

Post-Hospitalization Transitions: Examining the Effects of Timing of Primary Care Provider Follow-Up

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BACKGROUND: The transition between the inpatient and outpatient setting is a high-risk period for patients. The presence and role of the primary care provider (PCP) is critical during this transition. This study evaluated characteristics and outcomes of discharged patients lacking timely PCP follow-up, defined as within 4 weeks of discharge.

METHODS: This prospective cohort enrolled 65 patients admitted to University of Colorado Hospital, an urban 425-bed tertiary care center. We collected patient demographics, diagnosis, payer source and PCP information. Post-discharge phone calls determined PCP follow-up and readmission status. Thirty-day readmission rate and hospital length of stay (LOS) were compared in patients with and without timely PCP follow-up.

RESULTS: The rate of timely PCP follow-up was 49%. For a patient's same medical condition, the 30-day readmission rate was 12%. Patients lacking timely PCP follow-up were 10 times more likely to be readmitted (odds ratio [OR] = 9.9, $P = 0.04$): 21% in patients lacking timely PCP follow-up vs. 3% in patients with timely PCP follow-up, $P = 0.03$. Lack of insurance was associated with lower rates of timely PCP follow-up: 29% vs. 56% ($P = 0.06$), but did not independently increase readmission rate or LOS (OR = 1.0, $P = 0.96$). Index hospital LOS was longer in patients lacking timely PCP follow-up: 4.4 days vs. 6.3 days, $P = 0.11$.

CONCLUSIONS: Many patients discharged from this large urban academic hospital lacked timely outpatient PCP follow-up resulting in higher rates of readmission and a non-significant trend toward longer hospital LOS. Effective transitioning of care for vulnerable patients may require timely PCP follow-up. *Journal of Hospital Medicine* 2010;5:392–397.

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Care transitions between the inpatient and outpatient settings are a known period of risk in a patient's care. For instance, 1 in 5 medical patients suffers an adverse event during the first several weeks after hospital discharge, with half of these requiring the use of additional healthcare resources.¹ Additionally, medication and lab monitoring errors occur in up to half of all discharged patients.² Nearly 1 in 5 hospitalized patients, admitted with 1 of 16 different conditions including asthma, diabetes, congestive heart failure and urinary tract infection is readmitted to the hospital within six months. Up to 60% of resources are used in rehospitalized patients.^{3,4} In Medicare beneficiaries, the readmission rate is as high as 20% at 30 days. The same study suggests that up to half of Medicare patients readmitted within 30 days are not seen in the outpatient setting following discharge.⁵ Such statistics underscore the need for seamless post-discharge care.

Studies of post-discharge primary care provider (PCP) follow-up highlight the gaps in current practice within the transition from the hospital to PCP follow-up. For instance, while more than 1 in 4 discharged patients (27.6%) at one

large teaching hospital had outpatient work-ups recommended by their hospital physicians, more than a third (35.9%) of these recommendations were ultimately not completed. Furthermore, at this same center, an increased time interval between hospital discharge and PCP follow-up decreased the likelihood that a work-up recommended by a hospital physician was completed.⁶ In patients who do have a PCP, post-hospitalization follow-up is frequently impacted by a variety of factors, including co-payment requirements, transportation issues, lack of health insurance, as well as scheduling a follow-up appointment while in the hospital.^{7–10} Uninsured patients are at particular risk for failures in transitions, have poorer health outcomes and higher mortality than insured counterparts, and are nearly 3 times more likely to make an ED visit following hospital discharge.^{11–13}

In order to better understand the role of post-discharge PCP follow-up, we sought to identify: (1) the percentage of general medical inpatients lacking timely PCP follow-up after discharge from the hospital, and (2) the impact of patients lacking timely PCP follow-up on 30-day readmission rate and hospital length of stay (LOS). For the purposes

of this study, we have defined timely PCP follow up as occurring within 4 weeks of hospital discharge.

Methods

Study Setting and Population

This prospective cohort enrolled a convenience sample of patients admitted to Internal Medicine ward teams at the University of Colorado Hospital Anschutz Inpatient Pavilion between December 2007 and March 2008. Up to 2 patients were enrolled on weekdays on the morning following admission (ie, Sunday night through Thursday night admissions). Patients were screened for study entry if they were able to participate in an interview as identified by their medical team and available in their room. Of a total of 121 patients screened for study entry by a professional research assistant (PRA), 75 ultimately provided HIPAA authorization, informed consent, and completed the in-hospital interview. The most common reasons for screened patients refusing study enrollment included being “not interested” (26) and “too ill” (10). Ten subjects were lost to follow-up after hospital discharge, including one subject who was deceased. Therefore, 65 patients successfully completed the follow-up phone interview and were included in the analyses. Characteristics of the 121 screened patients and the 75 study patients were similar with respect to sex, age, race, and payer mix, and representative of the demographics of the patient population at large. Case mix indices (mean) were similar among the 121 screened (1.23), 75 enrolled (1.27), and final 65 study patients (1.25).

Exclusion Criteria

Patients admitted to the medical observation unit; patients admitted at night who are ultimately reassigned to specialty services (Oncology, Cardiology, Hepatology and Acute Care for the Elderly) were excluded. Human immunodeficiency virus (HIV) patients were excluded because of routine outpatient ID follow-up; patients <18 years of age; patients lacking a telephone; patients admitted on Friday and Saturday nights; and outside hospital transfers.

Measures

The primary study outcome was the rate of timely PCP follow-up defined as that occurring within 4 weeks of hospital discharge. PCP was defined in this study as either a patient's known PCP (or another provider in the same clinic), or a nurse practitioner/physician assistant. Patients seen in follow-up by a specialist related to the discharge diagnosis, eg, an Endocrinologist in a patient hospitalized for Diabetic complications; a Rheumatologist following up an SLE patient, etc., were also counted as having PCP follow-up as defined in this study.

Additional outcomes included three measures of hospital readmission: hospital readmission for same condition; hospital readmission or other care sought (ie, ED, Urgent Care) for same condition; and hospital readmission for any condi-

tion, and index hospital LOS. The distinction between same condition and any condition was made in an attempt to delineate a potentially preventable readmission (as an example, one study patient was subsequently readmitted with a gunshot injury that clearly would not have been affected by the presence of any PCP follow-up). Determination of same vs. any condition was made by the investigators through information obtained from patients on follow-up phone interviews: “Have you been readmitted to the University Hospital or another hospital since your discharge last month from the University Hospital? If yes: where, when, and why?” The investigators determined same vs. any through comparing this information to the primary diagnosis from the index hospitalization obtained from the final discharge documentation. A condition was considered same if the readmission was for the same condition or for treatment/complications related to the index hospitalized condition.

Descriptive data collected included patient demographics, diagnoses, insurance status, presence of an identified, established PCP, time to PCP follow-up in weeks, effects of payer source, admitting service (hospitalist vs. General Internal Medicine (GIM) attending), and nature of presenting illness (acute vs. acute on chronic condition). Categories of insurance obtained from chart review included commercial, self-pay (uninsured), Medicare, Medicaid and Veterans.

Data Collection

A PRA screened and obtained informed consent and a Health Insurance Portability and Accountability Act (HIPAA) waiver from patients the day following admission. At that time, the PRA obtained the patients' vital information from chart review and a scripted patient interview: age, sex, PCP, categories of insurance, contact phone numbers, and admitting date and diagnoses. The in-house interview included eight questions examining a patient's experiences of and attitudes toward PCPs. Four weeks after discharge, patients were contacted by the PRA via telephone. Scripted telephone interviews were used to determine occurrence and timing of PCP follow-up and hospital readmission status (to any hospital) per patient self-report. Potential barriers to PCP follow-up were assessed. Up to 3 attempts were made to contact study subjects out to 4 weeks from the initial call (8 weeks total). If an appointment for an enrolled patient had been made, but had not yet occurred, an additional phone call was made 2 weeks later to determine whether, and when, the appointment was kept. Review of discharge summaries determined a patient's hospital LOS.

Data Analysis

Descriptive statistics were calculated for the study population. Univariate comparisons were completed for patient characteristics and study outcomes for patients with and without PCP follow-up. We used *t*-tests for continuous variables (age and LOS) and chi-square or Fisher's exact tests

TABLE 1. Patient Characteristics Stratified by Timely PCP Follow-Up

Study Demographics	Timely PCP Follow-Up (n = 32)	No PCP Follow-Up (n = 33)	P Value
Female, n (%)	17 (53.1)	17 (51.5)	0.90
Age, years, mean (SD)	62.4	48.4	<0.001
Race, n (%)			
Caucasian	24 (75.0)	23 (69.7)	0.23
African American	7 (21.9)	5 (15.2)	
Hispanic/Latino	1 (3.1)	5 (15.2)	
Highest grade completed, n (%)			
Grammar school	2 (6.3)	3 (9.1)	0.15
High school	16 (50.0)	21 (63.6)	
College	13 (40.6)	9 (27.3)	
Postgraduate	1 (3.1)	0 (0)	
Insurance*, n (%)			
Medicare	15 (46.9)	11 (33.3)	0.13
Medicaid	1 (3.1)	3 (9.1)	
Commercial/private	6 (18.8)	6 (18.2)	
VA/Tri-Care	5 (15.6)	1 (3.0)	
Self-pay/uninsured	5 (15.6)	12 (36.4)	0.06
Case mix index, median	1.15	1.11	—

Abbreviations: PCP, Primary Care Physician; SD, standard deviation; VA, Veterans Administration.

*Primary insurance of patient.

when necessary for dichotomous variables (gender, uninsured vs. insured, and all hospital readmission outcomes). Comparisons according to PCP follow-up for the categorical variables were tested with the Cochran-Mantel-Haenszel statistic for general association (race and insurance category) or for trends in the ordinal variable (education).

Patient characteristics and study outcomes with univariate P value < 0.1 were assessed for inclusion in the multivariate logistic regression models. Separate logistic regression models were examined with PCP follow-up (yes/no) as the explanatory variable and the 3 hospital readmission rates as the outcomes. Final logistic regression models included the primary predictor, PCP follow-up, along with potential predictor variables with P value < 0.05. Statistical analyses were carried out using SAS version 9.2 (SAS Institute, Cary, NC).

This protocol was approved by the Colorado Multiple Institutional Review Board (COMIRB) prior to the implemented study.

Results

Sixty-five patients completed this study. The mean age of the study population was 55.3 years and approximately half (52.3%) of the study participants were female. Fifty-two subjects reported having an established PCP on admission to the hospital (80%). The rate of timely PCP follow-up overall was 49.2%. Table 1 shows the study population characteristics stratified by presence of timely PCP follow-up. Patients lacking timely PCP follow-up were much younger (48.4 vs.

62.4 years; $P < 0.001$) than those with timely PCP follow-up; there were also non-significant trends toward patients lacking timely PCP follow-up being non-white: (33.3% vs. 25%, $P = 0.23$) and having lower education level (72.7% with high school or lower education vs. 56.2% for those with PCP follow-up, $P = 0.15$) than those with timely PCP follow-up. Of the 32 patients having timely PCP follow-up, 15.6% were uninsured. In comparison, among the 33 patients lacking timely PCP follow-up after hospital discharge, over a third (36%) were uninsured ($P = 0.06$). Among the uninsured, a large majority (70.5%) lacked timely PCP follow-up ($P = 0.06$). In contrast, only 11 of the 26 Medicare patients (42.3%) lacked timely PCP follow-up ($P = 0.13$).

Readmissions

The 30-day readmission rates for all study subjects were 12.3% for a patient's same medical condition, 17.2% for readmission or other care sought for the same condition, and 21.5% for any condition. Table 2 contains univariate comparisons for the patient outcomes of readmission and LOS stratified by timely PCP follow-up. Hospital readmission for the same medical condition was significantly higher in patients lacking timely PCP follow-up compared to those with timely PCP follow-up (21.2% vs. 3.1%, $P = 0.05$). The composite outcome of hospital readmission and/or other care sought (emergency department or urgent care) for a patient's same condition was also significantly higher in patients lacking timely PCP follow-up (28.1% vs. 6.3%; $P = 0.02$). However, hospital readmission for any condition did not differ with absence of timely PCP follow-up.

Multiple logistic regression revealed that patients lacking timely PCP follow-up were 10 times more likely to be readmitted for the same condition within 30 days of hospital discharge (odds ratio [OR] = 9.9; $P = 0.04$) and nearly seven times as likely to be readmitted for the same condition or receive other care (OR = 6.8, $P = 0.02$) (Table 3).

LOS

Overall hospital LOS in all patients was 5.4 ± 4.6 days. In patients lacking timely PCP follow-up, there was a trend toward longer hospital LOS: 6.3 days vs. 4.4 days, $P = 0.11$. For all uninsured study patients (17), the mean LOS was 6.4 days vs. 5.0 days for all other insurance categories, $P = 0.31$.

Insurance Status

Being uninsured was associated with a patient lacking timely PCP follow-up ($P = 0.06$), but was not directly associated with higher readmission or longer hospital LOS (OR = 1.0, $P = 0.96$). The lack of insurance was not a significant predictor of hospital readmission in the multiple logistic regression models.

Timing of PCP Follow-Up

In evaluating timing of any PCP follow-up after hospital discharge and clinical outcomes, most PCP follow-up (90.6%)

TABLE 2. Outcomes Stratified by Timely PCP Follow-Up (n = 65)

Outcome	Timely PCP Follow-Up (n = 32)	No PCP Follow-Up (n = 33)	P Value
Length of stay (days), mean (SD)	4.4 (3.7)	6.3 (5.2)	0.11
Hospital readmission for same condition within 30-days of discharge, n (%)	1 (3.1)	7 (21.2)	0.05
Hospital readmission or other care sought (ie, ED, urgent care) for same condition within 30-days of discharge, n (%)	2 (6.3)	9 (28.1)*	0.02
Hospital readmission for any condition within 30-days of discharge, n (%)	5 (15.6)	9 (27.3)	0.25

Abbreviations: ED, emergency department; PCP, primary care physician; SD, standard deviation.
*n = 32.

TABLE 3. Results of Logistic Regression Models for Association of Untimely PCP Follow-Up With Hospital Readmission Outcomes

Outcome	Odds Ratio (CI)	P Value
Hospital readmission for same condition	9.9 (1.2-84.7)	0.04
Hospital readmission or other care for same condition	6.8 (1.4-34.3)	0.02
Hospital readmission for any condition	2.3 (0.7-7.9)	0.17

NOTE: Adjusted for uninsured status.
Abbreviation: CI, confidence interval.

occurred within the first 2 weeks following hospital discharge. However, we found no statistical difference between timing of post-discharge PCP follow-up and hospital readmission outcomes (hospital readmission for same reason, $P = 0.51$; hospital readmission or other care sought for same reason, $P = 0.89$), or in hospital LOS ($P = 0.87$). Timing of PCP follow-up—when comparing post-hospitalization follow-up <1 week, 1 to 2 weeks, and 2 to 4 weeks—was not predictive of readmission rates or LOS.

Established PCP

When significance of having an established PCP prior to hospital admission was evaluated, 52 patients reported having an established PCP on hospital admission (80%), half of whom were Medicare patients. Of the 13 patients with no PCP on admission, the majority (10) were self-pay (77%, $P < 0.0001$). Interestingly, only 29 (55.8%) of the patients who reported a PCP on admission to the hospital saw their PCP within 4 weeks of hospital discharge. Of 13 patients without a PCP on admission, only 3 obtained 4-week PCP follow-up. When we examined our study outcomes for subjects stratified by the presence of an established PCP prior to hospitalization, we found univariate association with timely post-discharge PCP follow-up (56% of those with established PCP vs. 23% of those without, $P = 0.04$), but no difference in readmission rates or hospital LOS.

Severity of patient illness—measured using hospital data and the case mix index (CMI)—of the 3 patient populations

(screened, enrolled, final) was quite similar. The CMI (mean) for the 121 screened patients was 1.23. The CMI for the 75 enrolled patients was 1.27. And the CMI in the 65 final study patients was 1.25. When evaluating illness severity (CMI) of patients in relation to hospital LOS between the 2 final study populations, the CMI (median) was also similar: 1.15 for the 32 patients with timely PCP follow-up vs. 1.11 for the 33 patients without timely PCP follow-up.

We found no association when looking at the rate of timely PCP follow-up based on admitting service attending, or acute vs. acute on chronic diagnosis.

Barriers to PCP follow-up most frequently cited by study patients were: lacking a PCP (no established PCP prior to hospital, no insurance, out of town, recently changed insurance), could not get an appointment, discharged to a halfway house, and saw another doctor (specialist unrelated to discharge diagnosis).

Discussion

A growing body of work highlights the role of multiple, varied interventions at, or following discharge, in improving outcomes during the transition from inpatient to outpatient care. Examples include care coordination by advanced nurse practitioners, follow-up pharmacist phone calls, and involvement of a transition coach encouraging active patient involvement—all are known to improve patient outcomes following a hospitalization.¹⁴⁻¹⁸ The active involvement of a PCP is central to a number of these proven interventions to ensure effective completion of ongoing patient care. And while some previous studies suggest increased overall resource utilization when PCP follow-up occurs after hospitalization,¹⁹ the level of fragmented care that occurs in today's hospitalized patient, as well as the fact many patients lack PCP care at all, raises questions about clinical outcomes after hospitalization related to timely PCP follow-up. The issue of appropriateness of resources utilized has also not been adequately explored.

Within this context, this study examines the role that PCP follow-up might play in such interventions and its effects on patient outcomes. Notably, in this urban academic medical center, we found that timely PCP follow-up

after hospital discharge occurred in fewer than half of general medical inpatients. Lack of timely PCP follow-up was associated with increased hospital readmission for the same condition and a trend toward a longer index hospital LOS.

While this small study cannot fully elucidate the impact of lack of timely PCP follow-up on post-discharge care, our findings suggest some mechanisms by which lack of timely PCP follow-up might result in poor outcomes. For instance, patients lacking a PCP visit after discharge may not obtain needed follow-up care in the post-discharge period, leading to clinical deterioration and hospital readmission. Uninsured patients may be at particular risk for failed transition because they are less likely to have consistent PCP access, whether as an already established patient or one newly assigned.^{20,21} Perhaps a larger study would better demonstrate statistical significance in reflecting the association between uninsured patients, lack of a PCP, and post-discharge follow-up deficiencies. There may, in fact, be issues related to patient attitudes and beliefs, such as subjectively feeling better or even an implicit distrust of the healthcare system among the uninsured, that exist as well. Even among patients with a PCP prior to hospitalization, PCP follow-up after hospital discharge may be lacking due to modifiable factors such as patient attitudes and beliefs and logistical barriers in arranging follow-up.

Patients without potential for timely PCP follow-up might be kept in the hospital longer to ensure they are well enough medically to sufficiently meet their own follow-up needs. Hospital LOS might be increased by providers to compensate for the lack of PCP follow-up. Alternatively, these patients may be sicker with their index hospitalization.

It is not surprising that payer source appears to influence a patients' ability to obtain timely PCP follow-up. It is well documented that uninsured patients have higher healthcare resource utilization.²²⁻²⁴ Lack of access to primary care in such patients contributes to a cycle of using the most expensive sites of care. In our study, we found many of the patients lacking timely PCP follow-up were younger, perhaps reflecting the same patient population who have higher rates of being uninsured. Conversely, older patients are more likely to have PCP access, in large part due to having Medicare benefits (although this dynamic has shown a shift in recent years). The uninsured may present sicker as a result of lacking pre-hospital PCP access or transportation to a PCP visit.

Limitations

This study was performed at a single, academic institution limiting its' generalizability. In addition, this small cohort study, which took place over four winter months, may have implicit biases toward certain disease entities and follow-up issues unique to study size and season. The small study size was dictated by a finite amount of available resources, potentially contributing to minor inconsistencies with some of the results. While statistical significance was still seen

with many of our results, a much larger study may better enhance the study outcomes.

It also remains unclear why the effects of PCP follow-up were evident for a patient's same condition, but not for any condition. The distinction between designations is potentially subjective and may be difficult to accurately determine. Most existing readmission studies in the literature assign readmission for any condition. A future, larger study may be able to examine whether this difference exists between same vs. any condition.

As an academic medical center, access to specialty clinics may be facilitated, thus increasing PCP follow-up in patients who might otherwise not have it available to them. Additionally, our subjects were limited to a convenience sample of the population of the general medicine wards and may not be representative of all medical inpatients. Patients lacking a telephone were missed. We relied on patient recollection and self-report of PCP follow-up visits and re-hospitalizations. While we acknowledge limitations of patient self-report, both in communication and comprehension, we believe patients are reasonably able to report on whether or not they were readmitted to the hospital, the cause of their readmission and whether/when they had PCP follow-up. Patient self-report could be collected systematically and without long time lags. Finally, the research team did not have reliable access to readmission data for hospitals other than the facility in which the study was conducted.

It is possible patients readmitted early after discharge may have been counted as lacking PCP follow-up simply because the readmission occurred so soon after discharge precluding the opportunity for PCP follow-up to occur. The effects of patients having non-PCP (home health nurse, pharmacist, phone advice) follow-up after hospital discharge were not examined.

Also, LOS and readmission to a hospital may be more a reflection of disease severity than the absence of PCP follow-up, ie, patients ultimately readmitted after hospital discharge may have been a sicker subset of patients upon index hospitalization.

In this urban academic medical center, discharged medicine patients commonly lack timely PCP follow-up. The lack of timely PCP follow-up after hospital discharge was associated with higher rates of readmission and a non-significant trend toward longer hospital lengths of stay. Hospital discharge represents a period of significant risk in patient care necessitating the effective continuation of treatment plans including follow-up of laboratory, radiology or other testing, and management by a variety of providers. PCPs may play a crucial role in care coordination during this period. Structured intervention performed at the time of discharge might increase post-hospital PCP access and facilitate timely PCP follow-up to ensure continuity of needed care after hospital discharge in the most vulnerable patients. Such interventions might include systems improvements, such as increasing PCP access in the post-hospital period, to increase the

likelihood that complex needs are met at a vulnerable period in patient care.

A more effective handoff between inpatient and outpatient settings may ultimately improve clinical outcomes, diminish resource utilization, and decrease overall healthcare costs.

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