Importance: Poor health care provider communication across health care settings may lead to adverse outcomes.

Objective: To determine the frequency with which inpatient providers report communicating directly with outpatient providers and whether direct communication was associated with 30-day readmissions.

Design: We conducted a single-center prospective study of self-reported communication patterns by discharging health care providers on inpatient medical services from September 2010 to December 2011 at The Johns Hopkins Hospital.

Setting: A 1000-bed urban, academic center.

Participants: There were 13,954 hospitalizations in this time period. Of those, 9,719 were for initial visits. After additional exclusions, including patients whose outpatient health care provider was the inpatient attending physician, those who had planned or routine admissions, those without outpatient health care providers, those who died in the hospital, and those discharged to other healthcare facilities, we were left with 6,635 hospitalizations for analysis.

Interventions: Self-reported communication was captured from a mandatory electronic discharge worksheet field. Thirty-day readmissions, length of stay (LOS), and demographics were obtained from administrative databases.

Data Extraction: We used multivariable logistic regression models to examine, first, the association between direct communication and patient age, sex, LOS, race, payer, expected 30-day readmission rate based on diagnosis and illness severity, and physician type and, second, the association between 30-day readmission and direct communication, adjusting for patient and physician-level factors.

Results: Of 6,635 included hospitalizations, successful direct communication occurred in 2,438 (36.7%). The most frequently reported reason for lack of direct communication was the health care provider’s perception that the discharge summary was adequate. Predictors of direct communication, adjusting for all other variables, included patients cared for by hospitalists without house staff (odds ratio [OR], 1.81 [95% CI, 1.59-2.08]), high expected 30-day readmission rate (OR, 1.18 [95% CI, 1.10-1.28] per 10%), and insurance by Medicare (OR, 1.35 [95% CI, 1.16-1.56]) and private insurance companies (OR, 1.35 [95% CI, 1.18-1.56]) compared with Medicaid. Direct communication with the outpatient health care provider was not associated with readmissions (OR, 1.08 [95% CI, 0.92-1.26]) in adjusted analysis.

Conclusions and Relevance: Self-reported direct communication between inpatient and outpatient providers occurred at a low rate but was not associated with readmissions. This suggests that enhancing interprovider communication at hospital discharge may not, in isolation, prevent readmissions.


There are 2 main ways that inpatient and outpatient physicians communicate about their mutual patients—through discharge summaries and by directly talking with one another. Written discharge summaries are often unavailable at a patient’s first fol-
low-up appointment,10 and their absence has been shown to limit a primary health care provider’s ability to provide care in nearly a quarter of postdischarge follow-up appointments.9 Reports in the literature are conflicting as to the importance of the discharge summary for reducing 30-day readmissions. Some studies report an increase in 30-day readmission rates in patients whose physicians do not have a discharge summary available at their follow-up visits,3,10 while others have not found a difference in 30-day readmission rates.2,11,12

Although direct communication may be an important means to improve care transitions and reduce readmissions,13 this method has been infrequently studied. In a survey of family health care providers, most felt it was important to hear from the inpatient provider at admission (73%) and at discharge (78%).14 However, outpatient providers have reported low rates of direct communication with inpatient physicians.4,5 There has been little prior research on documented attempts by inpatient providers to directly communicate with outpatient providers, and whether such attempts are associated with 30-day readmission rates.

**STUDY DESIGN AND OVERSIGHT**

We conducted a single-center prospective study of self-reported communication patterns by discharging health care providers on inpatient medical services from September 2010 to December 2011 at The Johns Hopkins Hospital, a 1000-bed urban, academic center. This project was approved by the Johns Hopkins University School of Medicine institutional review board.

We included first admissions for all patients discharged from the medical services. We excluded patients whose outpatient health care provider was the inpatient attending physician, those who had planned or routine admissions, those without outpatient providers, those who died in the hospital, and those discharged to other health care facilities.

**INSTITUTIONAL OPERATIONAL BACKGROUND**

At Johns Hopkins Hospital, health care providers are required to complete an electronic discharge worksheet in the inpatient electronic medical record. This document is printed at the time of discharge and given to the patient. The discharge worksheet includes the inpatient physician’s name and contact information, medications at discharge, follow-up appointments, and discharge instructions. This document is automatically faxed to referring providers who are electronically “linked” to the patient in an autosys system, which resides outside of the electronic medical record. Owing to Health Insurance Portability and Accountability Act regulations, linkages are purged between hospitalizations and referring providers must be relinked to their patients in this system de novo during each hospitalization. Auditing indicates that this linkage occurs inconsistently and, when done, is often incorrect. Like the discharge worksheet, the discharge summary is sent via the autosys system to health care providers who are linked to the hospitalization, but are often not completed at the time of the follow-up visit. Providers are allowed 30 days to complete discharge summaries per institutional bylaws.

Prior to implementing this project, we had received consistent feedback from outpatient health care providers that inpatient providers at our institution failed to communicate with them in an effective fashion when their patients were hospitalized. Referring providers complained that they often were unaware that one of their patients had been hospitalized and often did not receive any paperwork related to the hospitalization prior to the postdischarge follow-up visit. This was hypothesized to contribute to unnecessary rehospitalizations, but we lacked adequate data on communication patterns and whether these patterns were indeed associated with readmissions.

**ASSESSING DIRECT COMMUNICATION WITH OUTPATIENT PRIMARY CARE PROVIDERS**

Beginning in September 2010, the discharge worksheet was modified so that all health care providers were required to complete the following field on communication with the outpatient provider: “communication about this hospitalization with provider(s) primarily responsible for outpatient management—can be a PCP or a specialist.” Physicians were given the following options from a drop-down menu: “successful communication,” “attempted but unsuccessful communication,” “unsure if communication was done,” and “communication was not attempted.” If the physician did not attempt communication, he or she was required to select 1 of 7 reasons: “discharge worksheet or summary will be adequate,” “outpatient provider is within the same hospital system,” “no outpatient provider,” “patient or family member plans to update outpatient provider,” “admission was planned or routine,” “outpatient provider is the inpatient attending [physician],” and “it is not needed.” Providers were also able to use a free text section to leave additional comments.

We categorized direct communication as successful if “successful communication” was selected. We considered the communication unsuccessful for all other categories. As a separate analysis, we also examined “attempted but unsuccessful communication” as a separate category, comparing it with successful communication. Finally, as a sensitivity analysis, we included patients who lacked a primary care provider (PCP) and those patients whose PCP was the inpatient attending physician of record. In this sensitivity analysis, we labeled communication as “successful” for those whose PCP was the inpatient attending physician and “unsuccessful” for patients who lacked an outpatient health care provider.

**THIRTY-DAY READMISSIONS**

Any rehospitalization to Johns Hopkins Hospital within 30 days of discharge from the first visit was classified as a readmission. We did not seek to exclude readmissions that were planned.

**READMISSION RISK-ADJUSTMENT METHOD**

Although it is important to account for patient-related and diagnosis-related predictors of readmission in our modeling, there are currently no widely used and accepted risk stratification tools for use in a general medical population. The Centers for Medicare & Medicaid Services (CMS) risk-adjustment method used for public reporting is disease specific (for acute myocardial infarction, heart failure, and pneumonia), as are other tools that have been developed.14-16 Other models have been developed for application in specific populations17 and a recent systematic review has highlighted limited discriminatory ability of existing models.18 The group from Yale that developed the disease-specific measures for CMS has since been tasked to develop an all-cause readmission measure for public reporting purposes, but this measure has not yet been finalized and is intended for use in the Medicare population. Whether it will apply to
We incorporated these variables in a multivariate logistic regression model to determine which factors were independently associated with successful communication. Finally, we performed multivariate logistic regression analysis with 30-day readmissions as the dependent variable using the these variables in addition to communication status (successful vs unsuccessful). All hypothesis tests were 2-tailed with the α set at .05.

**DIRECT COMMUNICATION WITH OUTPATIENT HEALTH CARE PROVIDERS**

In the study period, there were 13,954 hospitalizations. Of those, 9,719 were for initial visits. After additional exclusions, we were left with 6,635 hospitalizations for analysis (eFigure; http://www.jamainternalmed.com). Successful communication was reported in 2,438 cases (36.7%), attempted but unsuccessful communication was reported in 585 cases (8.8%), and no attempts were reported in 3,612 cases (54.4%). The most common reason for not attempting direct communication was the health care provider’s assertion that the discharge summary was adequate (Table 1). There was a modest but significant trend toward higher rates of direct communication over time. Treating time as a continuous variable, the odds ratio (OR) for successful handoff on the last day of the study period was 1.22 (95% CI, 1.03-1.44) relative to the first day of the study period. This corresponds to a fitted direct communication rate of 34.7% during the first month of the study and 39.1% during the last month of the study. Visual inspection of the data did not suggest that there was an inflection point or specific time point at which a dramatic change in handoff rates occurred.

**STATISTICAL ANALYSIS**

We report descriptive data as proportions or means as appropriate. We used logistic regression with 95% confidence intervals to identify factors that were associated with successful communication (vs unsuccessful) in unadjusted analyses. We chose variables based on possible or plausible associations with either communication patterns or readmissions. Patient age, sex, payer (Medicare, Medicaid, private, other), race (white vs nonwhite), and length of stay (LOS) have been evaluated in prior risk models on hospital readmission, and were included. Hospitalist attending physician without house staff (vs nonhospitalist or hospitalist with house staff), and expected 30-day readmission rate (continuous, as defined in the previous subsection) were chosen because we thought they would be associated with handoff rates and might have an impact on 30-day readmissions.

**RESULTS**

### VARIABLES ASSOCIATED WITH SUCCESSFUL COMMUNICATION

In univariate analyses, variables associated with successful communication included: patient cared for by hospitalist attending physician without house staff (OR, 1.85 [95% CI, 1.61-2.11]), higher expected 30-day readmission rate (OR, 1.21 [95% CI, 1.14-1.31] per 10%), longer LOS (OR, 1.02 [95% CI, 1.01-1.03] per day), female sex (OR, 1.11 [95% CI, 1.01-1.23]) and patients insured by Medicare (OR, 1.30 [95% CI, 1.14-1.48]) and private companies (OR, 1.29 [95% CI, 1.13-1.48]) compared with Medicaid. Age and race were not associated with successful communication overall (Table 2).

Compared with patients with successful communication, attempted but unsuccessful communication was more common in nonwhites (OR, 1.27 [95% CI, 1.06-1.53]), and in patients insured by Medicaid when compared with those insured by Medicare (OR, 1.38 [95% CI, 1.11-1.72]) or private companies (OR, 1.80 [95% CI, 1.42-2.29]).

In multivariate analyses, patients cared for by hospitalist attending physician without house staff (OR, 1.81 [95% CI, 1.59-2.08]) and patients insured by Medicare (OR, 1.35 [95% CI, 1.16-1.56]) and private companies (OR, 1.35 [95% CI, 1.18-1.56]) when compared with

### Table 1. Description of Handoff Patterns

<table>
<thead>
<tr>
<th>Communication</th>
<th>Total, No. (%) (n = 6635)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful</td>
<td>2438 (36.7)</td>
</tr>
<tr>
<td>Unsuccessful</td>
<td>4197 (63.3)</td>
</tr>
<tr>
<td>Discharge summary is adequate</td>
<td>1459 (22.0)</td>
</tr>
<tr>
<td>Unsure if communication done</td>
<td>1319 (19.9)</td>
</tr>
<tr>
<td>Attempted but unsuccessful</td>
<td>585 (8.8)</td>
</tr>
<tr>
<td>Health care provider within health care system</td>
<td>578 (8.7)</td>
</tr>
<tr>
<td>Patient or family plan to update provider personally</td>
<td>165 (2.5)</td>
</tr>
<tr>
<td>Other reasons</td>
<td>91 (1.4)</td>
</tr>
</tbody>
</table>

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Medicaid remained positive predictors of successful communication (Table 2).

**COMMUNICATION AND READMISSIONS**

Fourteen percent of patients were readmitted to our hospital within 30 days. Successful communication was not significantly associated with readmissions in univariate (OR, 1.14 [95% CI, 0.98-1.33]) or multivariate (OR, 1.08 [95% CI, 0.92-1.26]) analyses (Table 3). The LOS and expected 30-day readmission rate were predictors of 30-day readmissions in multivariate analyses. In the sensitivity analysis in which we included patients who lacked a PCP and those patients whose PCP was the inpatient attending physician of record, labeling communication as “successful” for those whose PCP was the inpatient attending physician, and “unsuccessful” for patients who lacked an outpatient provider, the adjusted OR was virtually unchanged (OR, 1.07 [95% CI, 0.91-1.24]).

**COMMENT**

In our study, the reported rate of direct communication from inpatient to outpatient health care providers was low, and there was no association between successful communication and 30-day same-hospital readmissions. Combined with results from research showing a lack of association between discharge communication as defined by the availability of discharge summaries and 30-day readmissions that has been reported, the results suggest that interprovider communication alone may not be sufficient to reduce readmissions. However, it is likely that direct communication can improve the handoff process, independent of its impact on readmissions. Most outpatient providers report that they would like direct verbal communication at discharge, and in another survey of PCPs of hospitalized seniors, 30% of the PCPs reported being unaware of the hospitalization, highlighting the need for improved communication.

The higher rate of communication by hospitalists working independently compared with house staff services may
be due to competing responsibilities in the setting of new house staff work hour regulations. In addition, on the house staff teams, there may be greater confusion over who is responsible for the communication. Also, hospitals at our institution are made aware of their own reported handoff rates, and this type of health care provider-specific feedback may have played a role in fostering a greater attention to the handoff process among hospitalists.

Interestingly, the expected 30-day readmission rate (defined by diagnosis and illness severity) was a significant predictor of direct communication, which could be explained by the health care providers prioritizing communication efforts for sicker patients. This is notable given that Allaudeen et al24 reported that providers on the general medicine service of an urban medical center were not able to accurately predict those at higher risk of readmission.

There was a higher rate of communication in patients insured by Medicare and private companies compared with those insured by Medicaid; this observation deserves further evaluation. A major contributor to this disparity was that health care providers were more often unsuccessful in attempting to reach providers for patients with Medicaid. However, we do not know the basis for these failed attempts or the extent to which providers may have made repeated attempts to contact some referring providers but not others. Possible explanations may include perceived lack of engagement of the PCP or difficulty in reaching PCPs who practice in resource-challenged clinics that may not, for example, have adequate staff support for efficient telephone triage. Regardless, it is known that underinsurance can have an important adverse impact on health outcomes.25-28

The results of our study should be taken in the context of several limitations. First, our measure of communication was obtained through self-report by the inpatient health care provider, which may be overestimated owing to social desirability bias. Second, we could not account for communication undertaken by other providers outside the primary team (eg, consultants). Third, we were unable to examine the quality of the communication, which may have varied in important ways. Fourth, our study was performed at a single academic medical center and might not be generalizable to other clinical settings. Fifth, we reported on 30-day samehospital readmission and were unable to examine readmissions to surrounding hospitals. Sixth, we evaluated the effects of communication on readmission rates but did not examine other outcomes that could be associated with communication, such as patient or referring provider satisfaction. Seventh, although there was a modest increase in direct communication rates over our study period, our study design did not allow for assessment of a true preintervention communication rate to determine whether the electronic prompt we placed in the discharge worksheet actually changed behavior. Finally, as highlighted herein, there is not yet an established, validated, and widely accepted tool for risk-adjusting readmission rates, and there may be important variables that we did not include in our risk-adjustment method.

In sum, our findings suggest that direct communication between inpatient and outpatient health providers is undertaken in only a minority of cases. Although we did not see a direct relationship between direct communication and readmissions, it remains possible that direct communication between providers may improve other aspects of quality of care.

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Online-Only Material: The eFigure is available at http://www.jamainternalmed.com.

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Complexity Science and the Readmission Dilemma

The increasing proliferation of articles dealing with hospital readmission is in no small part a response to the recommendations in the 2007 Medicare Payment Advisory Commission report to Congress (http://www.medpac.gov/documents/Jul07 _EntireReport.pdf). These recommendations became the basis for the Hospital Readmissions Reduction Program in the Affordable Care Act altering the criteria for hospital payment reimbursement. Enforcement of these criteria by the Centers for Medicare & Medicaid Services reduces Medicare payments to hospitals that exceed preset all-cause readmission rates. As health care policy and aspects of care delivery are increasingly influenced by reimbursement, it is important to ensure that the attenuation of the overall health care financial burden is accomplished by research-driven improvements in the quality and safety of care that minimize the potential for unintended outcomes.

The percentage of hospital readmissions that are potentially preventable is unknown. In a systematic review that included studies using various methodologies and criteria, van Walraven et al\(^1\) reported that the median proportion of readmissions that could be classified as avoidable was 27.1% (range, 5%-79%); the true proportion is unclear. Most readmission research has been either to define reliable and generally reproducible factors that identify patients most at risk for readmission or to develop the required interventions to modify these risk factors and modulate their effects. Donzé et al\(^2\) describe a 7-component prediction score based on a validated analytical approach identifying generic factors associated with 30-day readmissions. These factors deal primarily with severity of illness as represented by clinical markers, intensity of therapeutic interventions, prior admission frequency, as well as admission to an oncologic setting. The effectiveness of these studies is commonly identified as a major contributor to the risk of subsequent admissions, but specifics as to how these risks can be modified or contained continues to be an issue. Severity is directly associated with the intensity and

See also pages 632 and 695