

ORIGINAL RESEARCH

Effect of a Hospitalist-Run Postdischarge Clinic on Outcomes

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BACKGROUND: New post-discharge strategies to reduce adverse events are needed.

OBJECTIVE: To determine whether follow-up in a hospitalist-run post-discharge clinic (PDC) decreases post-discharge adverse events when compared to follow-up in a primary care clinic (PCP) or urgent care clinic (UC).

DESIGN: Retrospective cohort study using propensity scoring in multivariate analysis.

PATIENTS: Consecutive Veterans discharged home after a nonscheduled admission seen in PDC, UC, or PCP within 30 days of discharge.

INTERVENTIONS: Recently discharged patients are seen by housestaff who cared for them during the index admission and staffed with a rotating hospitalist in PDC; UC and PCP patients are seen by housestaff or attending ambulatory physicians.

MAIN MEASURES: The primary outcome was a composite of hospital readmissions, Emergency Department visits, and mortality 30 days after discharge.

KEY RESULTS: 5085 patients met criteria; 538 followed up in PDC (10.6%), 1848 with their PCP (36.3%), and 2699 in UC (53.1%). Patients following up in PDC were older and had a higher comorbidity burden. ICU exposure was similar between groups. Patients seen in PDC had shorter length of stay (LOS) (PDC, 3.8 days, UC, 5.0 days, PCP, 6.2 days; $p = 0.04$) and time to first post-discharge visit (PDC, 5.0 days, UC, 9.4 days, PCP, 13.7 days; $p < 0.01$). There were no differences between groups in the primary outcome in unadjusted or propensity-adjusted multivariate analysis.

CONCLUSIONS: Patients seen in a hospitalist-run PDC had similar 30-day post-discharge adverse outcome rates despite a 2.4-day shorter LOS compared to patients seen by their PCP. Prospective testing of PDCs is warranted. *Journal of Hospital Medicine* 2014;9:7–12. © 2013 Society of Hospital Medicine

Currently, healthcare systems rarely provide ideal transitions of care for discharged patients,¹ resulting in fragmented care,^{2–5} significant patient uncertainty about how to manage at home,^{6,7} and frequent adverse events.^{8,9} These factors are so commonly experienced by discharged patients that they are recognizable as a postdischarge “syndrome.”¹⁰

One element important for reducing the post-discharge risk of adverse events is provision of adequate follow-up.^{11,12} However, supplying this care is challenging in the modern era, and it will become progressively more difficult to achieve. In 2004, 50% of readmitted Medicare fee-for-service patients had no postdischarge visit within 30 days of their discharge,⁹ likely due in part to difficulty arranging such care. Changes in insurance coverage and demographics are expected to result in more than 100 million newly insured patients by 2019, yet the primary-care work-

force is projected to begin shrinking by 2016.^{13,14} In the increasingly uncommon situation that a primary-care clinician is available promptly after discharge, information transfer is often inadequate^{4,15–17} and can be exacerbated by the growing discontinuity between inpatient and outpatient care.^{2–4} Efforts to increase the supply of primary-care clinicians and thereby improve early access to postdischarge care are important for the future, but hospitals, particularly those penalized for high risk-adjusted readmission rates, are seeking novel solutions now.

One increasingly common innovation is to extend the role of inpatient providers (usually hospitalists) into the postdischarge period.¹⁸ Preliminary evidence suggests improved continuity¹⁹ and access²⁰ achieved by providing this care may decrease postdischarge adverse events,^{19–21} though evidence is conflicting.²²

As a closed, multilevel healthcare system, the Denver VA Medical Center is uniquely positioned to evaluate the influence of alternative postdischarge-care strategies on subsequent adverse events. Discharged patients are seen in a well-established hospitalist-run postdischarge clinic (PDC), a robust urgent-care system (UC), or by a large primary-care provider (PCP) practice. The purpose of this study was to evaluate whether patients seen in a hospitalist-run PDC have reduced adverse outcomes in the 30 days following

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hospital discharge compared with follow-up with the patient's PCP or in an UC clinic.

METHODS

Patients

This was a retrospective cohort study of consecutive adult patients discharged from the general medical services of the Denver VA Medical Center after a non-elective admission between January 2005 and August 2012. This time range was chosen because all 3 clinics were fully operational during this period. The Denver VA Medical Center is an academically-affiliated 128-bed hospital that provides a full range of tertiary services. All medical patients, including intensive care unit (ICU) patients, are cared for on general medical teams by University of Colorado housestaff with hospitalists or subspecialty attendings. Patients who lived in the Denver metropolitan area, were discharged home, and who followed up with a PCP, UC clinic, or PDC within 30 days of discharge were included. Patients discharged to subacute facilities, hospice, or this tends to be capitalized as a special program at our VA were excluded. For patients with multiple admissions, only the first was included.

Clinics

Primary Care

Primary-care clinics in the VA system are organized into Patient-Aligned Care Teams (PACTs) and are available for appointments 5 days per week. Patients discharged from the medical service who have PCPs are called within 48 hours of discharge by PACT nurses to evaluate their postdischarge state. Primary-care physicians could be resident housestaff or ambulatory attending physicians. Seventy-two percent of patients seen at the Denver VA have an assigned PCP.

Urgent Care

The Office-based Medical Team provides UC and short-term regular appointments for recently discharged medical patients or patients who require frequent follow-up (such as those that require serial paracenteses). It is a separate clinic from an emergency department (ED)-based walk-in clinic. It is also available 5 days per week; patients are seen by resident housestaff unfamiliar with the patient, and the clinic is staffed with an ambulatory attending physician. Patients are commonly seen multiple times in the same clinic, though usually with different providers.

Postdischarge Clinic

The hospitalist-run PDC is scheduled 2 afternoons per week. Patients are always seen by housestaff and medical students from the team that cared for them as an inpatient, then staffed with a rotating hospitalist attending who may have been the supervising inpatient attending during the patient's inpatient stay. Thus, continuity is preserved with the housestaff team

in all cases, although attending continuity is variable. This is added to the daily responsibility of the resident and hospitalist physicians who are providing care on the inpatient service at the time of the clinic. Capabilities of the clinic are similar to UC and PCP clinics. Patients are usually seen once postdischarge with referral to the PCP for further follow-up; however, patients can be seen multiple times by the same provider team.

If a patient followed up with multiple clinics, the first clinic visited determined the group to which that patient was allocated for the purpose of analysis. If a patient was scheduled for clinic follow-up but did not attend within 30 days of discharge, he or she was excluded. We did not collect data on visits outside of these 3 clinics, as pilot data demonstrated they accounted for nearly all (>90%) of posthospitalization follow-up visits. During the study period, there were no guidelines for discharging physicians about which clinic to have the patient follow up in. The UC and PDC were known to have better early access to follow-up appointments and thus tended to see patients requiring early follow-up in the judgment of the discharging clinician.

Statistical Analysis

The VA's Computing and Informatics Infrastructure (VINCI) was used to collect pre-discharge patient data for descriptive and analytic purposes. Pertinent potential confounders included patient age, sex, marital status, comorbidities, number of prescribed medications on discharge, previous hospital admissions in the last year, ICU admission (as a dichotomous variable), ICU length of stay (LOS), and hospital LOS. Postdischarge variables included time to first follow-up appointment and hospital LOS if readmitted.

The primary outcome was a composite of ED visits, hospital readmissions, and mortality in the 30 days following hospital discharge. These outcomes were captured in the VA system; we did not measure outside utilization. A power analysis indicated that the sample has >90% power to detect small differences (4%) in the composite outcome between types of outpatient care. We also evaluated the effect of different types of follow-up on the 3 individual components of the primary outcome. To compare baseline categorical variables across 3 groups, χ^2 trend tests were used; analysis of variance (ANOVA) or Kruskal-Wallis test was used for continuous variables in univariate analysis.

We then used propensity scoring to adjust for baseline differences between groups in an attempt to adjust for referral bias, using multivariate logistic regression to calculate a propensity score for each patient in 2-way comparisons, and a single score for every patient in a multinomial comparison.²³ Our final propensity score incorporated age, number of hospital admissions in the past year, and Elixhauser

comorbidity score,²⁴ with excellent overlap in propensity scores between groups. Although hospital LOS was different between groups, inclusion in the propensity score did not reduce this significant difference, and its inclusion in the propensity model decreased model fit. Limitations of the accessible data prevented high-dimensional propensity scoring and limited the outcome of the propensity score to attendance at the clinic assigned, rather than referral to the clinic assigned. The propensity score, hospital LOS, time to the first outpatient visit, and group assignment (PDC, PCP, UC) were entered into a multivariate logistic regression model.

To find a subgroup who may benefit most from follow-up in the PDC, we a priori identified patients with one of the 5 discharge diagnosis-related groups (DRGs) most commonly associated with subsequent readmission⁹ and examined outcomes between the 3 different kinds of follow-up, restricted to patients discharged with one of these diagnoses. All analyses were conducted using SAS 9.3 (SAS Institute, Inc., Cary, NC).

RESULTS

9952 patients who met criteria were discharged during this time period; however, 48.9% did not follow up with one of these clinics within 30 days, leaving 5085 patients in our analysis. Of these, 538 followed up in PDC (10.6%), 1848 followed up with their PCP (36.3%), and 2699 followed up in UC (53.1%). Table 1 presents pre-discharge characteristics of these patients. Patients seen in PDC were older and had a more significant comorbidity burden.

Patients seen in PDC had a mean 2.4-day shorter LOS than those seen by their PCPs (PDC: 3.8 days, UC: 5.0 days, PCP: 6.2 days; $P = 0.04$ for comparison). Neither the percentage of patients admitted to the ICU during their index hospitalization nor the ICU LOS was different between groups. Patients were seen earlier postdischarge in PDC than in other types of follow-up (PDC: 5.0 days, UC: 9.4 days, PCP: 13.7 days; $P < 0.01$ for comparison). In univariate analysis, there was no difference between groups in the composite 30-day outcome (Table 2). Analysis of the individual components of the primary outcome revealed significant differences in readmission rates, with PDC having the highest rate.

Univariate analyses conducted on pre-discharge characteristics after multinomial propensity scoring revealed significant differences between groups no longer existed for the variables that were included in the propensity score (age, Elixhauser score, and inpatient stays prior to visit; Table 1).

In multivariate analysis comparing PDC to PCP follow-up, there was no difference in the composite outcome after controlling for propensity score and time to outpatient visit (odds ratio [OR]: 1.07, 95% confidence interval [CI]: 0.81-1.40). Similar results were obtained in comparing PDC with UC (OR: 1.05,

TABLE 1. Baseline Characteristics of Patients

| | PDC, N = 538 | UC, N = 2699 | PCP, N = 1848 | P Value | P Value After Propensity Adjustment |
|--|-----------------|-----------------|------------------|---------|---|
| Age, years (SD) | 67.8 (12.6) | 67.1 (13.0) | 64.8 (13.0) | <0.01 | 0.86 |
| Male sex, % | 95.0 | 95.4 | 94.4 | 0.33 | |
| Marital status, % | | | | | |
| Divorced | 40.2 | 36.2 | 35.0 | 0.09 | |
| Married | 35.9 | 37.3 | 39.8 | 0.13 | |
| Never married | 12.3 | 13.7 | 14.3 | 0.48 | |
| LOS, days (SD) | 3.8 (3.6) | 5.0 (11.7) | 6.2 (10.8) | 0.04 | |
| Elixhauser score (SD) | 0.80 (1.1) | 0.69 (1.0) | 0.75 (1.0) | 0.02 | 0.06 |
| Admitted to ICU, % | 19.0 | 19.9 | 23.0 | 0.12 | |
| ICU LOS, days (SD) | 2.8 (4.4) | 2.8 (3.4) | 2.3 (1.5) | 0.15 | |
| Discharge medications, mean (SD) | 10.0 (6.7) | 10.4 (7.4) | 10.4 (8.2) | 0.37 | |
| Admissions per patient in prior year, mean (SD) | 0.18 (0.5) | 0.21 (0.6) | 0.23 (0.6) | 0.08 | 0.78 |

NOTE: Characteristics of patients seen within 30 days of discharge in PDC, PCP, and UC are shown. Intensive care unit LOS is for patients who had an ICU admission. After propensity adjustment, significant differences between ages and Elixhauser score became nonsignificant. Abbreviations: ICU, intensive care unit; LOS, length of stay; PCP, primary-care provider; PDC, postdischarge clinic; SD, standard deviation; UC, urgent care.

TABLE 2. Univariate Analysis

| | PDC | UC | PCP | P Value | P Value After Propensity Adjustment |
|---|------------|-----------|------------|---------|---|
| Composite outcome, % | 19.9 | 18.3 | 17.5 | 0.42 | 0.30 |
| Hospital readmission | 13.0 | 11.1 | 9.4 | 0.03 | 0.03 |
| ED visit | 10.2 | 9.9 | 10.5 | 0.78 | 0.93 |
| Mortality | 1.1 | 0.7 | 0.7 | 0.58 | 0.65 |
| LOS if readmitted, days (SD) | 6.9 (18.1) | 4.9 (7.8) | 4.8 (6.5) | 0.28 | 0.23 |
| Time to first visit after discharge, days (SD) | 5.0 (3.0) | 9.4 (6.1) | 13.8 (8.5) | <0.01 | <0.01 |

NOTE: Three-way comparisons are shown between the different types of follow-up before and after propensity adjustment, including individual components of the primary outcome. Abbreviations: ED, emergency department; LOS, length of stay; PCP, primary-care provider; PDC, postdischarge clinic; SD, standard deviation; UC, urgent care.

95% CI: 0.82-1.34) and in multinomial logistic regression comparing PDC with other types of follow-up (PDC vs PCP: OR: 1.01, 95% CI: 0.78-1.31; PDC vs UC: OR: 0.99, 95% CI: 0.78-1.26).

Restricting the multivariate analysis to those patients discharged with one of the 5 discharge DRGs most associated with readmission did not alter our findings regarding the primary outcome. We also found no change in the composite outcome or any subcomponent of the composite outcome when restricting the analysis to 7-day outcomes or when excluding scheduled readmissions (which represented <5% of all readmission).

DISCUSSION

A hospitalist-run postdischarge clinic did not reduce a composite of 30-day postdischarge adverse outcomes in our study when compared with primary-care or urgent-care follow-up. In fact, patients who followed up in PDC had a small increase in 30-day

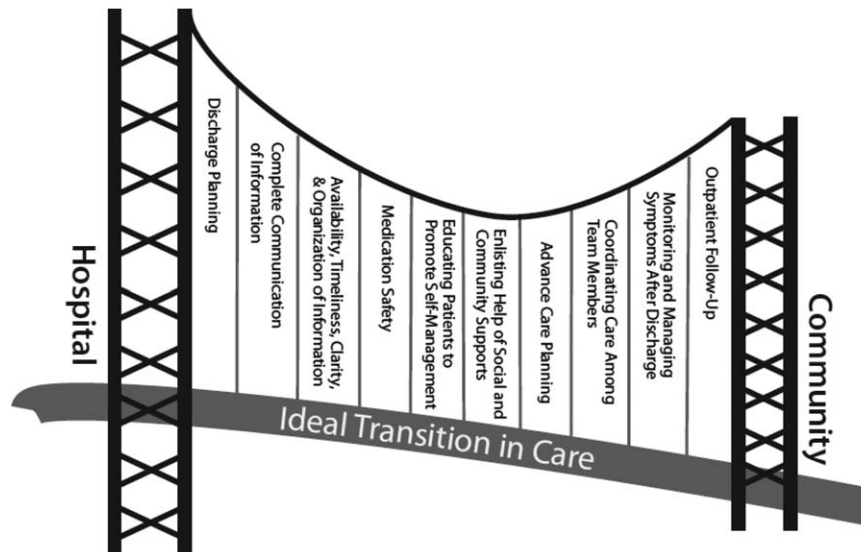


FIG. 1. The Ideal Transition of Care. Key components of an ideal transition in care illustrated as a “bridge” patients must cross during a care transition from hospital to the community. From Burke et al.¹

readmissions. However, they also were sicker at baseline, considered higher risk by the discharging physician, were able to be seen significantly earlier, and had an associated 2.4-day shorter hospital LOS than patients seen by their PCPs.

Our findings do not confirm those of prior research in this area, which indicated outpatient follow-up by the same physician who was the treating inpatient physician was linked to lower mortality rates, hospital readmissions, and ED utilization.^{19–21} In fact, in our study, there was a significant (albeit small) increase in 30-day readmissions in patients seen in PDC. There are significant challenges to the generalizability and validity of these prior studies. In one study, inpatient care was provided by outpatient primary-care doctors in Canada,¹⁹ a payer and care model rare in the United States.²⁵ In a second, “usual” care was not specified, and it is likely the reduction in ED visits resulted from provision of follow-up care of any kind compared with those who did not follow up after discharge.²⁰ In a third, the PDC was part of a larger bundle of postdischarge interventions, and it only reduced ED visits when compared with patients who did not have follow-up; rates of ED visits were similar in a comparison with PCP follow-up.²¹

There are several possible explanations for the lack of improvement in 30-day adverse outcomes with a hospitalist-run PDC. First, although early access to early postdischarge care was improved and evidence suggests this is important in reducing readmissions,^{11,12} in populations similar to that studied, more postdischarge care has also been linked to increased readmissions.²² This may be due to more frequent re-evaluation of fragile, chronically ill patients, presenting more options for readmission. Second, the intervention currently only addresses some components of the Ideal Transition of Care¹ (Figure 1) and may benefit

from an enhanced visit structure using a multidisciplinary approach. Third, the intervention took place in the context of a robust primary-care system with a universal electronic medical record; the effects of improved access and continuity may be magnified in a system without these advantages. Fourth, there was a low readmission rate overall, and it is unclear how many of these readmissions were preventable. Finally, it may be that although the initial postdischarge care was adequate, readmissions occurred after the first visit, suggesting subsequent care during the 30 days postdischarge could have been improved.

The most likely explanation for the substantially decreased LOS associated with follow-up in PDC is that inpatient physicians who knew they could see their own patients early in the postdischarge process were more tolerant of uncertainty surrounding the patients’ clinical course.

For example, a frequent clinical conundrum for hospitalists is when to discharge patients improving on diuretic therapy for a heart failure exacerbation or antibiotics for cellulitis. Provided a PDC, these hospitalists may choose to discharge a patient still actively being treated, because they may feel they have access to early follow-up to change course if needed as well as the ability to see the patient themselves, allowing precise evaluation of the change in their condition. Without this clinic, the hospitalist may wonder when postdischarge follow-up will occur. They may be more hesitant to discharge a patient who has not fully completed treatment for fear he or she will still appear decompensated to the postdischarge provider (though greatly improved from admission), or will not have timely-enough follow-up to change treatment if the condition worsens.

Our finding that the LOS was still shorter when comparing PDC with UC suggests continuity may be

a significant component of this effect. It seems unlikely that patients following up in PDC had less complex hospitalizations given similar ICU exposure and LOS, as well as older age and larger baseline comorbidity burden.

The LOS seen in patients who followed up in PDC was lower than Medicare rates²⁶ but similar to reported rates at other VA acute-care hospitals.²⁷ It is consistent with prior findings that hospitalist care reduces LOS,²⁶ though the magnitude in our study was much larger than that in prior reports. Prior studies have suggested this decreased LOS is linked to increased adverse postdischarge outcomes, such as ED visits and readmissions, as well as increased costs and decreased discharges to home.²⁸ The PDC was not associated with increased postdischarge adverse events measured, though a formal cost analysis and analysis of other postdischarge outcomes, such as placement in a skilled nursing or rehabilitation facility after return home, could be assessed in future work.

The findings of our study should be interpreted in the context of the study design. Our study was retrospective, observational, and single-center. There may have been additional baseline differences between groups predisposing to bias we did not capture in the propensity score. For example, we could not measure rates of attendance at the different clinics and cannot rule out that outcomes associated with PDC were also associated with increased attendance rates. However, none of the clinics had mechanisms in place to improve follow-up rates; patients referred to PDC were those considered highest risk for readmission and were sicker at baseline, making it very unlikely that they were predisposed to attend clinic more frequently and/or to have better outcomes; and even if PDC improved follow-up rates, this would be a significant contribution given the limitations of primary-care access. Our propensity score could not perfectly mimic randomization to a treatment assignment, but rather to treatment received, because of this limitation.

We did not ascertain ED visits or readmissions outside the VA system; it is possible these differentially affected one group more than another, though this seems unlikely. Our patient population was representative of veteran populations elsewhere who are at high risk of adverse postdischarge outcomes, but our findings may not be generalizable to younger, more ethnically diverse populations or to women.

CONCLUSIONS

Provision of postdischarge care by hospitalists may reduce LOS without increasing postdischarge adverse events. Further work is required to evaluate the role of hospitalist-run PDCs in healthcare systems with more limited postdischarge access to care, to formally evaluate the costs associated with extending hospitalists to the outpatient setting, and to prospectively

evaluate the role of a PDC compared with other kinds of hospital follow-up.

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