Clinical Science

Timeliness and quality of surgical discharge summaries after the implementation of an electronic format

Caroline E. Reinke, M.D., M.S.H.P.,a,e,* Rachel R. Kelz, M.D., M.S.C.E.,a Charles A. Baillie, M.D.,b Anne Norris, M.D.,b Sara Schmidt, B.S.N., R.N.,c Nicholas Wingate, B.S.,d Jennifer S. Myers, M.D.,b,e

aDepartment of Surgery, Division of Surgery Education, Perelman School of Medicine, University of Pennsylvania, 3400 Spruce Street, 4 Maloney, Philadelphia, PA 19104, USA; bDepartment of Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA; Clinical Effectiveness and Quality Improvement, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA; Jefferson Medical College, Philadelphia, PA, USA; Center for Healthcare Improvement and Patient Safety, Department of Medicine, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

KEYWORDS:
Electronic discharge summary; Electronic medical record; Patient safety; Surgical education

Abstract

BACKGROUND: As electronic discharge summaries (EDS) become more prevalent and health care systems increase their focus on transitions of care, analysis of EDS quality is important. The objective of this study was to assess the timeliness and quality of EDS compared with dictated summaries for surgical patients, which has not previously been evaluated.

METHODS: A retrospective study was conducted of a sample of discharge summaries from surgical patients at an urban university teaching hospital before and after the implementation of an EDS program. Summaries were evaluated on several dimensions, including time to summary completion, summary length, and summary quality, which was measured on a 13-item scoring tool.

RESULTS: After the exclusion of 5 patients who died, 195 discharge summaries were evaluated. Discharge summaries before and after EDS implementation were similar in admission types and discharge destinations of the patients. Compared with dictated summaries, EDS had equivalent overall quality (P = .11), with higher or equivalent scores on all specific quality aspects except readability. Obvious use of copying and pasting was identified in 8% of discharge summaries and was associated with decreased readability (P = .02).

CONCLUSIONS: The implementation of EDS can improve the timeliness of summary completion without sacrificing quality for surgical patients. Excessive copying and pasting can reduce the readability of discharge summaries, and strategies to discourage this practice without the use of appropriate editing should be used.

© 2014 Elsevier Inc. All rights reserved.

Discharge from the hospital is a critical transition for patients. Accurate and timely communication is necessary for a safe transition, and surgical patients may rely primarily on discharge summaries for accurate communication of inpatient care when following up with their primary care...
physicians or when presenting for urgent or emergent evaluation. Deficits in communication and information transfer at hospital discharge have been described and are associated with medication errors, loss of information related to pending test results, and other problems related to a lack of primary care provider awareness of the hospitalization. Although the discharge summary is an important tool to summarize and transfer information about a patient’s hospital care to his or her outpatient providers, concerns about the timeliness, completeness, and accuracy of discharge summaries have been previously described and pose a threat to patient safety.

As the use of health information technology continues to grow, electronic programs for discharge summaries are likely to be widely adopted. Electronic summaries have many advantages, including the ability to standardize format, use existing information in the health information record, and immediately finalize the summary at the time of discharge. They also present the ability to copy and paste information from other parts of patients’ electronic medical records (EMRs), which may have unintended negative consequences. Prior studies have demonstrated that electronic discharge summaries improve the timeliness of summary completion, and most result in similar or improved quality compared with traditional dictated discharge summaries for medicine patients, but they have not yet been studied in surgical patient populations.

We sought to determine the timeliness of completion and quality of electronic discharge summaries compared with dictated summaries for surgical patients at an academic medical center. We also examined the relationship of the use of copying and pasting to discharge summary quality.

**Methods**

We conducted a retrospective pre-post study to assess the quality and timeliness of discharge summaries before and after the implementation of an electronic discharge summary program (EDSP).

**Setting**

This study was conducted at the Hospital of the University of Pennsylvania, a tertiary care teaching hospital in Philadelphia. The hospital had a preexisting computerized physician order entry system (Sunrise Clinical Manager; Allscripts, Chicago, IL). Although providers could create progress notes and handoff documents in the EMR, the system previously could not generate discharge summaries electronically.

Historically, discharge summaries were created by phone dictation. A pocket card containing dictation instructions and recommended format for discharge summaries was provided to residents during orientation (see Fig. 1). Dictations were sent for transcription, which typically took 5 to 7 days, and the final document was placed in our EMR archives. To comply with state regulations, dictated summaries were required to be signed <30 days after patient discharge, although providers were encouraged to complete dictation on the day of discharge or shortly thereafter.

**Intervention: electronic discharge summaries**

In July 2009, an EDSP was designed within our EMR. The program uses a template with prompts for discrete data or free-text entries, and all items in the template with the exception of hospital admission date, discharge date, and attending physician are optional. Admission date and discharge medications are the only aspects of the EDSP that are automatically imported from other areas of the EMR. Residents could choose to copy and paste information from an electronic handoff tool and electronic progress notes within our EMR into the EDSP, but this information does not autopopulate the electronic discharge summary. The EDSP could be edited and saved throughout the hospitalization. There was no associated change in the nursing practice at the time of discharge related to reviewing the summary before discharge. A portion of the electronic discharge summary template is shown in Fig. 2.

**FORMAT FOR DISCHARGE SUMMARY**

1. Patient Name – Spell Name
2. Patient Medical Record Number
3. Admission Date, Discharge Date
4. Principle Diagnosis
5. Secondary Diagnoses, Complications
6. Surgical Procedures, Date, Surgeon
7. Summary of Clinical Course
   a. Chief Complaint, HPI, PMH, Social History, Family History, PE.
   b. Significant Lab, Consultations, Radiologic Findings
   c. Hospital Course
   d. Discharge Instructions – Follow-up Meds, Diet, Physical Restrictions
   e. Condition on Discharge
8. State person who should receive copies [Spell names and give full addresses]

**Figure 1** Discharge summary dictation guide. HPI = history of present illness; PE = physical examination; PMH = past medical history.
All incoming interns are given basic education about discharge summaries during orientation, which includes information on how to use the EDSP. Providers were encouraged, but not mandated, to use the EDSP rather than dictation. An incentive to complete the electronic summary in a timely manner was provided by prohibiting summaries from being finalized electronically if not completed electronically within 5 days of discharge, in which case dictation would have been required. Implementation of the electronic summary format was quickly adopted by providers, with approximately 85% of discharge summaries completed electronically in the 1st year after implementation.

The completed summaries were electronically signed by the intern and stored in the EMR. During the study period, neither dictated nor electronic summaries were required to be reviewed or signed by an attending physician, and there was no standardized method for sending them to primary care providers outside our health system.

**Inclusion and exclusion criteria**

All patient discharges from the Hospital of the University of Pennsylvania with discharge summaries authored by surgical interns during the study periods from October 1 to December 31, 2008 (before the EDSP), and October 1 to December 31, 2009 (after the EDSP), were identified. A random sample of 100 dictated summaries and 100 electronic summaries were selected for inclusion in the study. The use of a random sample of discharges across all surgical services was designed to minimize the effect of any individual resident on our results. Patients who died during hospitalization were excluded.

**Study design**

The scoring tool was modeled after existing discharge summary quality tools, and the content was modified by the investigators on the basis of their expertise and the study goals. Before study commencement, the tool was tested and revised by the investigators using a small sample of summaries not included in the analysis. Grading rules were developed by consensus, and are included in the Appendix.

The scoring tool included 8 descriptive items and 13 quality items. The descriptive items included admission type, discharge destination, length of summary, length of stay, discharging service, summary format, use of copying and pasting, and time from discharge to completion of summary. Most descriptive items were transcribed from the summary onto the discharge summary tool by a research assistant. Admission type, discharge destination, and use of copying and pasting were identified by the graders. In this section, the use of obvious copying and pasting was defined as “a discharge summary in which the structure and content of the information is more appropriate for a progress note or sign-out, and does not fit the traditional format of a discharge summary.”

The 13 quality items varied in their objectivity and weight of contribution toward the final score, with either 2 or 3 points being the maximum number of possible points per item. For quality items that were not applicable to all hospitalizations (eg, pathology reports for patients who did not undergo biopsy or surgery), a “not applicable” option was available. Because inpatient charts were not available, pending test results was scored as absent only if obviously indicated (surgical pathology not yet available) but not mentioned in the summary. When grading the ability to communicate to the primary care physician, reviewers were instructed to take into account if pertinent history and physical exam, lab, radiologic, and/or other findings were noted in the discharge summary, using the guiding principle that the discharge summary is primarily a tool to help the next physician safely care for the patient. Readability includes an assessment of sentence structure (complete vs incomplete), grammatical errors, and general flow of the discharge summary. The total quality score was calculated by summing the score of the applicable questions, dividing by the total number of possible points (excluding any questions marked as not applicable), and multiplying by 100 (see Fig. 3).
Each summary was graded by 1 of 4 investigators (C.E.R., C.A.B., A.N., and S.S.). Two of the graders were board-certified internists, 1 was a 4th-year surgical resident, and 1 was a nurse. All graders had ample experience discharging patients and communicating with primary care providers, and 2 were formally trained in primary care. Ten percent of summaries were randomly selected and graded by all 4 investigators to determine interrater reliability using intraclass correlation coefficients (ICCs) in a 2-way mixed-effects model examining the reliability means.

Outcome variables

The primary outcome variable was the overall discharge summary quality score, calculated as a percentage of all possible points. We compared scores on each item between the dictated and electronic summaries. Secondary outcome variables included time to completion of summaries and summary length. Time to completion of summaries was defined as the number of days between the date of discharge and the date that the summary was completed.

<table>
<thead>
<tr>
<th>Quality Item</th>
<th>0 Absent</th>
<th>1 Inadequate</th>
<th>2 Present</th>
<th>3 Very thorough</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of admission and discharge</td>
<td>x</td>
<td>--</td>
<td>x</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Principle diagnosis</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Condition at discharge</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Follow-up appointment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Doctor’s name</td>
<td>x</td>
<td>--</td>
<td>x</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>- Clinic phone number</td>
<td>x</td>
<td>--</td>
<td>x</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>- Time frame for follow-up</td>
<td>x</td>
<td>--</td>
<td>x</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Follow-up instructions for physician</td>
<td>x</td>
<td>--</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Pending test results*</td>
<td>x</td>
<td>--</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Discharge medication list</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>--</td>
</tr>
<tr>
<td>Reason for hospitalization/HPI</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>--</td>
</tr>
<tr>
<td>Significant findings and test results</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>--</td>
<td>x</td>
</tr>
<tr>
<td>Procedures performed and findings</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>--</td>
<td>x</td>
</tr>
<tr>
<td>Pathology/cytology reports</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>--</td>
<td>x</td>
</tr>
<tr>
<td>Overall readability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to communicate to the primary physician</td>
<td>x</td>
<td>--</td>
<td>x</td>
<td>x</td>
<td>--</td>
</tr>
</tbody>
</table>

* If absent, graders were asked to indicate if it was pathology, lab results, or radiology results that were missing.

7 Each summary was evaluated for problems present in the summary that might affect readability, including grammar/spelling mistakes, temporal organization problems, obvious copy/paste, or other.

8 Each summary was evaluated for problems present in the summary that might affect ability to communicate to the primary provider for safe/effective care, including obvious medication discrepancy, obvious omission of relevant clinical information from hospital course, obvious omission of important/necessary follow-up, or other.

“x” indicates that this was a possible score for that individual quality item while “--” indicates this quality item was not able to receive this number of points.

Figure 3  Discharge summary evaluation tool: components and scoring system. HPI = history of present illness; N/A = not applicable.
If the time to completion was less than zero (the summary was completed before discharge) this value was set to zero for statistical analyses. Length of summary was defined as the number of words in the body of the summary but did not include information such as follow-up information and medications.

### Statistical analysis

Statistical analyses were performed using Stata version 11.0 (StataCorp LP, College Station, TX). Descriptive analyses of summary qualities are reported as means and standard deviations or as medians and interquartile ranges for continuous variables and as percentages for categorical variables. We compared the 2 summary types using a t test (total quality score), Wilcoxon’s rank-sum tests (length of stay, time to completion, length of summary, comparison of dictated vs electronic score for specific quality aspects), a chi-square test (discharge destination), and a Fisher’s exact test (admission type) as appropriate.

This study was approved by the Institutional Review Board of the University of Pennsylvania.

### Results

Of the 200 discharge summaries identified for study inclusion, 195 were included for analysis (Table 1). Five were excluded because the patients died before discharge.

Overall characteristics of the hospital course and discharge summaries are shown in Table 1. There was no statistical difference between dictated and electronic summaries in terms of admission type ($P = .11$) or discharge destination ($P = .34$), while length of stay was different ($P = .02$). Overall, 49% of admissions were emergent, the median length of stay was 5 days, and 87% of patients were discharged home. Median time to completion of summaries was significantly shorter for electronic summaries (0 days, indicating completion on the day of discharge) compared with dictated summaries (6 days after discharge) ($P < .01$). Length of summary was also shorter for electronic summaries ($P < .001$).

Although the electronic discharge summaries were intended to be created such that they could not be electronically signed >5 days after discharge, we found 5 summaries that were signed electronically 12 to 19 days after discharge. Additionally, 4 summaries were signed in our EMR (as dictated summaries would be) without any modifications to the electronic version of the summary. One summary was never finalized.

Interrater reliability for the overall quality score was very good (ICC, 0.90), while the ICCs for each specific quality item ranged from 0.27 to 0.97 (Table 2). Follow-up instructions for physicians (conditions or results that needed to be reassessed or monitored by the outpatient physician) had the lowest ICC, with poor agreement. Principal diagnosis, condition at discharge, presence of follow-up provider’s number, and discharge medication list had the highest ICCs, with almost perfect agreement. It was not possible to calculate a single meaningful measure of reliability for 2 binary quality items, because of the very low incidence of a negative response and the limitations of the k paradox. All other items had at least strong agreement, except ability to communicate, which had moderate agreement.

Mean quality item scores are shown in Table 2. Overall summary quality was slightly higher for electronic summaries compared with dictated summaries, but not statistically different (total score, 75% vs 72%). Electronic summaries more often contained the follow-up provider’s number, follow-up instructions for the physician, pending test results, and completion of necessary follow-up. The most common medication on discharge was metronidazole (19% of patients), followed by amoxicillin (15%).

### Table 1 Hospitalization and discharge summary characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Dictated</th>
<th>Electronic</th>
<th>$P^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of discharges</td>
<td>96</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>Admission type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>54 (57%)</td>
<td>44 (45%)</td>
<td>.11</td>
</tr>
<tr>
<td>Emergent</td>
<td>41 (43%)</td>
<td>53 (55%)</td>
<td></td>
</tr>
<tr>
<td>Length of stay (number of days)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>5</td>
<td>4</td>
<td>.02</td>
</tr>
<tr>
<td>Range</td>
<td>2–21</td>
<td>1–44</td>
<td></td>
</tr>
<tr>
<td>Discharge destination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>84 (89%)</td>
<td>83 (85%)</td>
<td>.34</td>
</tr>
<tr>
<td>Facility</td>
<td>10 (11%)</td>
<td>15 (15%)</td>
<td></td>
</tr>
<tr>
<td>Time to completion (number of days)</td>
<td></td>
<td></td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Median</td>
<td>6</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>0–49</td>
<td>0–45</td>
<td></td>
</tr>
<tr>
<td>Length of summary (number of words)</td>
<td></td>
<td></td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Median</td>
<td>216</td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>22–970</td>
<td>0–1,081</td>
<td></td>
</tr>
</tbody>
</table>

*P values for tests comparing total for dictated summaries versus total for electronic summaries for each characteristic (chi-square tests for admission type and discharge destination and Wilcoxon’s rank-sum tests for length of stay, time to completion, and length of summary).
The only quality aspect of electronic summaries that was significantly worse in electronic summaries was the readability of summaries. Although we are unable to determine the reason for this difference in our study, it is possible that the readability of dictated summaries more closely mimics prose. Ability to communicate is of particular interest to this type of study, and we found that 34% of all summaries would definitely help care, while 18% were graded as possibly hindering care.

We examined the relationship between length of discharge summary in number of words and the total quality score, which were related. For each additional word in the summary the final score increased on average by 0.03 points ($P < .001$), and length of summary accounted for approximately 11% of the variation in total quality score (Fig. 4).

For the 53 discharge summaries identified as having missing pending test results, 52 (98%) were missing instructions to follow up on pathology results, and they were more often dictated summaries. Five (9%) were missing instructions to follow up on laboratory results (Table 3). The most common problem contributing to poor readability was temporal organization problems, while the most common problem contributing to poor ability to communicate was obvious medication discrepancy.

Eight (8%) electronic summaries had obvious use of copying and pasting. Although there was no significant difference in the overall quality score between summaries graded as using copying and pasting and all other summaries, there was a difference in readability (Table 4), and 7 of the summaries cited use of obvious copying and pasting as the reason for poor readability. To illustrate this problem, an excerpt from a summary that was graded as having obvious use of copying and pasting is shown in Fig. 5.

**Comments**

The implementation of an electronic discharge summary platform significantly improved the timeliness with which summaries were completed, without sacrificing the quality

![Figure 4 Relationship between length of discharge summary and total quality score.](image-url)

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Discharge summary quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Dictated (mean score)</td>
</tr>
<tr>
<td>Dates of admission and discharge</td>
<td>2.00</td>
</tr>
<tr>
<td>Principal diagnosis</td>
<td>1.95</td>
</tr>
<tr>
<td>Condition at discharge</td>
<td>1.34</td>
</tr>
<tr>
<td>Follow-up provider</td>
<td>1.65</td>
</tr>
<tr>
<td>Name</td>
<td>1.92</td>
</tr>
<tr>
<td>Phone number</td>
<td>0.35</td>
</tr>
<tr>
<td>Time frame</td>
<td>1.90</td>
</tr>
<tr>
<td>Follow-up instructions</td>
<td>1.15</td>
</tr>
<tr>
<td>Pending results</td>
<td>0.06</td>
</tr>
<tr>
<td>Discharge medication list</td>
<td>1.34</td>
</tr>
<tr>
<td>History of present illness</td>
<td>1.79</td>
</tr>
<tr>
<td>Significant findings</td>
<td>1.51</td>
</tr>
<tr>
<td>Procedures</td>
<td>1.93</td>
</tr>
<tr>
<td>Pathology</td>
<td>0.37</td>
</tr>
<tr>
<td>Readability</td>
<td>2.17</td>
</tr>
<tr>
<td>Ability to communicate</td>
<td>2.06</td>
</tr>
<tr>
<td>Total score$^2$</td>
<td>72%</td>
</tr>
</tbody>
</table>

$^*${Using rank-sum test.}$^1${Using intraclass correlation, 2-way mixed-effects models testing reliability of the mean for all quality items.}$^2${Score not valid because values were constant between graders.}$^4${Unable to calculate because of extremely low incidence of negative responses and the $\kappa$ paradox.$^5${Significant at $\alpha < .05$.}$^6${Calculated by adding the individual quality aspect scores, dividing by the number of possible points, and multiplying by 100 (after excluding any questions marked as not applicable).}
ogy to improve patient care.16 The discharge summary has
clinicians based on the ability of their EMRs to use technol-
quality of care provided during an acute care hospitalization.
summaries to stakeholders such as patients and primary care
status at the time of discharge.
that the document provide a comprehensive yet succinct
delayed postoperative complications are likely to present
patients call with postoperative concerns to outpatient staff
available to physicians regarding recent admissions when
members or present for readmission. As inpatient length of
charge summaries is a relevant curriculum target.
documents. Our study adds to the body of literature
by analyzing electronic discharge summary quality for
surgical patients cared for at an academic center. To our
knowledge, it is the first study to focus on surgical
discharges and the first to attempt to identify and assess
the impact of the unique capability presented by the
electronic platform (the ability to copy and paste) on
discharge summary quality and readability.
The discharge summary is often the sole source of
information for referring physicians, home health aides,
and subacute, rehabilitation, and nursing home facilities.
Additionally, it is often the only information immediately
available to physicians regarding recent admissions when
calls with postoperative concerns to outpatient staff
members or present for readmission. As inpatient length of
stay after surgery decreases, patients who experience
delayed postoperative complications are likely to present
as outpatients, further increasing the importance of accurate
and readable discharge summaries. Thus, it is imperative
that the document provide a comprehensive yet succinct
description of the hospital course as well as the patient’s
status at the time of discharge.
The timely completion and transmission of discharge
summaries to stakeholders such as patients and primary care
providers has been identified as a key determinant of the
quality of care provided during an acute care hospitalization.
The Health Information Technology for Economic and
Clinical Health Act creates incentives for hospitals and
clinicians based on the ability of their EMRs to use technol-
y to improve patient care.16 The discharge summary has
been branded as a “meaningful use” objective in the act.
Similarly, the National Quality Forum17 has endorsed the
complete and timely discharge summary or similar transition
record as a performance measure for care coordination. To
receive credit for quality care, hospitals will need to devise
strategies to ensure completion and transmittal of high-
quality summaries in a timely fashion.
Institutional concerns about the impact of electronic
discharge summaries on summary timeliness and quality
prompted us to perform this study. We demonstrated that
electronic summaries did not sacrifice the overall quality of
hospital discharge summaries for a surgical patient popu-
lation. Additionally, they outperformed dictated summaries
in several specific quality components and were similar in
most others. This finding emphasizes the importance of
reviewing electronic discharge summaries early in the
implementation period to identify and mitigate quality
concerns and “bad habits.” This allows health care institu-
tions to identify opportunities for improvement, in terms
of both electronic formatting and educational interventions
for surgical trainees. For example, a previous study of a
discharge summary curriculum for medical residents at our
institution demonstrated improvements in summary quality
when a strategy of individualized summary review and
feedback for interns accompanied a brief curricular inter-
vention.13 Given the Accreditation Council for Graduate
Medical Education core competencies in systems-based
practice and practice-based learning, and the external
drivers to improve the safety of hospital transitions and re-
duce readmissions, education around the quality of dis-
charge summaries is a relevant curriculum target.
The change in quality reported after the implementa-
tion of electronic discharge summaries has varied in the liter-
9–11,18–20 In this study, some aspects of the discharge
summary improved, while others did not. We believe that
the improvement in documentation of pending test results
was due to the inclusion of a specific prompt for this in
the EDSP, which was not present in the guide for dictated
summaries. The quality of the discharge medication list
improved significantly, likely because of the improvement in
the timeliness of the EDSP. Although the suggested outline
for dictated discharge summaries included discharge medica-
tions, residents may not have seen the value in recreating
that list because dictated summaries were typically created
days after discharge. The EDSP also incorporated the
discharge medication list automatically from the electronic pa-

tient discharge instructions, creating an efficient method for
including a complete and accurate discharge medication
list. The improvement in the quality of follow-up instruc-
tions and the increase in the presence of a follow-up pro-
vider phone number may similarly reflect the inclusion of
a specific prompt for this information as well as the ability
to complete summaries and provide copies to patients on
the day of discharge. The fact that electronic prompts in
the EDSP cued the residents to include many of the quality
items that improved in the electronic discharge summary
supports the patient safety principle that prompts, check-
lists, and systems that are designed to make the right thing
to do the easy thing to do, are more likely to result in mean-
ningful behavioral change.
Although most discharge summary items were similar or
improved in quality in the EDSP, we found a decrease in

| Table 3 | Discharge summaries with absent follow-up instructions |
|---------------------------------|----------------|----------------|
| Missing instructions to follow-up on | Dictated | Electronic | Total | P*  |
| Pathology | 31 (32%) | 20 (20%) | 51 (26%) | .06  |
| Laboratory results | 2 (2%) | 3 (3%) | 5 (3%) | .68  |
| Radiologic results | 0 (0%) | 0 (0%) | 0 (0%) | —    |

*Using chi-square tests.

| Table 4 | Obvious and inappropriate use of copying and pasting in discharge summaries |
|----------------|----------------|----------------|
| Variable | Obvious copying and pasting | No (n = 89) | P*  |
| Mean total score | 72.4 | 76.0 | .38  |
| Mean readability | 1.4 | 2.0 | .02  |

*P value for total score calculated using a t test and for readability using a Wilcoxon’s rank sum test.
the readability of the summary, which may be related to the increased use of copying and pasting. The use of copying and pasting, in which text from one part of the EMR is reproduced in another part, has been described in the literature and can result in outdated, inaccurate, or error-prone documentation when used in excess without appropriate editing.\textsuperscript{21–23} Maslove et al\textsuperscript{10} cited concerns about copying and pasting as a reason for evaluating the quality of discharge summaries, but the frequency of this practice was not studied in this or any other study to our knowledge. This may be due in part to the challenges associated with identifying copy-and-paste behavior.

In our review of 100 electronic discharge summaries, 8 summaries were clearly identified as having used copying and pasting, because the documents were in formats that were more appropriate for progress notes or sign-outs than discharge summaries. These summaries had lower scores on readability, presumably related to the distracting and illogical nature of the documentation. Although this number seems relatively low, we believe this is an underestimation of clinically important and inappropriate copying and pasting. A potentially better method for the identification of the inappropriate use of copying and pasting in the EMR, and one that deserves future research, is real-time feedback on the electronic documentation skills of trainees by a clinician involved in the care of the patient. Because health care increasingly relies on the EMR as the primary mode of information transfer, future studies can build on our work to develop more robust methods of identifying and quantifying the impact of appropriate and inappropriate use of copying and pasting on documentation quality.

Although others have demonstrated improved timeliness with electronic discharge summaries,\textsuperscript{11,22,23} we found even greater improvements in timeliness, with the majority of our electronic summaries completed on or before the day of discharge. This substantial improvement may reflect a preference for the electronic format, possibly because of the ability of multiple providers to contribute and for information to be captured throughout the hospitalization. One major benefit of the electronic format is the ability to work on the discharge summary throughout the hospital course, so that on the day of discharge, completion of the summary requires only a brief update. For summaries that are dictated, the entire course has to be reviewed at the time of dictation, which can be a significant barrier on a busy inpatient service. Thus, we believe that electronic summaries that can be edited during the stay are more apt to be completed in a timely manner. It may also reflect the growing culture within our institution regarding the importance of timely communication at discharge. Finally, we believe that the incentive process was a powerful motivator to improve summary timeliness. Our incentive process required physicians to dictate their summaries if they did not complete them electronically within 5 days. This strategy and finding could easily be adopted by other teaching hospitals as even incremental improvements in discharge summary timeliness may have implications for patient safety. However, because the timely completion of a discharge summary is only the first step in the important process of communication with the next provider of care, the most recent iteration of our EDSP includes a prompt for providers to indicate what communication method was used at discharge (eg, phone call, e-mail, faxed summary).

Our study had several limitations. Discharge summaries were analyzed by reviewers who did not have specific knowledge of the patients’ hospital courses and did not compare the summaries with the inpatient medical record. Thus, omission of important information was only identified if it was obvious from the summary that relevant information had been excluded. However, many aspects of a discharge summary do not require detailed knowledge of the hospitalization, and this situation simulates the scenario in which outpatient providers interpret discharge summaries when patients are evaluated in hospital follow-up settings. Furthermore, previous studies of discharge summary quality used a similar approach to ours, and we believe this added to the content validity of our discharge summary tool.\textsuperscript{9–11} Reviewers were not blinded to the dictated versus electronic status of the discharge summary (because of distinct formatting). Because of the focus on summaries authored by interns, these results cannot be extrapolated to summaries performed in nonteaching hospitals by attending physicians or nonphysician providers. Interrater agreement was low on 1 item, possibly reflecting the fact that consensus does not yet exist on which items require follow-up.

\begin{table}
\centering
\begin{tabular}{|l|}
\hline
Figure 5 & A copied and pasted excerpt (as it appeared in the final discharge summary). \\
\hline
\end{tabular}
\end{table}

\textbf{Surgery}  
\textbf{Hospital Course:}  
\texttt{xx/8-9: no events}  
\texttt{xx/10: consult for peg tube. Diarrhea resolved. Insulin regimen changed due to hyperglycemia. Pan cultured for fever 102.6, results negative}  
\texttt{xx/11: Peg tube placed by GI (Dr. AA). 8.0 slivery tracheostomy placed (Dr. BB)}  
\texttt{xx/12: Tolerated ten hours of trach collar}  
\texttt{xx/13: EEG showed no seizures. Tolerating trach collar trials}  
\texttt{xx/14: tracheostomy collar tolerated for 24 hours. Pan culture results negative}  
\texttt{xx/15: Transferred from neurosurgical intensive care unit to intermediate intensive care unit. Remain on 30\& humidified trach collar. Patient with diarrhea, c-diff sample sent. Rectal tube placed.}  

\textbf{Figure 5}  
A copied and pasted excerpt (as it appeared in the final discharge summary).
Conclusions

When compared with dictated discharge summaries, electronic discharge summaries can improve timeliness without sacrificing the overall quality of hospital discharge summaries for a surgical patient population. In teaching hospitals, interns and residents author the majority of these summaries, and it is important for hospital leaders and medical educators to review the quality of these discharge summaries to identify opportunities for improvement and respond to them with the creation of educational and information technology interventions. As the topics of health information technology and safe transitions of care remain at the forefront of health care reform, future studies of discharge summaries and related transition-of-care documents (ie, change of shift handoff) should explore both the positive and negative impacts of copying and pasting on the quality of electronic documents within the medical record.

References


Appendix

Discharge Summary Scoring Rules

As you read rules below, use the guiding principal that the discharge summary is a tool to help the next physician (inpatient or outpatient) safely care for the patient. We are not grading the quality of care delivered by the inpatient physician. We are grading the discharge summary. As you go through the discharge summaries, stick to the rules and keep in mind…Will this discharge summary help the outpatient physician when the patient follows up? Will this discharge summary help the next inpatient physician if the patient is readmitted?

1. Read the discharge summary in its entirety first, before you begin to score the discharge summary.
2. If unsure of author status, look at attached list of listed authors, and addendums, if present.
3. Length of discharge summary should be taken as the number of words from just below the *Final Report* *heading though entire rest of the document (including listed authors, and addendums, if present).*
4. Pay close attention to the date of discharge summary completion. On dictated discharge summaries, it’s listed toward the bottom of the summary and preceded by “/mrc D…” The date of transcription immediately follows the date of completion. For typed summaries, the date of completion is toward the top of the summary and preceded by “Verified by…”

5. For pertinent findings, we have separated them into pertinent Hx and physical exam, lab, radiologic, and/or other findings. Use the guiding principal that the discharge summary is a tool to help the next physician (in-patient or outpatient) safely care for the patient.
- We’ve decided to give the discharge summary some latitude with regard to exam findings.
- ‘other’ tests include echo, EEG, vascular lab tests, PFTs, etc.
- Procedures include more invasive diagnostic and therapeutic maneuvers. Examples include EGD, cardiac cath, ERCP, TEE, PICC line, central line, thoracentesis, vascath, etc, etc.
  - Not all procedures will have “findings”. For example a PICC line or vascath placement, for the most part, does not have applicable findings. Therefore, for certain procedures, marking “not applicable” is appropriate.

6. If you notice that the list of discharge medications is clearly incorrect, then mark it as “inadequate”. In most cases it will be difficult to tell if there are any errors on the list of discharge medications. See next…

7. For follow up issues, the question is…Were clinical conditions that need to be reassessed or monitored by the outpatient physician noted in the discharge summary? For example, a lung nodule that needs to be evaluated with repeat CT in 12 weeks. Duration of antibiotics is another example of a follow up issue that needs to be known. Another example of a follow up issue that needs to be addressed is titration/adjustment of medications. For example, if a pt’s blood pressure meds were held because the pt was hypotensive in the hospital, the discharge summary should mention that blood pressure meds may need to be resumed.
  - If no mention, mark as “absent”. If the discharge summary indicated that no issues needed specific follow up, mark as “present”

8. For pending test results, the question is…Were tests for which the result was pending at the time of discharge listed in the discharge summary?
  - If no mention, mark as “absent”. If the discharge summary indicated that no test results were pending, make as “present”

9. For information provided to the patient and/or family, the question is…Was information provided to the patient and/or family noted in the discharge summary? (e.g. Were follow up appts mentioned?)
  - If the patient was instructed to “find a primary care physician”, this would be inadequate. A name and time frame (Dr. Smith in 2-3 weeks) are needed at a minimum.

10. Labs, radiological studies, procedures, stress tests, and pathology may not been applicable if not performed. Because follow up issues were considered extremely important in our survey, some mention of follow up issues is required (even when there are none, it should be listed as such)

11. For the rating of readability, the question is really trying to get to whether the reader got a clear picture of what happened to the patient during the hospital stay.

12. For the rating of whether the discharge summary facilitates safe and effective care, think about whether you would need to track down additional information to safely care for this patient. If so, the rating should be -1 or -2.