⁶ Another study reported a mean number of discharge medication discrepancies of 3.3 per patient¹⁷, a finding similar to our estimate of 3.5 discrepancies per patient admission.

The clinical importance of the medication discrepancies identified in our study might be inferred by examining the types of medications involved in the discrepancies. Over 50% of all 495 discrepant medications were for cardiovascular agents, opioid analgesics, neuropsychiatric agents, hypoglycemics, antibiotics and anticoagulants. A minority of discrepant medications involved as needed medications (n=91) or bowel agents (n=48); the majority of discrepancies were for medications meant to be prescribed on a scheduled basis. Although some might consider discrepancies among *prn* or bowel agents as trivial, we caution against dismissing the importance of discrepancies for *prn* or bowel agents to the care of the patient. If we consider a medication as “essential” if their sudden withdrawal or change increases the risk of adverse health events such as hospitalization or emergency department visits^{18,19}, then stool softeners are essential when co-administered with a narcotic analgesic. Indeed, constipation due to opioid analgesics is an important adverse event affecting many patients after hospital discharge.²⁰

Although we did not directly measure harm attributable to medication discrepancies in our study, there is overlap between the types of medication discrepancies found in our study and

medications linked to adverse drug events. Changes and discontinuations of medications such as metoprolol, colchicine, metoclopramide, risperidone, warfarin, insulin and codeine in patients transferred between acute and long-term care facilities contributed to a 4.4% risk of ADEs per drug alteration in one study.²¹ A similar array of drugs (antibiotics, corticosteroids, cardiovascular drugs, analgesics, and anticoagulants) were implicated in one quarter of hospital readmissions for patients with adverse events following hospital discharge in another study.²² Given the risk of ADEs associated with drug alterations and the risk of readmission associated with posthospital ADEs, the medication discrepancies identified in our study posed potential for harm to our study population.

The limitations of our study deserve comment. First, our study is geographically limited to two long-term care-based SNFs in Central Massachusetts with patient populations that were predominantly white. This limits the generalizability of our findings to SNFs based in acute care facilities or to other geographic regions who may serve more racially diverse patient populations. Also, we have limited information about the medications without discrepancies, and therefore cannot determine whether certain medication classes are more or less likely to have a medication discrepancy when actually prescribed. The frequency of classes observed in our study likely reflects the frequency of prescribing of those medications upon admission to SNF in general.

Our findings have several implications. First, SNF nurses are faced with daily task of reconciling discrepant documentation from other hospitals. Although nurses recognize the importance of medication reconciliation, they are often faced with time constraints related to obtaining better information about patient medications. Finding the time to complete the medication reconciliation by calling the discharging hospital to clarify medications can be a challenge, particularly during night shifts and weekends. Because the Joint Commission is

requiring medication reconciliation in SNFs for accreditation in 2009, many skilled nursing facilities are adopting medication reconciliation processes. In this way, nursing staff can lead the processes to improve medication reconciliation with the goal of decreasing unresolved medication discrepancies during transitional care. However, many SNFs do not maintain Joint Commission accreditation and likely lag in their medication reconciliation processes. In these cases, many discrepancies are likely going unnoticed and may be contributing to compromised patient safety.

It is therefore incumbent upon discharging hospitals and their physicians to ensure consistency in their discharge documentation. It would also be helpful for hospital physicians to document reasons for changes to previous medication regimens (e.g. home medications) so that SNF physicians can optimally manage the handoff to the primary care physician at the appropriate time.¹⁴ Hospital physicians should realize that there is often a vulnerable 24-48 hour period following SNF admission when the patient waits to be seen by a SNF admitting physician. Upon admission, medication orders are typically reviewed by the SNF nurse and verified on the telephone by a covering provider unfamiliar with the patient. It may take up to 48 hours before the patient and medical record are evaluated by the SNF physician. During this period, medication errors and adverse events may be more likely to occur despite efforts by the SNF admitting team to clarify medications with the community primary care physician or the hospital team.

Our study underscores the importance of current efforts to improve communication between providers upon transition of care^{23,24} and the need to improve transitions from hospitals to SNF. Even in systems with electronic messaging between hospital caregivers and physicians assuming post-discharge patient care, poor inter-institutional communication was the factor most

commonly associated with preventable adverse events.¹⁹ As such, the Medicare Payment Advisory Commission has identified the need to improve inter-institutional provider communication, including improving inadequate discharge summary information, as an important strategy to reduce readmissions.²⁵ Since SNF policies are driven by state and federal regulations, we argue that state policies to improve the consistency and completeness of inter-institutional communication forms may have a greater effect on reducing potential medication discrepancies during inter-institutional transfers than Joint Commission medication reconciliation efforts alone. Further, we recommend that efforts such as the Society of Hospital Medicine’s development of a “Discharge Checklist for Hospitalists” targeting transition of care from the hospital to the community be replicated for inter-institutional transfers.²³ In this way, health care providers across the spectrum of care can improve the quality of inter-institutional documentation to prevent medication discrepancies at transfers of care.

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TABLES

Table 1. Patient Characteristics

<i>Characteristic</i>	<i>N</i>	<i>%</i>
Sex		
Male	79	39.1
Female	120	60.9
Age		
<55 years	14	7.0
55-64 years	33	16.6
65-74 years	39	19.6
75-84 years	61	30.7
≥ 85 years	52	26.1
Race		
White	189	95.0
Black	5	2.5
Hispanic	2	1.0
Asian	3	1.5
Comorbid Conditions		
Stroke	11	5.5
Hypertension	135	67.8
Dementia	26	13.1
Diabetes Mellitus	58	29.2
Heart Failure	31	15.6

Chronic Obstructive Pulmonary Disease	26	13.1
Coronary Artery Disease	53	26.6
Peripheral Vascular disease	16	8.0
Renal Failure	28	14.1
Anemia	36	18.1
Infection	23	11.6
Atrial Fibrillation	37	18.6
Wound	4	2.0
Fracture	3	1.5

Table 2. Classes of Medications with Discrepancies on SNF Admission*

<i>Drug Class</i>	<i>n</i>	<i>% of 495 medication discrepancies</i>
Gastrointestinal agents ¹	77	15.6
Cardiovascular agents ²	63	12.7
Opioid analgeics	61	12.3
Neuropsychiatric agents ³	39	7.9
Hypoglycemic agents	38	7.7
Anticoagulants ⁵	34	6.9
Antibiotic/antiinfective agents ⁴	33	6.7
Vitamins, minerals and nutritional supplements ⁶	31	6.3
Asthma/allergy agents	30	6.1
Nonopioid analgesics ⁷	21	4.2
Hematologic agents	16	3.2
Osteoporosis agents ⁸	16	3.2
Topical agents ⁹	11	2.2
Endocrine agents ¹⁰	7	1.4
Unknown ¹¹	6	1.2
Rheumatologic agents ¹²	5	1.0
Genitourinary agents ¹³	4	0.8
Complementary and alternative agents	2	0.4
Immunosuppressants ¹⁴	1	0.2

¹ Antiemetics, stool softeners, anti-diarrheals, stool bulking agents, H2 blockers, proton pump inhibitors, laxatives, gastric coating agents, sulfasalazine

² ACE inhibitors, diuretics (loop, thiazide, potassium sparing), beta-blockers, nitrates digoxin, calcium channel blockers, lipid-lowering agents

³ Antidepressants, antiseizure agents, cholinesterase inhibitors, atypical antipsychotics, sedative/hypnotics

⁴ Quinolones, azole antifungals, trimethoprim-sulfamethoxazole, cephalosporins, erythromycin, imipenem/cilastin, metronidazole, vancomycin, macrolides, lactobacillus, abacavir

⁵ Warfarin and antiplatelet agents

⁶ Potassium supplements, fish oil, total parenteral nutrition

⁷ Acetaminophen, propoxyphene, capsaicin cream, lidocaine patch, NSAIDs, tramadol, quinine

⁸ Epoetin, iron supplements, vitamin B12

⁹ Dermatologic and ophthalmic agents

¹⁰ Steroids, hormone replacement, calcitriol

¹¹ Drug name illegible or omitted

¹² Allopurinol and colchicine

¹³ Anticholinergics (oxybutinin, solifenacin), alpha blockers

¹⁴ Azathioprine

Figure 1. Medication Reconciliation Process for a New SNF Admission

