Data Report

Association of Discharge Summary Quality With Readmission Risk for Patients Hospitalized With Heart Failure Exacerbation

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Background
Patients admitted with heart failure have disproportionately high readmission rates, most recently ranging from 17.5% to 30.3% nationally.¹ The Affordable Care Act penalizes hospitals with higher than average readmission rates after admissions for heart failure. However, clinicians remain uncertain, which strategies are associated with reducing readmissions in this population.²

Experts have proposed that the creation and transmission of a high-quality discharge summary to outpatient clinicians may improve the transition from hospital to home. Discharge summaries may facilitate safer transitions in care by informing outpatient clinicians about the course of hospitalization, identifying pending studies requiring follow-up, suggesting further follow-up testing, and clarifying changes in medications and treatments after discharge. Nonetheless, despite widespread enthusiasm for improving the quality of discharge summaries, there have been few studies of the effectiveness of discharge summaries in helping to avoid readmissions, and those few have found no association of timeliness,³ transmission,⁴ or content⁵ with readmission. To determine the association of discharge quality and readmission in a large national sample, we examined discharge summaries of patients enrolled in the Telemonitoring to Improve Heart Failure Outcomes (Tele-HF) randomized controlled trial.

Methods and Results

Study Cohort and Setting
The Tele-HF study included patients living at home and hospitalized for heart failure in the previous 30 days.⁷ Patients in Tele-HF were recruited from 33 cardiology practices in 21 states and the District of Columbia. We obtained discharge summaries for the index hospitalization. Wherever possible, we obtained copies of the original summary, redacted by each institution for Health Insurance Portability and Accountability Act-sensitive content. In the case of 1 hospital, we received Microsoft Word documents into which the text of the summary had been cut and pasted. The Yale Human Investigation Committee approved this study.

Measures
In previous work, we categorized the quality of each Tele-HF summary in 3 domains, such as timeliness, transmission, and content.⁸ We defined timeliness as days between discharge date and preparation date.⁹ We defined transmission as any notation that the summary was sent to any of the clinicians listed as having a follow-up appointment with the patient. For content, we measured the number of content items included that were mandated by The Joint Commission (reason for hospitalization, significant findings, procedures and treatment provided, patient’s discharge condition, patient and family instructions, and attending physician’s signature)¹⁰ and the number of content items that were recommended by the Transitions of Care Consensus Conference (TOCCC).¹¹ These items included principal diagnosis and problem list, medication list, transferring physician’s name and contact information, cognitive status of the patient, test results, and pending test results.

We defined a readmission as any admission to any acute care hospital within 30 days of discharge from the index hospitalization. The Tele-HF study obtained information about readmissions through patient interviews, and review of office charts and hospital records.

Statistical Analysis
We used hierarchical logistic regression models to determine the association between each domain of discharge summary quality and 30-day patient-level readmission risk. We adjusted sequentially for patient-level factors and then hospital characteristics.

Results
Of 1640, 1246 (76%) discharge summaries from 45 hospitals met inclusion criteria; of these patients, 208 (17%) were
readmitted within 30 days of discharge. Summaries transmitted to any outpatient clinician were associated with lower odds of readmission after adjustment for patient and hospital characteristics (odds ratio, 0.53; 95% confidence interval, 0.32–0.90; \( P=0.02 \)), as were summaries including more Transitions of Care Consensus Conference content elements (odds ratio, 0.67; 95% confidence interval, 0.46–0.97; \( P=0.03 \)). Preparing summaries on discharge day and inclusion of The Joint Commission elements were not associated with readmission risk (Table).

**Comment**

In this large multicenter study of patients hospitalized with heart failure, we found that including key content elements and sending the summary to the outside physician were each associated with reduced readmission risk. These findings differ from several previous studies, which found no association.\(^3\)\(^–\)\(^6\) Our study included more recent hospitalizations than most previous studies; given trends in recent years toward care by hospitalists, it is possible that more patients in our study were not cared for in the hospital by their primary doctor, making the discharge summary more important to postdischarge care. In addition, our study was larger and included a broader diversity of hospital settings, including community hospitals. It is also possible that discharge summary quality is a marker of general hospital quality, such that hospitals that produce high-quality discharge summaries also educate patients better, provide higher quality inpatient care, and/or have other high-quality transition care practices in place, such as follow-up, medication reconciliation, and communication with outpatient clinicians. We do not have data to determine which of these hypotheses accounts for our findings.

Our study has some limitations. We did not determine the accuracy of discharge summary content, and used guidelines for key content that have not been validated as important for postdischarge care, although they have face validity. We may have underestimated transmission to outside clinicians, especially in integrated systems in which outpatient clinicians can directly access the inpatient record. Although the parent Tele-HF study sought to identify readmissions through several mechanisms, including patient interviews, review of office records, and collection of hospital records, we may have missed some readmissions. Despite these limitations, our findings represent the largest study of the association between discharge summary quality and readmission risk in patients with heart failure to date, and include a diversity of hospitals around the nation.

In summary, we found that high-quality discharge summaries were associated with reduced risk of readmission for patients with heart failure. These findings may provide more impetus for thoughtful improvements in discharge summary quality, and provide some guidance as to the key aspects of discharge summary preparation on which to focus improvement efforts.

**Acknowledgments**

The senior author (Dr Horwitz) affirms that the article is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained. She had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. All authors contributed to the study concept, design, analysis, and interpretation of data. Critical revision of the article for important intellectual content was done by all the authors. All authors approved the final article for submission. Drs Chaudhry and Krumholz performed acquisition of data. Dr Salim Al-Damluji and Horwitz drafted the article. Dr Salim Al-Damluji performed statistical analysis. Dr Krumholz received funding. Dr Horwitz supervised the study.

**Sources of Funding**

This project was supported by a grant (5 R01 HL080228) from the National Heart, Lung, and Blood Institute. Dr Horwitz is supported by the National Institute on Aging (K08 AG038336) and by the American Federation for Aging Research through the Paul B. Beeson Career Development Award Program. Dr Krumholz is supported by grant U01 HL105270-04 (Center for Cardiovascular Outcomes Research at Yale University) from the National Heart, Lung, and Blood Institute. No funding source had any role in the study design; in the collection, analysis, and interpretation of data; or in the writing of the report.

**Disclosures**

All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author). Dr Krumholz is a recipient of research grants from Medtronic and from Johnson & Johnson, through Yale University, to develop methods of clinical trial data sharing and is chair of a cardiac scientific advisory board for UnitedHealth.

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**Table. Association of Discharge Summary Quality With Odds of Readmission**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unadjusted Odds Ratio (95% CI)</th>
<th>( P ) Value</th>
<th>Adjusted for Patient Characteristics* Odds Ratio (95% CI)</th>
<th>( P ) Value</th>
<th>Adjusted for Patient and Hospital Characteristics† Odds Ratio (95% CI)</th>
<th>( P ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission</td>
<td>0.51 (0.31–0.85)</td>
<td>0.012</td>
<td>0.56 (0.33–0.96)</td>
<td>0.033</td>
<td>0.58 (0.33–1.00)</td>
<td>0.017</td>
</tr>
<tr>
<td>Timeliness</td>
<td>1.06 (0.66–1.71)</td>
<td>0.797</td>
<td>0.98 (0.60–1.61)</td>
<td>0.998</td>
<td>1.01 (0.60–1.69)</td>
<td>0.878</td>
</tr>
<tr>
<td>TJC</td>
<td>0.7 (0.55–0.91)</td>
<td>0.009</td>
<td>0.87 (0.63–1.19)</td>
<td>0.338</td>
<td>0.91 (0.65–1.27)</td>
<td>0.355</td>
</tr>
<tr>
<td>TOCCC</td>
<td>0.61 (0.45–0.84)</td>
<td>0.004</td>
<td>0.67 (0.46–0.98)</td>
<td>0.031</td>
<td>0.67 (0.45–0.99)</td>
<td>0.027</td>
</tr>
</tbody>
</table>

\( ^{*} \)Sex, age, race, insurance status, New York Heart Association class, 15 cardiovascular comorbidities, and length of stay. 
\( ^{†} \)Patient characteristics plus urban status, teaching status, geographic region, and bed size.
References


Key Words: epidemiology • heart failure • patient readmission • quality of health care
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Circ Cardiovasc Qual Outcomes. published online January 13, 2015;
Circulation: Cardiovascular Quality and Outcomes is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2015 American Heart Association, Inc. All rights reserved.
Print ISSN: 1941-7705. Online ISSN: 1941-7713

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circoutcomes.ahajournals.org/content/early/2015/01/13/CIRCOUTCOMES.114.001476.citation

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