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Original Article

Implementation of a Standardized Discharge Time-out Process to Reduce Prescribing Errors at Discharge

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Abstract

Background: To reduce prescribing errors occurring on discharge from the hospital, a standardized discharge time-out process was implemented on a general medicine service at Wake Forest Baptist Medical Center. In the time-out process, the multidisciplinary care team reviewed the patient's medical records together to determine the optimal discharge medication regimen. This regimen was recorded on a time-out form and then was used to develop the patient's discharge documents.

Objective: To evaluate the impact of a standardized discharge time-out process on prescribing errors that occur as patients are discharged from a general medicine service.

Method: The medical records of all patients discharged from a general medicine service during 60-day periods before (''pre-group'') and after (''post-group'') implementation of a standardized discharge time-out process were retrospectively reviewed by an internal medicine physician to determine the presence of discharge prescribing errors.

Results: There were 142 and 124 evaluable patients in the pre- and post-groups, respectively. Compliance with the time-out process was 93% in the post-group. At least 1 prescribing error was detected in 49 (34.5%) of the discharges in the pre-group and 17 (13%) of the discharges in the post-group ($P < .0001$). All of the errors noted in the post-group occurred in discharges in which a clinical pharmacist was not involved.

Conclusion: A multidisciplinary, standardized discharge time-out process was associated with a dramatic reduction in prescribing errors when patients were discharged from a general medicine service. The time-out process is one strategy to improve patient safety at hospital discharge.

Key Words—*discharge*, *medication safety*, *prescribing errors*, *time-out*

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Numerous investigations have shown that prescribing errors can lead to severe, negative consequences for patients.[1-3] Discharge from the hospital is a time that is particularly susceptible to error. Patients' medication regimens are often changed multiple times during their hospital stay and then modified again as they are transferred to the outpatient setting. From the patients' perspective, the discharge process can appear to be disorganized and hurried. Patients can feel overwhelmed by the ''education'' they receive on multiple topics, which can lead to an incomplete understanding of their discharge medications.[4,5] Reconciliation of medications upon hospital discharge, which is included in the Joint Commission's National Patient Safety Goals,[6] can be an effective process to identify and correct discharge medication errors.[7] Previous investigators have identified risk factors for prescribing errors made at discharge, including an intern physician as the discharge provider and the use of medications with multiple oral formulations.[8] The use of a standardized ''time-out'' process has been demonstrated to reduce errors in certain areas of the hospital such as the operating room.[9,10] After analyzing reports of prescribing errors that occurred as patients were discharged from our facility, we developed a standardized discharge time-

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out process for patients who were discharged from our general medicine service. The main goal of this program was to reduce the number of medication errors at the time of discharge. This article describes our discharge time-out process and its effect on discharge prescribing errors.

BACKGROUND

Wake Forest Baptist Medical Center is an 885-bed academic medical center with clinical pharmacist involvement on approximately 80% of patient care teams. To understand this project, it is helpful to be aware of the computer systems that supported patient care within our organization at the time of this study. Our institution had a different electronic medical record (EMR) system for inpatient and outpatient care. Upon admission to the hospital, the patient's home medication list was entered into the outpatient EMR system and electronically copied into the patient's history and physical in the inpatient EMR. The patient's current drug therapy during hospitalization was available in the inpatient EMR system. Upon hospital discharge, the list of discharge medications was entered by the physician into the outpatient EMR, and a printed list was given to the patient. Prescriptions were generated from the outpatient EMR.

METHODS

There are 2 phases to this study. The first phase was designed to better understand the frequency and nature of discharge prescribing errors occurring on the general medicine services at our institution. Therefore, an evaluation was conducted in December 2010 to analyze the quantity and quality of discharge prescribing errors from one general medicine service. The care team for this service consisted of an attending physician, an upper-level resident, 2 interns, a clinical pharmacist, a case manager, and medical students. The service had an average daily census of 17 to 20 patients; a clinical pharmacist was present 4 to 5 days per week, Monday through Friday. All discharges from the selected service that occurred during a 60-day period (October – November 2010) were reviewed by an attending-level internal medicine physician (S.J.H.). Patients with incomplete data records were excluded from the evaluation. Data were obtained using a systematic computerized search of the EMRs. The admission history and physical, the home medication list, progress notes, hospital medication orders, discharge summaries, and discharge medication lists were reviewed to determine discharge prescribing errors. The physician reviewer consulted with the attending physician of record to ensure that noted discrepancies were not intentional. Identified errors were classified into one of the following categories: medication omission, additional medication, dosage error, and other. A potential severity score was assigned using a scoring system published by Abdel-Qader et al (see **Table 1**).[8]

Pharmacists and physicians from the general medicine service met to analyze the data from phase 1 and develop an intervention strategy to reduce discharge prescribing errors. They concluded that the biggest potential source of error involved the process of developing an accurate discharge medication list. In constructing this list, prescribers had to be aware of the patient's home medication list, the changes in therapy that occurred during hospitalization, and a variety of factors related to the transition to the outpatient environment (eg, availability of various dosage forms, patient's ability to afford medications, simplification of dosage regimens to enhance compliance). To address these concerns, the team decided to apply a safety practice to the process of hospital discharge that had been successful in other areas of the institution, the "time-out."

A discharge time-out form was created to capture key elements related to a patient's discharge, including the construction of an accurate discharge medication list (see **Figure 1**). Starting in mid-December 2010, a time-out process using this form was piloted on the selected general medicine service. The medical team was instructed to have either the attending physician or upper-level resident complete the time-out form with the entire team present. This discussion was conducted during rounds once the decision was made to discharge the patient. The time-out discussion was required to be verbal and to follow the form line by line, without exceptions. To develop the discharge medication list, the clinical pharmacist reviewed the patient's home medication list and compared it to the list of medications the patient was currently receiving in the hospital. The physicians and pharmacist came to agreement about what medications should be on the discharge list as well as the length of treatment for antibiotics and when follow-up visits should be scheduled. The case manager and pharmacist addressed problems related to financial/social issues and drug availability. The time-out form was then used by the intern to enter the discharge medication list into the outpatient EMR to become part of the official discharge record. The clinical pharmacist performed a final review of the list in the EMR prior to the patient being discharged from the hospital. The discharging physician was contacted to correct any discrepancies that were noted. A copy of the list was

Table 1. Classification of error severity[8]

Potentially lethal
High potential for life-threatening adverse effects/reactions
Potentially lifesaving drug at a dosage too low for the disease being treated
High dosage (>10 times normal) of a drug with low therapeutic index
Serious
Route of administration could lead to severe toxicity
Low dosage of drug for serious disease in patient with acute distress
High dosage (4-10 times normal) of drug with low therapeutic index
Dosage resulted in serum drug concentration in potentially toxic range
Drug could exacerbate the patient's condition (related to warnings or contraindications)
Misspelling or mix-up in medication order could lead to dispensing of wrong drug
Documented allergy to drug
High dosage (>10 times normal) of drug without low therapeutic index
Significant
High dosage (1.5-4 times normal) of drug with low therapeutic index
Drug dosage too low for patient's condition
High dosage (1.5-10 times normal) of drug without low therapeutic index
Errant dual-drug therapy for a single condition
Inappropriate dosage interval
Omission from medication order
Minor
Incomplete information in medication order
Unavailable or inappropriate dosage form
Non-formulary drug
Noncompliance with standard formulations and hospital policies

given to the patient along with discharge instructions about the medications.

Phase 2 of our study was to document the impact of this time-out process on the number of prescribing errors occurring at discharge. An evaluation was conducted that compared discharges from the previously mentioned 60-day period in October and November 2011 (referred to as the *pre-group*) to discharges occurring from the same medical team in a subsequent 60-day period during January to March 2011 (referred to as the *post-group*). All discharges in the post-group were reviewed by the same attending physician in a manner similar to the pre-group to document the number of prescribing errors. Chi-square was used for statistical analysis.

RESULTS

There were 142 and 124 evaluable patients in the pre- and post-groups, respectively. As displayed in **Table 2**, there was at least 1 prescribing error detected in 49 (34.5%) of the discharges in the pre-group and 17 (13.7%) of the discharges in the post-group ($P < .0001$). Of those patients in the pre-group who had a discharge prescribing error, there was a mean of 3.2 ($\pm$1.2 SD) errors per discharge. A summary of the type and severity of pre-group prescribing errors is provided in **Table 3**. The most common errors involved medication omission and dosage errors. The majority of errors were classified as "significant."

In the post-group, the attending physician failed to call a time-out for 7% of discharges. Therefore, there was a 93% compliance rate with the discharge time-out procedures. A pharmacist was not involved in 30% of discharges due to staffing issues (primarily on weekends). All of the errors noted in the post-group occurred in discharges where a clinical pharmacist was not involved. The average time-out discussion took 2 minutes and 37 seconds ($\pm$1 minute and 18 seconds SD).

DISCUSSION

This program demonstrates the innovative integration of the time-out safety tool into the patient

Patient:_____

MRN: _____

Code: Full DNR/DNI

1. DVT prophylaxis or treatment dose anticoagulation continued at DC?_____
   LOVENOX HEPARIN SQ ARIXTRA
   Warfarin dose _____
   DOT: _____
   INR F/U on _____

2. Contraindication to antiplatelets:
   Y N
   ASA required on DC?_____
   Dose: 81mg 325mg

3. CHF? Systolic Diastolic
   No
   Fluid restrict to _____
   Weigh daily and if >2 pounds, then:
   _____

4. PICC in place? Y N

   DC PICC on _____

5. Foley present on DC? Y N
   _____

6. Diet/activity: _____
   _____

7. Tube feeds: Y N

   Directions: _____
   _____

8. Home health:_____
   _____

9. Wound care: _____
   _____

10. Antibiotics
    Name Dx End date
    _____
    _____

11. F/U appointments: PCP _____
    _____
    _____

    Major NEW lab abnormalities to be followed by PCP?

    Na K Bicarb

    Glucose BUN/Cr LFTs

12. Test recommended as out-patient:

    TTE CT Scan _____ Colo

    EGD U/S _____ TFTs

Discharge medications:
_____
_____
_____
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Figure 1. General medicine discharge time-out form.

Table 2. Discharge prescribing errors

Patients	Pre-group	Post-group	*P*
Total	158	134	
Evaluable	142 (89.9%)	124 (92.5%)	
Discharge prescribing error	49 (34.5%)	17 (13.7%)	<.0001

discharge process. Time-out has been associated with improved outcomes among patients undergoing surgery. It inserts a "formal pause" and the use of a checklist into operating room procedures to systematically address various safety concerns.[9] Proposed reasons for the success of this method include the promotion of interdisciplinary communication and improvement in teamwork and attitudes toward quality and safety.[10]

Our time-out procedure allowed all of the clinicians associated with the patients' care to systematically evaluate pertinent data to develop accurate discharge medication lists. It provided a designated period of time for team members to ask questions, express opinions, and decide together on appropriate medication therapy. Because the time-out process involved a case manager and a pharmacist, many issues often not considered by physicians (eg, cost of medications, ease of administration, resources required for administration and/or follow-up) could be addressed. This innovative program was associated with a significant reduction in discharge prescribing errors.

Our rate of a discharge prescribing error occurring in 34.5% of pre-group patients is fairly similar to the rates reported by other investigators. Wong and colleagues identified at least 1 definite unintentional medication discrepancy in 41.3% of patients discharged from their facility.[11] Approximately 30% of these discrepancies had the potential to cause possible or probable patient discomfort and/or clinical deterioration. Similarly, Vira et al reported at least 1 unintended variance in 41% of patient discharges.[7] Abdel-Qader and colleagues detected a discharge prescribing error in 20.4% of their patients; 76.3% of errors were classified as significant.[8]

This study supports our basic practice philosophy of assigning clinical pharmacists to various patient care teams. Pharmacists have been shown to be effective at identifying and correcting discharge prescribing errors.[7,8] For pharmacists to efficiently contribute to the discharge time-out process, they have to be very familiar with the patients. They have to be aware not only of the changes in the patients' therapy that occurred during hospitalization, but also the reason for those changes. They also have to be subject matter experts on the standard treatment of the diseases in their area of practice and be able to communicate effectively to other team members.

After the results of our study were presented to medical staff and hospital leadership, the program was expanded to the 3 other general medicine services, with the ultimate goal to implement the discharge time-out process throughout the hospital.

CONCLUSION

Discharging a patient from the hospital can be an event fraught with error. Our own data suggest that 1 in 3 patients may be discharged with an inaccurate medication list. To provide our patients with a safer discharge experience, our institution implemented a discharge time-out process that relied heavily on the input of the clinical pharmacist to ensure that an accurate medication list was developed. This process was associated with a dramatic decrease in the number of prescribing errors from 34.5% to 13.7% of discharges. Applying this systematic, multidisciplinary tool to the discharge process can have a significant impact on the safety and quality of care provided to patients.

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Table 3. Classification of discharge medication errors in pre-group (n = 157)

Type of error	%
Medication omission	40
Dosage error	35
Additional medication	15
Other	10
Severity of error	
Serious	3
Significant	68
Minor	29

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