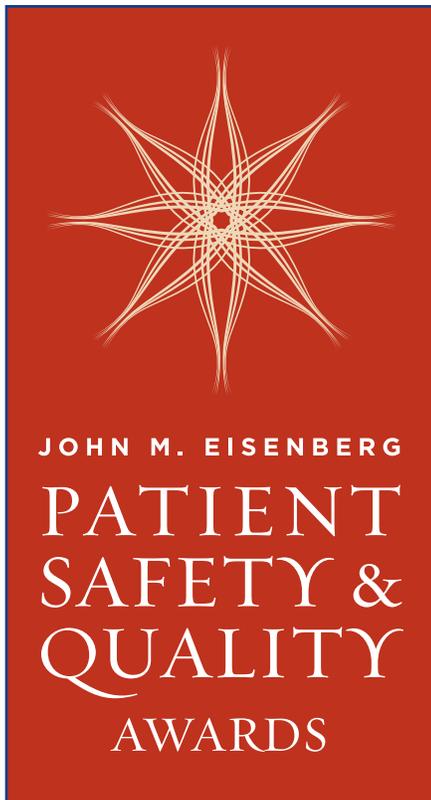


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2013 John M. Eisenberg Patient Safety and Quality Awards

Individual Achievement

- An Interview with Gail Warden

Innovation in Patient Safety and Quality at the National Level

- Reducing Avoidable Hospital Readmissions Effectively: A Statewide Campaign
- Patient Safety First . . . a California Partnership for Health

Innovation in Patient Safety and Quality at the Local Level

- The Vidant Health Quality Transformation

Methods, Tools, and Strategies

- Development and Sustainability of an Inpatient-to-Outpatient Discharge Handoff Tool: A Quality Improvement Project

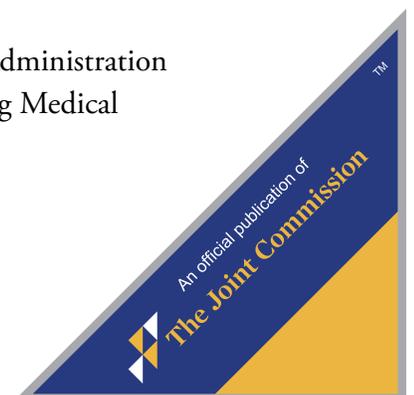
Care Processes

- Using a Triggered Endocrinology Service Consultation to Improve the Evaluation, Management, and Follow-Up of Osteoporosis in Hip-Fracture Patients

Department

Case Study in Brief

- Surgical Programs in the Veterans Health Administration Maintain Briefing and Debriefing Following Medical Team Training



Methods, Tools, and Strategies

Development and Sustainability of an Inpatient-to-Outpatient Discharge Handoff Tool: A Quality Improvement Project

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The period after hospital discharge is fraught with hazards for patients, who are at risk for medication errors, missed test results, adverse events, and readmissions.¹⁻³ Poor communication and information transfer between the inpatient and outpatient settings at the time of discharge have been identified as important potential causes of these hazards.⁴ In response, six societies (American College of Physicians, Society of General Internal Medicine, Society of Hospital Medicine, American Geriatrics Society, American College of Emergency Physicians, and Society for Academic Emergency Medicine) in 2009 issued a consensus policy statement identifying standard communication formats as an important component of safe transitions of care between inpatient and outpatient settings.⁵

Handoff communication between the inpatient and outpatient settings is primarily accomplished with the discharge summary. However, critical information can often be missing, such as the date of the first postdischarge follow-up visit, a complete and accurate list of discharge medications, and follow-up recommendations.⁴ Although electronic medical records (EMRs) have improved the timeliness and availability of discharge summaries,⁶⁻¹⁰ they have had mixed results at improving the quality of the discharge summary.^{4,8,11,12} It remains unclear whether improving the quality of discharge summaries improves health outcomes.^{11,13} One robust finding is that standardized and structured summaries have more utility than typical discharge summaries to outpatient providers needing to extract clinically relevant information in the postdischarge follow-up visit.^{14,15} Although earlier studies reported on the impact of simplifying and standardizing the transfer of discharge information,^{16,17} and more recent studies reported on creating an electronic discharge summary,¹⁰ the handoff between inpatient and outpatient providers has remained the focus of interest.

Inpatient-to-inpatient handoffs could serve as a model for an improved inpatient-to-outpatient handoff tool. However, despite extensive interventions, studies, and recommendations,^{18,19} recent reviews conclude that high-quality studies with strong

Article-at-a-Glance

Background: After hospital discharge, patients are at risk for medication errors, missed test results, adverse events, and readmissions. Handoff communication between the inpatient and outpatient settings is primarily accomplished with the discharge summary. However, critical information can often be missing, such as the date of the first postdischarge follow-up visit, a complete and accurate list of discharge medications, and follow-up recommendations. There have been no studies focusing on identifying and implementing a parsimonious, clinically relevant, inpatient-to-outpatient discharge handoff tool within a fully integrated electronic medical record (EMR) system. A concise, written, electronic handoff communication tool was created to address this gap.

Methods: Using inpatient and outpatient provider stakeholder input, a standard, succinct, and clinically relevant handoff tool was designed and implemented within the Veterans Affairs EMR. Retrospective chart review at 3 and 15 months after the handoff tool rollout in December 2010 was conducted to monitor handoff uptake and outcomes.

Results: At 15 months after implementation, 86% (129/150) of patients had a completed handoff at the time of discharge. More handoff notes were available in the EMR within 24 hours of discharge than discharge summaries (100% versus 77%, $p < .0001$). There was no difference between those patients with or without a handoff in the number of emergency department visits or readmissions.

Discussion: A standardized clinically relevant discharge handoff tool had high user uptake and sustainability and improved timeliness of communication of information between the hospital and outpatient setting. Even within a fully integrated EMR system, simple and efficient handoffs between inpatient and outpatient providers may fulfill a communication gap at the time of discharge.

empirical evidence linking handoff characteristics and best practices with outcomes are lacking.²⁰⁻²² Recently, a conceptual framework for the functions of inpatient-to-inpatient handoffs has been proposed.²³ One lesson from this literature is that standardizing handoff formats seems to improve the communication of important information.

In this article, we describe a quality improvement (QI) project in which we created a novel electronic handoff communication tool between the inpatient and outpatient teams at the time of hospital discharge. We used recommendations put forth in the review article by Kripilani et al. on deficits in communication between inpatient and outpatient providers, the transitions of care consensus policy statement, and lessons from the inpatient-to-inpatient handoff literature, to guide the information content of our electronic handoff intervention.^{4,5} To our knowledge, there have been no studies focusing on identifying and implementing a parsimonious, clinically relevant, inpatient-to-outpatient discharge handoff tool within a fully integrated EMR system. To address this gap, we created and implemented a concise, written, electronic handoff communication tool to improve postdischarge care.

In 2010 the Veterans Affairs (VA) health care system underwent a transformation to patient-centered medical homes within each primary care clinic, which are called patient aligned care teams (PACTs).²⁴ One of the required components in this transformation was to use handoffs to improve the discharge communication between inpatient providers and the outpatient PACTs. To implement these national goals at our facility, we implemented a novel hospital-to-clinic handoff tool in December 2010. Our objectives were as follows:

1. Develop a standardized, succinct, clinically relevant discharge handoff tool by engaging key inpatient and outpatient stakeholders.
2. Determine whether this tool would have high user uptake, be sustainable, and improve the timeliness of communication from the inpatient to outpatient settings.
3. Determine whether the use of this tool would be associated with primary care provider (PCP) follow-up postdischarge and reduced emergency department (ED) visits and readmissions.

Methods

SETTING

This work took place on the medicine service at the San Francisco VA Medical Center (SFVAMC), a 104-bed hospital. The medicine service at the SFVAMC consisted of 10 teams—each with an attending, a senior resident, and two interns. The average daily census for the teams was approximately 8 to 12

patients. Each team discharged an average of 4 to 7 patients per week. Each medicine team changed on a monthly basis as house staff rotated through different services. Most hospitalized adults at the SFVAMC were affiliated with either the hospital-based primary care clinic or one of six regional primary care clinics called community-based outpatient clinics (CBOCs). Each CBOC lies from 5 to 300 miles from the main campus and contains anywhere from two PACTs in the smallest CBOC to nine PACTs in the largest hospital-based primary care clinic at the medical center. A PACT consisted of one physician or nurse practitioner PCP, one RN care manager, one licensed vocational nurse, and one clerk, with associated pharmacist, nutritionist, and social worker coverage for multiple PACTs. Depending on whether the PCP is a physician or nurse practitioner, each PACT had a patient panel range of 800 to 1,200 per one provider (MD, nurse practitioner) full-time equivalent.

The SFVAMC and all of its CBOCs used the same EMR system—called the Computerized Patient Record System (CPRS). CPRS is a fully integrated EMR, with all notes, orders, and results placed in the electronic chart, including discharge summaries.

DISCHARGE PROCESS

At the outset of our QI project—in August 2010—the discharge process at the SFVAMC consisted of the following steps:

1. Completion of an electronic patient discharge instructions note by house staff and delivered to the patient before discharge
2. Arrangement of outpatient primary care follow-up appointments
3. An automated electronic notification to the PCP that the patient has been discharged
4. Completion of the discharge summary (a detailed description of the patient's admitting symptoms, hospital course, and discharge plan) by house staff within three days of discharge.

Outpatient primary care follow-up appointments were made either by a unit clerk or house staff. When an appointment could not be made at hospital discharge, patients were given numbers to call to arrange for a clinic follow-up visit. Outpatient teams could also contact the patient after he or she had received the automated notice of discharge and schedule a follow-up appointment.

This project took place under the supervision of SFVAMC leadership. Per University of California, San Francisco Committee on Human Research guidelines, this work was classified as a QI activity and did not require formal Institutional Review Board review.

Handoff Tool Implementation Time Line

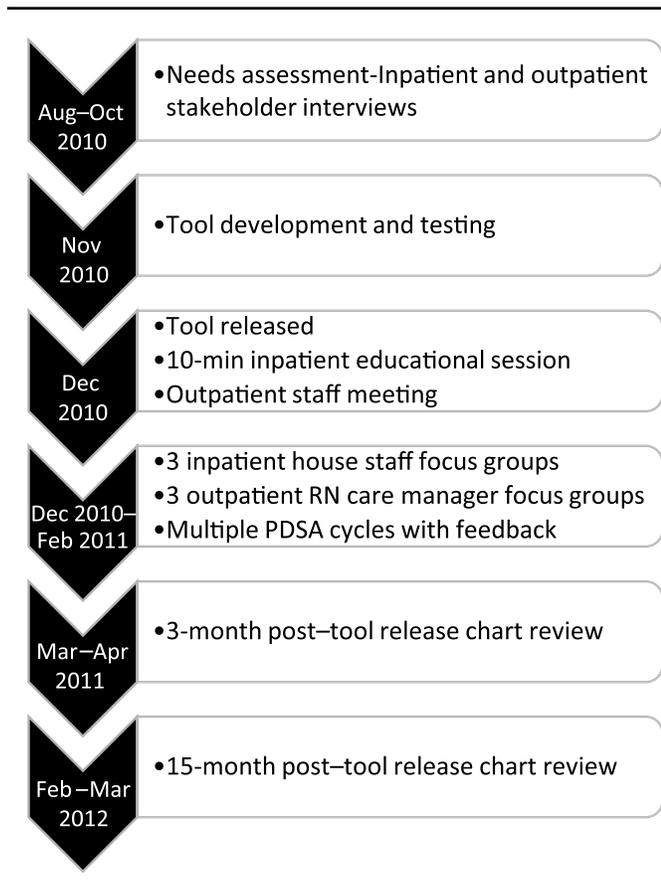


Figure 1. A time line for the development and implementation of the inpatient-to-outpatient discharge handoff tool is shown. PDSA, Plan-Do-Study-Act.

HANDOFF INTERVENTION: DEVELOPMENT AND IMPLEMENTATION

A time line for the tool’s development and implementation is shown in Figure 1 (above). A needs assessment was conducted with key stakeholders in a three-month period. The clinic medical director and network ambulatory care director, clinical physician leaders, clinic nurse manager, medicine chief residents, and the inpatient hospitalist director were all interviewed with respect to the optimum discharge information content, format, and length for the handoff.

On the basis of the stakeholder interviews and the transitions of care consensus policy statement,⁵ we created a pilot version of the discharge handoff tool. We tested the tool with inpatient house staff (a total of six residents and interns) for feedback about content, usability, and likelihood of use. We proceeded to develop a final version of the handoff tool as the intervention. As shown in shown in Figure 2 (page 222), it contained

six sections—primary care provider and hospital providers, discharge date and diagnosis, follow-up appointments, pending labs/tests/procedures, other pertinent information, and home care services arranged. Medications at discharge were not included in the handoff, as a concurrent QI project was focusing on discharge medication reconciliation.

The handoff tool was integrated into the discharge work flow as a part of the suite of electronic tools used by inpatient providers at the time of discharge. The tool was available to all providers, but use was optional and did not require an active “opt out” decision by the inpatient provider completing the required discharge documentation. The handoff tool was linked to a required element for discharge, the patient discharge instructions note, to increase the likelihood that the handoff would be completed on the day of discharge. The intended receivers were outpatient RN care managers and primary care providers in the PACTs. RN care managers were designated as the first-line receivers. They received electronic notification that a handoff had been completed for a patient in their clinic, as well as automated printouts of the handoff in their clinics. In the PACT model, the RN care managers were then asked to share the discharge handoff information with their providers during their daily huddles. During the huddles, providers could then discuss appropriate follow-up and any other issues they wanted to address ahead of the actual discharge follow-up appointment. A single training session was held with the hospital-based primary care clinic and CBOC nursing and clerk staff about the process of receiving the discharge handoff information and the subsequent triage of the information contained in the handoff.

One 10-minute, in-person, educational session describing how to complete the handoff tool was given to inpatient house staff. The handoff tool was activated in the EMR simultaneously with streamlined text and instructions on how to use the handoff tool, for inpatient providers unable to attend the training session.

After the tool’s activation in December 2010, three sessions within the first three months were conducted with both inpatient house staff and outpatient RN care managers and PCPs, with use of Plan-Do-Study-Act (PDSA) cycles to review issues and problems with the implementation, content, delivery, utility, and dissemination of the tool. We focused particularly on the RN care managers, who were the main operators in ensuring care coordination between the hospital and the outpatient clinics. One issue addressed in the PDSA cycles was the uncertainty resulting from an empty section of the handoff tool. For example, if the “Pending labs and tests” section was not completed, the RNs were unsure if the lack of information meant there were

no labs to follow up on, or whether the resident failed to comment on pending labs/tests. We then instituted a yes/no radio button for particular sections of the handoff to signal active resident review of that section (Figure 2).

HANDOFF EVALUATION

Our study sample was chosen from an ordered list among all patients discharged from the medicine service during a 6-week period that began 3 months (March–April 2011) and 15 months (February–March 2012) after implementation of the tool. The list was ordered by alphabetic sequence of the patients' last names, and the chart review started with last names beginning with the letter *A* and proceeded through the alphabetized list as the availability of staff to conduct chart reviews permitted. After 3 and 15 months of implementation, 118 and 150 charts were abstracted, respectively. The second period was chosen approximately one year after the first to ensure a comparable sample, given the time of year and training experience of the house staff. Patients who died during admission or by 30 days postdischarge, were transferred to another primary service such as surgery, were discharged to a nursing home or hospice, left the hospital against medical advice, had a scheduled readmission for any reason, or belonged to a primary care clinic that was not set up to receive a discharge handoff were excluded.

The primary outcome of this analysis was the handoff uptake, which was defined as the proportion of discharges in which the handoff tool was completed (number of patients with a completed handoff tool/number of patients discharged). Secondary outcomes were categorized as process, balance, and

Inpatient-to-Outpatient Discharge Handoff Tool

Primary Care Provider (if blank, pt. unassigned) :

Inpatient Intern: * _____

Pager Number (include area code): * _____

Inpatient Resident: * _____

Pager Number (include area code): * _____

Expected Discharge Date: _____

Primary Admission Dx: * _____

Other Major Pertinent Dx: _____

Follow-up Appointments: FUTURE APPOINTMENTS - NONE FOUND - 2Y

Are there pending Lab Tests, Radiographic Tests, and Procedures at Discharge? * Yes No

If yes, list the tests that have ALREADY BEEN ORDERED, but results need follow-up by PACT team. Type in the test ordered, and write in WHEN results need to be followed up on.

For Results that need follow-up in <48 hrs, you must also CALL THE PCP OR THE PACT TEAM to notify them of urgent results follow-up.

Is there other pertinent info for the Handoff? * Yes No

Please free text any pertinent info that the PACT outpatient teams should know. Such as further workup needed as outpatient, diagnostic dilemmas or concerns, etc.

Are there home care services that have been arranged? * Yes No

If yes, free text any Nursing, PT/OT, Wound Care, or Other services that have been arranged.

Figure 2. All fields except for the Primary Care Provider (PCP) and Follow-up Appointments section are free text. PCP name and follow-up appointments are automatically pulled in from the electronic medical record. Examples of information in the "pertinent info for the Handoff" section might include "follow-up on colonoscopy polyp biopsy results" or "anemia was stable throughout hospitalization, consider further outpatient workup." 2Y, 2 years; Dx, diagnosis; PACT, patient aligned care team; PT/OT, physical therapy/occupational therapy.

outcome measures. The process measures we assessed were (1) sustainability—by comparing the proportion of patients with a completed handoff during each period—and (2) handoff section completion rates at the 15-month period (February–March 2012).

Table 1. Selected Characteristics

	3 Months After Handoff Tool Rollout (March–April 2011)			15 Months After Handoff Tool Rollout (February–March 2012)		
	Handoff: Yes <i>n</i> = 87	Handoff: No <i>n</i> = 31	<i>P</i> Value*	Handoff: Yes <i>n</i> = 129	Handoff: No <i>n</i> = 21	<i>P</i> Value*
Age, years (mean)	68.7	68.5	.96	70	70	.99
Female	6%	7%	1.0	4%	0%	1.0
Length of stay, days (mean)	4.2	4.2	.99	3.8	3.4	.67
Charlson comorbidity index—age adjusted (mean)	4.8	4.6	.70	5.6	5.8	.76
Prior hospitalization within 6 months	22%	42%	.037	34%	48%	.33

* Fisher's exact test or *t*-test where appropriate.

The balance measure we assessed was the elapsed time from discharge to PCP follow-up visit at the 3-month period (March–April 2011). The outcome measures we assessed were (1) timeliness, defined as the proportion of patients with a handoff tool communication or discharge summary available in the EMR within 24 hours and 1 week after discharge; (2) the number of patients with postdischarge ED visits and readmissions within 30 days; and (3) the elapsed time from discharge to ED visit or readmission.

HANDOFF DATA ABSTRACTION

Charts were abstracted by the first author [N.Y.M.] and two fourth-year medical students [T.C., B.G.], who received instruction on how to complete the abstraction form. The completed abstraction forms were then reviewed and compared to the EMR by the senior author for correct dates of admission, discharge, handoff and discharge summary completion, ED, and readmission.

HANDOFF DATA ANALYSIS

Handoff uptake is reported as a percentage of patients discharged with a handoff note in the EMR. The handoff section completion rate is reported as a percentage of handoff sections that were completed appropriately. All secondary outcomes were stratified by those who received a handoff and those who did not. Fisher's exact test was used to compare the proportion of patients with a primary care follow-up within 3 months of discharge. The Wilcoxon-Mann-Whitney test was used to compare the median elapsed time from discharge to primary care follow-up visit. We calculated the percentage of handoffs versus discharge summaries that were in the medical record within 24 hours and 1 week from discharge. The percentage of those discharged patients who had an ED visit and hospital readmission were counted as mutually exclusive events, as most readmissions

are via the ED. Fisher's exact test was performed to evaluate any differences in ED visits and hospital readmission rates between handoff groups. The Wilcoxon-Mann-Whitney test was used to compare the median elapsed time from discharge to ED visit or readmission. Multivariable logistic regression analysis was conducted, with ED visits and hospital readmission as dependent variables and use of the handoff note, age, sex, length of stay (LOS) age-adjusted Charlson comorbidity index score, and prior hospitalization within the last 6 months of the index hospitalization as independent variables. All analyses were performed using STATA statistical software, version 11.1 (StataCorp, College Station, Texas).

Results

SAMPLE CHARACTERISTICS

Patients in our sample averaged 69.3 years of age, with 5% female, with a mean LOS of 3.9 days and a mean age-adjusted Charlson comorbidity index score of 5.2. There were no significant differences in age, sex, LOS, or age-adjusted Charlson comorbidity index score between those patients who received a handoff and those who did not in either period. Patients receiving a handoff were less likely to have been hospitalized in the 6 months prior to the index hospitalization than those who did not at 3 months but not at 15 months after handoff tool activation (Table 1, above).

HANDOFF COMPLETION

After the first 3 months of handoff note activation, 87 (74%) of 118 patients had a completed handoff at the time of discharge. One year later, 129 (86%) of 150 patients had a completed handoff at the time of discharge (*p* = .012). More than 98% of all sections that required a resident to enter information (provider contact information, discharge date and diagnosis, pending labs and tests, other pertinent information, and home

Table 2. Handoff Section Completion Rates

Handoff Section	Provider Contact Information	Discharge Date and Diagnosis	Follow-Up Appointments	Pending Labs and Tests	Other Pertinent Information	Home Care Services
Completion Rate	100%	100%	Primary care physician—51% Any—92%	98%	99%	99%

Handoff section completion rates were calculated after 15 months of handoff tool activation (February–March 2012). For the Pending Labs and Tests, Other Pertinent Information, and Home Care Services sections, appropriate completion depended on choice of a radio button as to whether there was particular information to transmit in that section (see Figure 2). These sections were considered appropriately completed if the “yes” radio button was chosen and there was appropriate text in the section, or if the “no” radio button was chosen and there was no text in the section. Note that the Follow-Up Appointments section is autopopulated from the electronic medical record.

Table 3. Proportion of Handoffs versus Discharge Summaries Available in Medical Record*

	3 Months After Handoff Tool Rollout (March–April 2011)			15 Months After Handoff Tool Rollout (February–March 2012)		
	Handoff <i>n</i> = 87	D/C Summary <i>n</i> = 118	<i>P</i> Value*	Handoff <i>n</i> = 129	D/C Summary <i>n</i> = 150	<i>P</i> Value*
Within 24 hours	100%	68%	< .0001	100%	77%	< .0001
Within 1 week	100%	85%	< .001	100%	97%	.062

D/C, discharge.
*Test of proportions.

care services sections) were completed appropriately. The follow-up appointment section was autopopulated from the EMR (Table 2, above).

PRIMARY CARE FOLLOW-UP

After the first 3 months of handoff note activation, 95 (81%) patients had a primary care follow-up visit within 3 months of discharge. There was no difference ($p = .30$) between those patients with a handoff (72 [83%]) and those without a handoff (23 [74%]). Among those who had a handoff, there was a longer duration of time between hospital discharge and primary care provider follow-up, compared with those who did not get a handoff (median duration = 17 days [interquartile range (IQR) 10,32.5]) versus those without a handoff (median = 8 days [IQR 5,19; $p = .004$]).

HANDOFF VERSUS DISCHARGE SUMMARY TIMELINESS, 24 HOURS AND 1 WEEK POSTDISCHARGE

After the first 3 months of handoff note activation, more handoff notes were available in the EMR within 24 hours of discharge than discharge summaries (100% versus 68%, $p < .0001$), as well as within 1 week of discharge (100% versus 85%, $p < .001$). One year later, more handoff notes than discharge summaries were available in the EMR within 24 hours (100% versus 77%, $p < .0001$), but not at 1 week (100% versus 97%, $p = .06$) after discharge (Table 3, above).

EMERGENCY DEPARTMENT AND READMISSION

After the first 3 months of handoff note activation, 19 (16.1%) patients had an ED visit, and 18 (15.3%) had a readmission within 30 days of discharge. One year later, 33 (22%) patients had an ED visit, and 25 (17%) had a readmission within 30 days of discharge. In univariate analysis of the numbers of ED visits or readmissions, there was no difference between those with a handoff and those without a handoff, nor was there a difference in the elapsed time from discharge to ED visit or readmission in either period (Table 4, page 225).

In a multivariable logistic regression model adjusted for age, gender, LOS, comorbidities, and prior hospitalization, the presence of a handoff note was not associated with an ED visit (adjusted odds ratio [OR] = 3.07, 95% confidence interval [CI] 0.73–12.76 and OR = 1.02, 95% CI 0.33–3.13, for the 3- and 15-month periods, respectively) or 30-day hospital readmission (adjusted OR = 0.59, 95% CI 0.18–1.94 and OR = 2.27, 95% CI 0.46–11.22, for the 3- and 15-month periods, respectively).

Discussion

We report on the development and implementation of a novel discharge handoff tool. This work adopts the “standard communication format” recommendation put forth in the transitions of care consensus policy statement.⁵ We highlight three findings: (1) a standardized, succinct, clinically relevant discharge handoff tool was developed by engaging key inpatient and out-

Table 4. Emergency Department or Readmission*

	3 Months After Handoff Tool Rollout (March–April 2011)			15 Months After Handoff Tool Rollout (February–March 2012)		
	Handoff: Yes <i>n</i> = 87	Handoff: No <i>n</i> = 31	<i>P</i> Value*	Handoff: Yes <i>n</i> = 129	Handoff: No <i>n</i> = 21	<i>P</i> Value*
Return visits within 30 days: % (<i>n</i>)						
ED	18% (<i>n</i> = 16)	10% (<i>n</i> = 3)	.39	22% (<i>n</i> = 28)	24% (<i>n</i> = 5)	.78
Readmission	13% (<i>n</i> = 11)	23% (<i>n</i> = 7)	.24	18% (<i>n</i> = 23)	10% (<i>n</i> = 2)	.53
Elapsed time from discharge to: days (median)						
ED	17.5	11	.57	12	11	.65
Readmission	11	10	.96	8	5	.37

ED, emergency department.
* Fisher's exact test or Wilcoxon-Mann-Whitney where appropriate.

patient stakeholders; (2) the tool had high user uptake and sustainability and improved timeliness of communication of information between hospital and outpatient settings; and (3) use of this tool was associated with longer time-to-follow-up postdischarge but not ED visits/readmission rates.

Efforts to improve the communication between the inpatient and outpatients settings have focused on the discharge summary. Although the advent of electronic discharge summaries has improved the timeliness and availability of discharge summaries,^{6–9} they have had mixed results at improving the quality of the discharge summary.^{8,11,12} Electronic discharge summaries may add additional clinically irrelevant verbiage. Even in the comprehensive integrated EMR within the VA system, outpatient providers have identified significant barriers in electronic communication, including information overload, missing information, lack of information credibility, and difficulty in extracting meaningful data, all leading to mistrust in the system.²⁵

Surprisingly, the use of successful handoff instruments such as between the operating room and the postanesthesia care unit or between shift providers, such as residents providing overnight coverage,^{26,27} have not been adopted for use during the transition from hospital to home. We addressed the pitfalls of discharge summaries, as well as the mistrust in the system by creating a simplified and stakeholder-driven handoff tool that addresses these concerns within the VA's fully integrated EMR.

We found high inpatient user uptake of the handoff tool, which was sustained during a 15-month period. Sustainability was enhanced by engaging frontline stakeholders in the development of the handoff tool. During the development phase of the handoff, inpatient providers identified a gap in the communication between themselves and the outpatient teams and expressed concern over the possibility of errors during the transition period after discharge. The content of the handoff ad-

ressed the communication gaps providers had identified. We also paid attention to how providers would interface with the handoff on the computer screen by placing the tool within the discharge work flow of the inpatient teams, which ensured easy access to the tool without having to click on multiple screens, open new programs, or use different un-integrated systems. We gave significant thought and attention to the layout of the handoff on the screen to reduce redundant text, keep text fields structured and logical, and make sections self-explanatory, all making it easy to navigate through the tool. This context-sensitive approach to QI may explain the high sustainability of this intervention.²⁸ Anecdotally, outpatient providers, particularly the RN care managers, felt that the tool significantly improved communication from the inpatient setting.

During our handoff QI project, a concurrent QI project was being conducted to improve the quality of discharge summaries and their timely delivery. Nonetheless, residents chose to complete the handoff despite having to repeat the same information in the discharge summary. During feedback sessions, the majority of residents indicated that time constraints were the most common reason not to complete a handoff tool. We posit that the handoff has the advantages of concise, timely, and clinically relevant communication over the discharge summary, which can be verbose, be delayed, and contain nonclinically relevant information. Less information tends to be more useful in this case.

We included a balance measure in determining whether use of the handoff tool would affect the time to PCP follow-up to assess for unintended consequences of the intervention. We did not have an a priori hypothesis as to whether the handoff would affect the time to PCP follow-up visit in a positive or negative direction. To our knowledge, there is no current literature linking handoffs and time to PCP follow-up. Prior research has

shown that timely PCP follow-up may be linked with decreased readmission rates.^{29,30} We found that patients with a completed handoff had longer times to PCP follow-up than patients without a completed handoff. It may be that if a resident could schedule a follow-up appointment with the outpatient clinic within one to two weeks he or she did not complete a handoff tool, reasoning that nothing would be dropped given the outpatient follow-up. On the other hand, if a follow-up appointment was not available within a few weeks, the handoff tool might be used. House staff also may have felt more comfortable with more appropriate distant outpatient follow-up after discharge after the handoff tool had been completed. Another possibility may be that information within the handoff, such as pending labs and tests, allowed outpatient teams to follow up on these results and be reassured that urgent follow-up was unnecessary. Because patients discharged from the hospital span a broad range in acuity, definitions of *timely follow-up* range from one to four weeks.³¹ Our results suggest that, on average, the San Francisco VA was providing timely hospital discharge follow-up.

ED visits and readmission rates were not affected by the use of the handoff tool, although we had a limited sample size. Efforts that have resulted in changes in ED visits or readmission have usually involved intensive “bundled” interventions, including home visits and telephone calls after discharge.^{32,33} In our case, a single intervention to improve timely inpatient-outpatient communication was not able to decrease ED visits and readmissions. The systematic review by Hansen and colleagues found only a few high-quality single-intervention studies with significant differences in readmission rates.³¹ They concluded that it is likely that isolated interventions have small effects and that bundled interventions may have additive or synergistic effects to reduce readmissions.

LIMITATIONS

Our findings should be considered in light of the study’s limitations. This was an observational study with lack of a randomized control group for comparison. Our method of allocation was not random, but we could find no reason why a last name would be differentially related in any way to whether a patient received a handoff or not, or would have any relation to any of our outcomes. The results of this real-world QI project are applicable to other institutions looking to enact such changes. Use of the tool was optional, which likely meant that the decision to complete the handoff tool was not random, resulting in differences between the handoff and no-handoff groups. Similar clinical outcomes between the handoff and no-handoff groups suggest that the handoff is unlikely to be harmful and may be

helpful. The high user uptake (86%) and high handoff section completion rates (> 98%) highlight the perceived usefulness and ease of use of the tool. The primary care follow-up appointments section was autopopulated from the EMR and did not include appointments that were made with primary care after handoff tool completion but before the patient was discharged from the hospital.

Our logistic regression model may have been underpowered to detect a difference in our outcomes, as this study had a limited sample size. Although the patients were similar in demographic and clinical characteristics, 3 months after handoff activation a higher proportion of those patients without a handoff had been hospitalized 6 months prior to admission. This was not seen when assessed 15 months after handoff activation. This difference may reflect the possibility that unmeasured factors such as psychosocial complexity played a role in determining which patients received a handoff at the time of discharge. We used ED visits and readmissions at our local institution, but we have no reason to suspect that patients with handoffs would be differentially readmitted to other hospitals than those without handoffs, and vice versa.

Finally, this study was done in a VA population with a fully integrated EMR, which limits generalizability, so it might not be applicable to those institutions without a fully integrated EMR. As more organizations adopt integrated EMRs, these findings may become increasingly relevant.

NEXT STEPS

We plan to evaluate the use of the handoff tool in the outpatient setting, including how it is used during the PACT huddles and whether potential lab and medication errors are averted.¹ We have also discovered the unintentional spread and sporadic use of the tool to other services at the SFBVAMC. We would want to formally evaluate the handoff tool and its use in these other settings.

Conclusions

We conducted a QI project on the development and implementation of a novel electronic discharge handoff between the inpatient house staff and outpatient primary care teams and providers. Our results show that a standardized, succinct, and clinically relevant communication tool was useful within a fully integrated EMR system. The tool had high, sustained use for both inpatient and outpatient providers in fulfilling a needed communication gap that exists even within a fully integrated EMR and should be considered in future implementations of integrated EMR systems. **J**

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