Improving Continuity of Care via the Discharge Summary

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Abstract

Discharge summaries (DCS) frequently fail to improve the continuity of care. A chart review of 188 DCS was performed to identify specific components that could be improved through health information technology. Medication reconciliations were analyzed for completeness and for medical reasoning. Documentation of pending results and follow-up details were analyzed. Patient preferences, patient goals, and the handover tone were noted. Patients were discharged on an average of 9.8 medications, only 3% of medication reconciliations were complete and medical reasoning was frequently absent. There were 358 pending results in 188 hospital discharges though only 14% were mentioned in the DCS. Documentation of clear, timely follow-up was present for less than 50% of patients. Patient preferences, patient goals, and lessons learned were rarely included. A handover tone was in only 17% of the DCS. Evaluating the DCS as a clinical handover is novel but information for safe handovers is frequently missing.

Introduction

Discharge summaries (DCS) can decrease readmissions and adverse events. When a DCS was available at follow-up after hospital discharge, van Walraven et al. found a trend for decreased readmissions (relative risk 0.74), and when it was unavailable, Li et al. found a statistically significant 79% increase in the readmission rate within 7 days.¹² The incidence and severity of adverse events (AEs) after hospital discharge were found to be preventable or ameliorable with better communication from the hospital to community providers by Forster et al.³,⁴ ¹¹

However, DCS frequently fail to reach their potential to improve the continuity of care. A complete list of medications and discharge diagnoses are among the most important components of the DCS.⁵⁻⁹ Yet discharge medication discrepancies are common, even when a pharmacist was involved.¹⁰ Inaccuracies in discharge medication lists, medication changes, and reason for medication changes were found in only 36%, 30%, and 38% of DCSs by Legault et al.¹¹

The exclusion of tests pending at the time of discharge is another weakness of DCSs. Were et al. found only 13% of DCS reported all pending tests and that only 16% of all pending results were reported.¹² Roy et al. found results returning after discharge for 41% of patients, 43% of which were abnormal, two-thirds of which were potentially actionable.¹³

Moore et al. found the diagnostic and follow-up plans in the inpatient medical record were not completed by the outpatient physicians 41% of the time.¹⁴ However, the recommended workups were documented in only 46% of the DCS.¹⁵

van Walraven et al. also found that DCSs were not reaching follow-up physicians at 85% of the follow-up visits.¹⁶ Two thirds of those cases were because the DCS was simply never sent to the outpatient physician. In only 59% of cases studied by Were et al. was there sufficient information to ensure delivery of the DCS and results.¹² Though there is no clear standard in the literature, the timeliness of the delivery of the DCS is frequently related to its quality.⁵,⁶,¹⁷⁻¹⁹

As the lack of timely postdischarge follow-up has been associated with hospital readmissions and emergency department visits, the Society for Hospital Medicine has endorsed the scheduling of follow-up appointments and including the details in the DCS.⁹,²⁰

Multiple metrics have been developed to measure the quality of the DCS. van Walraven and Rokosh surveyed 100 physicians who identified admission and discharge diagnoses, discharge medications, follow-up plan, pending labs,
1-2 pages total length, receipt within four days, active medical problems, and outstanding social issues as being components of a high quality DCS.\textsuperscript{5} Horwitz et al. scored the timeliness of completion separately from the transmission of the DCS.\textsuperscript{19} Rao et al. focused on the quality of the communication (the clarity of the DCS, exclusion of irrelevant material, and consistency of the documentation).\textsuperscript{18} Stetson et al. developed the nine-question physician documentation quality instrument (PDQI), but still felt unable to describe an ideal DCS.\textsuperscript{21}

However, a comprehensive framework for DCS that emphasizes clear communication to support continuity of care is missing from the literature. Kripalani et al. specifically identifies communication deficits between inpatient and outpatient physicians as being common and with the potential to adversely affect care.\textsuperscript{7} Easily coded data such as accurate medication lists and tests pending at discharge are essential. Yet a comprehensive data dump should not obscure the context about patients; the medical reasoning behind the selection or duration of a treatment regimen or recommended next steps for the workup are also critical. Prior metrics have been useful to recognize specific information components, but without putting them in the context of a handover; in a handover both the responsibility and the information needs to be passed from the inpatient provider to the outpatient provider. Patient handovers involve 1) the sharing of information, 2) exchanging responsibility for a patient, and 3) transferring an understanding of the medical decision-making.\textsuperscript{22-40} As Moore et al. found, the outpatient provider is unable to complete recommended workups if those plans are not communicated; continuity of care is more feasible when there are effective handovers.\textsuperscript{15}

With the growing use of EHRs, it is important to consider how to leverage health information technology to ensure efficient communication between clinicians. Administrative and encoded clinical data should be automatically inserted into documentation to ensure the consistency of useful documentation. But such boilerplates should not come at the cost of clear clinical communication or by excessively long documents. Thoughtful summarization may emphasize the gist of the hospitalization and follow-up needs efficiently and effectively in a concise, cohesive narrative. Since DCS may be the only communication between the hospitalist and the primary care provider, they should be treated as handovers.\textsuperscript{41}

The aim of this study is to characterize the data in DCS through a retrospective chart review for its availability and its effectiveness of facilitating continuity of care. We focused on the medication list in the DCS, pending results, coordination of follow-up, and evidence of a clinical handover.

**Methods**

**Setting:** Data for this study came from an urban tertiary academic referral center in the intermountain west. Most patients are English-speakers. Patients admitted to the general medicine services were treated by four teaching or one attending hospitalist services. Each of the four teaching teams consisted of an attending, a senior resident, two interns, and two medical students. The attending service consisted of an attending and a senior resident. The housestaff generally dictated the DCS though typing was allowed.

**Participants and Data Sources:** To stratify the experience-level of the housestaff, three convenience samples were defined. The first 122 consecutive patient discharges were from the general medicine teaching service starting August 1, 2010, the next 33 consecutive discharges started May 1, 2011 from the same service, and the next 33 consecutive discharges starting May 1, 2011 from the attending service; i.e. the DCSs were created by new interns, experienced interns, and senior residents, respectively.

Discharge summaries, computerized-provider-order-entry (CPOE) orders, lab results along with date-timestamps of the order and the availability of the result, patient demographic information, length of hospital stay, and diagnostic codes used for the billing record were collected from the enterprise data warehouse (EDW). An adapted Charlson Comorbidity Index (CCI) was calculated from diagnoses and comorbidities in the billing record for the date of discharge.\textsuperscript{42,43}

**Chart Abstraction and Data Analysis:** Each DCS was abstracted into four main categories: a) the medication list, b) labs pending at the time of discharge, c) posthospitalization follow-up, and d) the clinical handover for continuity of care. The data abstraction was performed by one author (FS), a biomedical informatics postdoctoral fellow and practicing family physician.
The medication list was evaluated for its completeness, and each medication was evaluated for its status and for the presence of any relevant medical reasoning. A “Complete” medication list should indicate the status of each medication being “Continued,” “New,” “Changed,” or “Discontinued.”7,8,44,45 If the status of a given medication was “Unclear,” it was categorized as such and the medication reconciliation was considered “Incomplete.” The presence of medical reasoning regarding the indication, selection, or duration for each medication was noted. The number of medications per DCS, the proportion of “Complete” medication lists, and the proportions of the status and the presence of medical reasoning for each of the medications are reported.

Labs pending at the time of discharge were measured by treating the DCS and the EDW record of CPOE orders as separate sources. From the DCS, every mention of a pending result (e.g. a pending blood culture) and recommended follow-up test (e.g. follow-up INR or scheduled sleep study) was recorded. From the EDW, every laboratory order with pending results at the time of discharge was identified. The two lists were compared for each patient, item by item. For each pending result, there was one possible condition: a) reported in both the DCS and the EDW, b) reported in the DCS but not the EDW, or c) reported in the EDW but not the DCS.

Hospital follow-up was measured by the identification of a follow-up provider and the appointment, e.g. “Dr. Smith” was considered “General” whereas “Dr. George Smith in Clinic 2” was considered “Specific.” Follow-up appointments were categorized as a) within 14 days, b) beyond 14 days, c) not scheduled but recommended within a specific timeframe, d) not mentioned, or e) deferred due to patient transfer.

We developed a framework to assess “continuity of care” and “handover tone” as these qualitative concepts are missing from other metrics. To assess for a “continuity of care,” we looked for the presence of Patient Values, Preferences, Goals, and “Lessons Learned” in the DCSs. e.g. “a patient values independence more than safety,” “a patient preferred nursing home A due to proximity to family,” “the patient’s goal is to return to her own home before the holidays,” or “the key lesson from this hospitalization is...,” respectively. We drew from Weir’s adaptation of Hollnagel and Wood’s contextual control model (COCOM) to describe components of an effective handover.46,47 “Handover Tone” was operationalized as when there were three of the following: a) a cohesive story, b) predictions and guidance for the patient’s clinical trajectory, c) an explicit plan moving forward, d) key parameters to monitor, e) clear medical reasoning, or f) a holistic perspective about the patient. The frequencies of Patient Values, Preferences, Goals, “Lessons Learned,” and a “Handover Tone” in the DCSs are reported.

Statistical analysis was performed to evaluate differences between the cohorts. A 75% probability was estimated that a given categorical measure, such as whether the primary care provider was identified, would be present in the DCS. The minimal sample size to detect a difference between categorical variables is calculated by N = 4z²p(1-p)/D². For z₀.05 = 1.96, probability = 0.75, and precision = 0.2, the necessary sample size to detect a difference between would be 51. The chi-squared test evaluated for statistical difference between the three cohorts for categorical variables (gender distribution, whether the primary care provider was identified, and whether the patient was discharged to home, the length of the DCS, and the time from discharge to dictation of the DCS). An ANOVA was used to evaluate for gross differences between the cohorts regarding patient age, length of stay, and the Charlson Comorbidity Index.

The data were summarized in a fishbone diagram to illustrate quality gaps and informatics opportunities to improve the DCS. Each “bone” of the diagram represents a component of the DCS, that when missing or incomplete, contributes to creating discontinuity of care; the modes of failure do not occur in a simple linear process.

Results

Using ANOVA (for continuous variables) and chi-squared tests (for categorical variables), we found no statistical differences for the age, length of stay, comorbidity index, DCS length in words, time from discharge order to dictation, gender-ratio, identification of PCP, or discharge to home between the three cohorts, as summarized in Table 1. Grouping all discharges together, 95 or 51% of the patients were female, with an average age of 58 (SD 18) years, length of stay of 4 (SD 5.2) days, and a modified Charlson Comorbidity Index of 3.2 (SD 2.5).42,43 The mean length and time until dictation of all the discharge summaries were 762 (SD 336) words and 2 (SD 3.9) day, respectively.

Table 2 summarizes the number of medications, their status, and the availability of the related medical reasoning. 188 patients were discharged on an average of 9.8 (SD 5.7) medications. Only five out of 188 discharge summaries
were “Complete,” explicitly reporting the status of every medication. In the 61 discharge summaries when it was explicit, an average of 2.1 medications were discontinued. Seven discharge summaries failed to name any specific medications by either omitting the medication list or indicating “all medications were continued.” An analysis of the differences between the discharge summary and the pharmacist-performed medication reconciliation at discharge is reported elsewhere and is currently under review.

In the 188 discharges, 358 lab results (an average of two results per patient), were pending at the time of discharge from the hospital. 31 (9%) of the pending results were identified in both the discharge summary and by the EDW, 17 (5%) were identified by the discharge summary but not by the EDW, and the remainder, 310 (86%), were identified in the EDW but not in the DCS.

Not only are pending lab results commonly omitted from the DCS, those reported correlate poorly to those identified in the EDW, shown in Table 3. Of the 188 patients, only two (1%) cases had an exact match between the dictated discharge summary and the electronic record. In one of those cases, there were pending results and in the other case, the summary stated correctly there were no pending results.

Another 61 (32%) of cases implicitly matched where no pending results were mentioned in the DCS and none were found in the EDW. In the remaining 125 (66%) of cases, there was some discrepancy between the pending results noted by the discharge summary and reported by the EDW.

31 (16%) patients were discharged on warfarin. In only one third of those discharge summaries (10 patients) was there mention of a follow-up INR or how anticoagulation was to be managed as an outpatient.

A primary care provider (PCP) was identified specifically, generally, or not at all in 34%, 27%, and 39% of DCS, respectively. Since some DCS mention a PCP and specialist, 45% of all DCS identified at least one specific follow-up provider.

The DCS contained scheduled follow-up appointments for 88 (47%) and 11 (6%) of patients within 14 days and beyond 14 days, respectively. For 48 (26%) patients, some follow-up was recommended while no follow-up was mentioned for 29 (15%).

There were references in zero (0% of discharges), 11 (6% of discharges), 2 (1% of cases), and 5 (3% of cases) to patient values, patient preferences, patient goals, and lessons learned, respectively. An example statements of patient preferences was, “It was a good talk with Palliative Care; and the patient is to remain DNR/DNI, but would still like interventions other than that to help keep her healthy.” An example of a patient goal was, “He was transferred to [skilled nursing] for ongoing PT and OT therapy in hopes to regain his strength and eventually return home.” An example of a lesson learned was, “It also should be noted that the patient was only taking three medications at home once daily and it was unclear which medications he was taking and therefore we restarted the above medications and set the patient up with home health for assistance with medication administration.”

Handover tone was also uncommon. While a cohesive story and clear medical reasoning of the hospitalization was available in 151 and 156 cases, respectively, predictions and guidance for the patient’s clinical trajectory, an explicit plan with key parameters to monitor or a clear process to follow, or a holistic perspective of the patient was present in only nine, 22, and 20 of the cases, respectively. A handover tone was achieved in only 32 (17%) cases.

Figure 1 summarizes the modes of failure to provide continuity of care in discharge summaries in the topic areas of Medications, Follow-up, Pending Results, and Clinical Handover. These points were chosen as based on the data available in our study as well as the potential to improve these areas through health information technology. It helps to illustrate that improving discharge summaries will require a socio-technical solution.

Strengths and Limitations
The key strength of these findings is framing the analysis of the DCS primarily as a handover. Also, the mixed analysis method of performing a chart review and comparing relevant findings to results from an EDW query is relatively unique.
One of the greatest limitations to these findings is the use of a single data abstractor. It was felt that a physician or possibly a nurse was necessary in order to be familiar with the clinical context. Unfortunately, other clinical resources were unavailable for the data abstraction.

Another potential limitation was the attempt to stratify the experience levels of the physicians. Some might argue that a random sampling may be more representative. However, we found no differences between the three cohorts in terms of patient demographics, case complexity, or general analysis of the DCSs themselves.

Some might express concern about the generalizability of the results from a single academic institution or the use of a specific EHR. However, the hospital uses a common, widely implemented EHR and has CPOE fully implemented. Future work may reproduce this analysis at other sites.

Discussion

We found several quality gaps in the DCS at our institution, consistent with the literature. The context for these opportunities to improve are the DCSs created at an institution recognized by the U.S. News & World Report’s Best Hospitals and the University Health System Consortium as among the best in quality. It is also noteworthy that the institution’s readmission rate is below the national average.

Based on the DCS, we conclude that continuity of care was not a consideration at discharge; a specific follow-up provider was identified only 45% of the time, lower than the 67% observed by Were et al. Without identifying a specific follow-up provider, it becomes impractical and a legal liability to forward important information regarding the hospitalization contained in the discharge summary. These conclusions are inline with the low continuity scores observed by Van Walraven et al. Were et al. found 16% of pending tests reported in the discharge summary and Roy et al. found that 41% of patients discharged had pending labs where we found 67%. We found that discharge summaries reported only 48 (14%) of all pending results but that 17 (5%) were not identified by the EHR. Our conclusions were consistent with those of Walz et al.; the majority of pending test results were microbiology tests with the majority of those specifically being pending cultures.

Despite consensus that anticoagulation at transitions of care should be carefully coordinated, there was little evidence of this in our data with 68% of warfarin patients lacking mention of a follow-up INR.

Several prior efforts to improve discharge summaries have focused on the content of the discharge summaries such as through the use of checklists. A related approach that has shown improvement in the rated quality of discharge summaries is through formal teaching interventions. O’Leary was successful in creating a draft electronic discharge summary template that would automatically insert specific data elements and found an overall improvement in the quality and timeliness of discharge summaries.

A focus on conveying medical reasoning in the discharge summary has been essentially missing altogether from the literature. Several studies seem to recognize this problem, but fail to identify the need to explicitly communicate medical decision-making. The paucity of medical reasoning became evident in our chart review. However there is no “best” place to document the medical reasoning. Such information is not universally applicable; there is no data whether medical decision making fits best as a comment with each individual therapy within individual modules such as CPOE, the medication list, or even the problem list, versus combined sections of a history and physical, progress note, or discharge summary. Even the Moore et al. documentation of failure to communicate loose ends and intended diagnostic plans did not address the concepts of “lessons learned” or the clinical trajectory of a patient, patient preferences, or patient goals. The absence of this global perspective for the patient once he or she left the hospital was evident in our study.

The discharge summary may be the only clinician-to-clinician communication when the patient leaves the hospital and thus appears to be the most practical form for a handover. Our findings suggest that not only are DCSs imperfect as information containers, they are poorly suited as clinical handovers. While the data could be more complete by leveraging the EHR alone, handover tone will likely require a paradigm shift. The real failing of the discharge
summary is not the mere absence of data, but rather the failure to recognize the need for a handover. In a separate paper, we discuss that potential of using the DCS as a handover instrument.

A new paradigm for discharge summaries may be needed. This new paradigm for discharge summaries would include not only data, but would focus on clear communication. We envision the EHR being able to generate a dynamic, prepopulated discharge summary that includes data already stored within the EHR. The discharge summary would then be completed by clinicians adding brief narratives that clarify the medical decision making of the case and that provide guidance and a useful handover to the next provider. We are investigating automatic generation of portions of the DCS and teaching the DCS as a handover in our institution. Further research may be necessary to clarify the most valuable elements of medical reasoning, how to record patient preferences, and how to most efficiently gather and present this knowledge.

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References


**Tables and Figure**

**Table 1.** Demographics and description of discharge summaries*

<table>
<thead>
<tr>
<th>Group</th>
<th>Fall - Teaching General Medicine</th>
<th>Spring – Teaching Service</th>
<th>Spring - Attending Service</th>
<th>Groups Aggregated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient Statistics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Dates</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N Female n, (%)</td>
<td>August 1-27, 2010 N = 122 63 (52%)</td>
<td>May 1-7, 2011 N = 33 15 (45%)</td>
<td>May 1-15, 2011 N = 33 17 (52%)</td>
<td>N = 188 95 (51%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>Mean 59 SD 19</td>
<td>Mean 58 SD 18</td>
<td>Mean 52 SD 15</td>
<td>Mean 58 SD 18</td>
</tr>
<tr>
<td>Length of Stay (days)</td>
<td>Mean 5.4 SD 7.1</td>
<td>Mean 5.2 SD 3.3</td>
<td>Mean 4.5 SD 4</td>
<td>Mean 5.2 SD 6.2</td>
</tr>
<tr>
<td>Charlson Comorbidity Index Score</td>
<td>Mean 3.1 SD 2.4</td>
<td>Mean 3.8 SD 2.6</td>
<td>Mean 2.8 SD 2.6</td>
<td>Mean 3.2 SD 2.5</td>
</tr>
<tr>
<td>PCP Identified</td>
<td>41 34%</td>
<td>12 36%</td>
<td>11 33%</td>
<td>64 34%</td>
</tr>
<tr>
<td>Discharged to Home</td>
<td>57 47%</td>
<td>15 45%</td>
<td>11 33%</td>
<td>83 44%</td>
</tr>
<tr>
<td><strong>Discharge Summary Statistics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (words)</td>
<td>735 300</td>
<td>818 342</td>
<td>808 442</td>
<td>762 336</td>
</tr>
<tr>
<td>Days to Dictation</td>
<td>1.9 3</td>
<td>1.5 2.9</td>
<td>3 6.6</td>
<td>2 3.9</td>
</tr>
</tbody>
</table>

*There were no statistically significant differences between the three groups using the chi-squared test for dichotomous variables and an ANOVA for continuous variables.
Table 2. Average number of medications and occurrences of medical reasoning (about medications) per discharge summary.

<table>
<thead>
<tr>
<th>Medication Status</th>
<th># of Medications</th>
<th># of Occurrences of Medical Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continued</td>
<td>7.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Changed</td>
<td>1.2</td>
<td>0.8</td>
</tr>
<tr>
<td>New</td>
<td>2.3</td>
<td>1.8</td>
</tr>
<tr>
<td>Discontinued</td>
<td>2.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Unknown</td>
<td>7.3</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Table 3. Correlation of reporting pending results between DCS and EDW (2x2 table for source of reported pending results).*

<table>
<thead>
<tr>
<th>EDW</th>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DCS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td></td>
<td>1 (0.5%) Match</td>
<td>106 (56%) Discrepancy</td>
</tr>
<tr>
<td></td>
<td>1 (0.5%) Explicit Match</td>
<td>61 (32%) Implicit Match</td>
</tr>
<tr>
<td></td>
<td>6 (3%) Discrepancy</td>
<td></td>
</tr>
</tbody>
</table>

*In 13 (7%) of Discharge Summaries, there were mixed discrepancies so that some pending results were missing from the EDW while other pending results were missing from the DCS. The DCS with an explicit match stated, “there are no pending results,” which matched the EDW query. The DCSs with an implicit match did not mention the presence or absence of pending results, though none were found in the EDW.

Figure 1. Failure modes for providing continuity of care in discharge summaries