Information Technology Improves Emergency Department Patient Discharge Instructions Completeness and Performance on a National Quality Measure

A Quasi-Experimental Study

E.J. Bell^{1,2,3}; S.S. Takhar^{1,2}; J.R. Beloff²; J.D. Schuur^{1,2}; A.B. Landman^{1,2}

¹Harvard Medical School, Boston, MA; ²Brigham and Women's Hospital, Boston, MA; ³Baylor College of Medicine, Section of Emergency Medicine, Houston, TX

Keywords

Computerized medical records systems, emergency care information systems, patient discharge, quality improvement, health care reform

Summary

Objectives: To compare the completeness of Emergency Department (ED) discharge instructions before and after introduction of an electronic discharge instructions module by scoring compliance with the Centers for Medicare and Medicaid Services (CMS) Outpatient Measure 19 (OP-19).

Methods: We performed a quasi-experimental study examining the impact of an electronic discharge instructions module in an academic ED. Three hundred patients discharged home from the ED were randomly selected from two time intervals: 150 patients three months before and 150 patients three to five months after implementation of the new electronic module. The discharge instructions for each patient were reviewed, and compliance for each individual OP-19 element as well as overall OP-19 compliance was scored per CMS specifications. Compliance rates as well as risk ratios (RR) and risk differences (RD) with 95% confidence intervals (CI) comparing the overall OP-19 scores and individual OP-19 element scores of the electronic and paper-based discharge instructions were calculated.

Results: The electronic discharge instructions had 97.3% (146/150) overall OP-19 compliance, while the paper-based discharge instructions had overall compliance of 46.7% (70/150). Electronic discharge instructions were twice as likely to achieve overall OP-19 compliance compared to the paper-based format (RR: 2.09, 95% CI: 1.75 – 2.48). The largest improvement was in documentation of major procedures and tests performed: only 60% of the paper-based discharge instructions satisfied this criterion, compared to 100% of the electronic discharge instructions (RD: 40.0%, 95% CI: 32.2% – 47.8%). There was a modest difference in medication documentation with 92.7% for paper-based and 100% for electronic formats (RD: 7.3%, 95% CI: 3.2% – 11.5%). There were no statistically significant differences in documentation of patient care instructions and diagnosis between paper-based and electronic formats.

Conclusions: With careful design, information technology can improve the completeness of ED patient discharge instructions and performance on the OP-19 quality measure.

Correspondence to:

Adam Landman, MD, MS, MIS, MHS
Brigham and Women's Hospital
75 Francis Street, Neville House
Boston, MA 02115
(617) 525-8497
Fax (617) 264-6848
Email: alandman@partners.org

Appl Clin Inform 2013; 4: 499–514

DOI: 10.4338/ACI-2013-07-RA-0046

received: July 12, 2013

accepted: October 7, 2013

published: October 23, 2013

Citation: Bell EJ, Takhar SS, Beloff JR, Schuur JD, Landman AB. Information technology improves emergency department patient discharge instructions completeness and performance on a national quality measure: A quasi-experimental study. *Appl Clin Inf* 2013; 4: 499–514 <http://dx.doi.org/10.4338/ACI-07-RA-0046>

1. Background

There were approximately 129.8 million visits to United States Emergency Departments (ED) in 2010 and roughly 87 percent of these visits resulted in patient discharge to a home setting following medical work-up [1]. Discharged ED patients are provided with discharge instructions before leaving the ED that describe individualized self-care responsibilities and treatment plan instructions [2-4]. Additionally, ED discharge instructions should detail the diagnostic and therapeutic services performed during the ED clinical encounter [2, 3]. Discharge instructions that lack important patient information have been linked to poor patient outcomes, inefficient resource utilization, and increased healthcare spending [5-15]. Particularly, studies have demonstrated a relationship between discharge instructions that possess significant medication discrepancies and adverse patient events [5, 16-20].

Given the importance of discharge instructions, a coalition of health policy experts and medical organizations collaborated to define a formal set of criteria describing best practices for care transitions, including high quality discharge instructions [21]. These efforts led to the introduction of Outpatient Measure 19 (OP-19) in January 2012 by the Centers for Medicare and Medicaid Services (CMS), a national quality measure designed to evaluate the quality of ED discharge instructions [22, 23]. In order to achieve compliance with OP-19, ED discharge instructions must include all five of the following criteria: principal diagnosis or chief complaint; major procedures and tests performed; patient care instructions; follow-up instructions; and new or changed medications [22, 23].

Previous studies have suggested the use of HIT as a simple, efficient, and low-cost way of increasing the quality of discharge instructions; however, no studies to date have evaluated the completeness of electronic ED discharge instructions using an established national quality measure [24, 25].

2. Objectives

In May 2012, our ED transitioned from a paper-based, handwritten discharge instructions form to an electronic discharge instructions module. The electronic discharge instructions module was designed to provide high-yield information to patients and to improve emergency provider documentation. We evaluated the completeness of ED discharge instructions before and after implementation of an electronic discharge instructions module by measuring compliance with the OP-19 metric. We hypothesized that electronic discharge instructions would be more complete than paper-based patient discharge instructions.

3. Methods

3.1 Study Design and Setting

We performed a quasi-experimental study at Brigham and Women's Hospital to determine the completeness of ED discharge instructions before and after implementation of an electronic discharge instructions module at an academic, tertiary ED. Brigham and Women's Hospital is a 793-bed facility with approximately 47,000 admissions and 61,000 ED visits annually. The Partners HealthCare Human Research Committee approved the study.

Our ED uses multiple homegrown clinical information systems. ED Tracking provides a real-time view of ED patient locations, care statuses, and provider assignments, and allows easy access to all other clinical systems, passing user and patient context. ED Order Entry provides computerized provider order entry with decision support for medications and laboratory studies. The Longitudinal Medical Record (LMR) provides access to the patient's previous medical records across our health care enterprise, including ambulatory and inpatient records. We also use LMR for electronic prescribing for discharged ED patients. Clinical documentation was primarily paper-based; resident physicians completed paper-based clinical notes and attending physicians dictated summary notes using a transcription service.

Paper-based ED discharge instructions were prepared using a templated form with sections for diagnosis, test results, care instructions, follow-up instructions, and medications (► Figure 1). One copy of the two-ply form was given to the patient; the second copy was signed by the patient and later scanned into the patient's medical record. Providers sometimes supplemented this form by printing and attaching standardized patient care instructions from CareNotes (Truven Health Analytics).

3.2 Intervention: Electronic Discharge Instructions Module

In May 2012, we moved to an electronic discharge instructions module to replace the existing paper-based discharge instructions form. The electronic module was custom developed using a web-based framework and was designed by an interdisciplinary team comprised of emergency physicians, nurses, and professionals from information systems, health information management, and coding/compliance. We designed the system with attention to clinician workflow and to improve the quality and completeness of our patient discharge instructions, facilitating quick and easy fulfillment of the five required OP-19 elements: chief complaint or diagnosis, major procedures and tests performed, patient care instructions, follow-up instructions, and new/changed medications (Supplementary file: Appendix 1). The new electronic module was integrated with existing clinical information systems to further improve efficiency, accuracy, and completeness of discharge instruction elements. Providers were trained to use the electronic module through a combination of classroom lectures, web-based tutorials, and face-to-face sessions with information systems specialists in the ED.

Chief complaint or Diagnosis: The patient's chief complaints are automatically imported from the ED Tracking system and users are able to edit as needed (► Figure 2A). The user is also required to enter at least one diagnosis using a dictionary-based lookup drawing from our institution's enterprise terminology services based on Systemized Nomenclature of Medicine Clinical Terms (SNOMED), International Classification of Disease (ICD), and Current Procedural Terminology (CPT) terms.

Major procedures and tests performed: It was not technically feasible to automatically include all major procedures and tests performed during the ED visit in the discharge instructions. Therefore, we created solutions to allow inclusion of laboratory and imaging results in the patient instructions (► Figure 2B). A laboratory tests checkbox grid allows users to quickly select categories of commonly performed laboratory tests, such as complete blood count or liver function tests. Users can also import selected laboratory results directly into the patient discharge instructions. Major procedures performed during the ED visit are selected from a dropdown list with the most commonly performed ED procedures (Figure 2A). Names of imaging tests performed within the last 24 hours of the ED visit appear automatically and can be selected for inclusion in the discharge instructions with a single click (► Figure 2B). If the attending radiologist has signed the imaging report, the radiology interpretation text report can be included in the ED discharge instructions.

Follow-up instructions: The system also requires users to enter follow-up instructions or explicitly specify that no specific follow-up is required for this ED visit (► Figure 2C). Users can quickly select follow-up with a patient's primary care physician (pre-populated based on information collected at ED registration) or common institutional clinics, with the selected provider names and contact information automatically populated into the discharge instructions.

Medications: New medications for discharged ED patients are electronically prescribed in a separate clinical system, LMR. To avoid requiring providers to enter electronic prescriptions and then electronically document the same medication information in the patient discharge instructions, we interfaced the electronic discharge instructions module with LMR, thereby enabling electronic prescriptions from the last 24 hours to be easily included in the discharge instructions with a single click (► Figure 2D). Instructions to change or stop current medications are specified in the discharge instructions using structured fields to ensure patients are provided with complete instructions.

Patient care instructions: Patient care instructions can be prepared using a set of templates for common ED conditions (searchable based on entered diagnosis or keyword) or free text instructions can be entered (► Figure 2E).

Completion of the diagnosis, procedures/tests performed, medications, patient care instructions, and follow-up sections are all required before the discharge instructions can be printed for the pa-

tient. The electronic information is compiled into a Portable Data File (PDF, Adobe) and electronically stored in our institution's electronic document repository. Electronic discharge instructions are then printed and reviewed with patients by ED providers or nursing staff.

3.3 Selection of Participants

We used an existing electronic report to obtain a list of all patients seen in the ED during two time intervals of interest, including patient name, medical record number, age, sex, and disposition. The first time period was the three months preceding the implementation of the electronic discharge instructions module, 2/1/2012 through 4/30/2012. The electronic discharge instructions module was implemented on May 24, 2012. We allowed the months of May and June for users to acclimate to the new system and did not include these time periods in the study. The second time interval included the three months following the implementation of the electronic discharge instructions module, 7/1/2012 through 9/30/2012. We limited the sample to patients discharged home from the ED, excluding:

1. patients who left the ED before being fully evaluated by an attending emergency physician;
2. patients who left the ED before completion of care;
3. patients who left the ED against medical advice;
4. patients who expired in the ED;
5. patients admitted to the hospital; and
6. patients placed in the ED observation unit.

We then randomly selected a total of 300 patients from this list of patients discharged from our ED: 150 patients before implementation and 150 patients after implementation of the electronic discharge instructions module. We used block randomization by month to ensure equal representation from all time periods. There were no *a priori* expectations of difference in patients, work processes, or discharge instructions during these time intervals, except the change to the electronic system. This sample size provided us 90% power to detect a 15% difference (75% to 90%) in overall OP-19 compliance rates.

3.4 Outcome Measures

The primary outcome measure was the rate of overall compliance with the OP-19 metric pre and post implementation of the electronic discharge instructions module when scored using CMS OP-19 specifications.

The secondary outcome measures were the rate of compliance with the individual subsections of the OP-19 metric pre and post implementation of the electronic discharge instructions module when scored using the CMS OP-19 specifications.

The CMS OP-19 quality measure was adopted for calendar year 2013, but suspended shortly thereafter for measure specification issues, including patient privacy concerns [26]. While the measure is undergoing review, it remains a standardized measure of ED discharge instructions quality based on best available research and expert consensus and therefore remains well suited as an outcome measure. Privacy concerns or other measure biases will be equally applied to both groups in this study and no sensitive patient-level data are reported.

3.5 Study Protocol

The primary author (EJB), a fourth year medical student, performed chart reviews for all study participants. A second expert reviewer (ABL), an attending emergency physician, independently performed chart reviews for a random sample of 40 study participants [27]. Since the CMS OP-19 specification omits some important details, such as defining major procedures and tests, the two reviewers established a more detailed review protocol based on the CMS OP-19 specification prior to data abstraction (Supplementary File: Appendix 2). Reviewers were not blinded to the objectives of the study, or to whether the discharge instructions were paper-based or electronic, but were blinded to the results of the other's review.

The ED discharge instructions for every research subject were evaluated for each of the five required elements of OP-19 using the established protocol. OP-19 requires positive assertion of required elements in the discharge instructions and does not permit the use of any other medical records. Therefore, the entire medical record was not reviewed to detect omitted elements. We assigned an overall OP-19 score of yes if the discharge instructions successfully met all five elements; otherwise an overall score of no was assigned. While CMS OP-19 only reports the overall score, we report and compare the overall score as well as subsection scores for each of the required elements to better understand deficiencies.

All data collected were entered into a pre-formatted Microsoft Access (2003, Microsoft, Redmond, WA) database.

3.6 Data Analysis

We calculated the rate of overall compliance with the OP-19 metric pre and post implementation of the electronic discharge instructions module. We also reported and compared rates of compliance for the individual OP-19 elements to determine whether one element of the discharge instructions was disproportionately accounting for overall OP-19 non-compliance. To account for possible secular improvement in scores in the discontinuity design, we also tested to see if there was improvement in discharge instructions in the weeks prior to the implementation of electronic records (p for trend = 0.64). This justified our subsequent analysis as simply before and after implementation. We reported risk ratios and risk differences along with 95% confidence intervals comparing the overall OP-19 scores and individual OP-19 element scores of the electronic and paper-based discharge instructions. Risk ratio and risk difference are measures of effect describing the difference between groups. Risk ratio (or relative risk) represents the relative size difference between groups, the ratio of electronic OP-19 compliance to paper-based OP-19 compliance. Risk difference (or absolute risk reduction) is the difference between electronic module OP-19 compliance and paper-based OP-19 compliance. For clarity we present both effect measures since they represent complementary information [28, 29]. Because of the small cells in certain groups, we calculated P values using Fisher's exact test. There were no contradiction between the P values from the Fisher's exact test compared to the CI for the risk ratios and risk differences; therefore, we report just the results of the CI in our tables for brevity. Two-sided P values of less than 0.05 were considered to indicate statistical significance in all analyses. To test the reliability of the OP-19 measure and our chart review protocol, we calculated percent agreement and Kappa statistics for overall OP-19 compliance for the subset of 40 records that underwent review by two reviewers [27]. Statistical analysis was performed using Stata 12.1 (StataCorp LP, College Station, TX).

4. Results

There were 14,935 patients seen and evaluated in the ED during the pre-implementation time period; 8,578 (57%) patients met inclusion criteria and were discharged home. There were 15,894 patients seen and evaluated in the ED during the post-implementation time period; 9,248 (58%) met inclusion criteria and were discharged home.

The paper-based discharge instructions had an overall OP-19 compliance of 46.7% (70/150) with only 60% of charts fulfilling the major procedures and tests performed element (► Table 1). There was 98.7% (148/150) compliance with the paper-based chief complaint/diagnosis subsection, 91.3% (137/150) compliance with the follow-up instructions subsection, and 92.7% (139/150) compliance with both the patient care instructions and medications subsections. The electronic discharge instructions had 97.3% (146/150) overall OP-19 compliance. The four electronic discharge instructions that did not achieve overall OP-19 compliance were all missing patient instructions. Electronic discharge instructions were twice as likely to have achieved overall OP-19 compliance compared to the paper-based format (risk ratio: 2.09, 95% CI: 1.75–2.48). The largest improvement in moving to electronic discharge instructions was in the documentation of major procedures and tests performed with 100% of the electronic discharge instructions satisfying this criterion (risk difference: 40.00%, 95% CI: 32.2%–47.8%). The difference between the paper-based and electronic formats for

the patient care instructions (risk difference: 4.70%, 95% CI: -0.200%–9.60%) and diagnosis (risk difference: 1.30%, 95% CI: -0.500%–3.20%) subsections could be based on chance alone. There was a smaller difference in the medication documentation subsection with 92.7% and 100% for the paper-based and electronic formats, respectively (risk difference: 7.30%, 95% CI: 3.20%–11.5%). There was 90% agreement between the two reviewers with a Kappa statistic of 0.71, demonstrating substantial agreement [30, 31].

5. Discussion

This study evaluated the completeness of ED discharge instructions in an academic ED after the transition from paper-based, handwritten discharge instructions to an electronic discharge instructions module. The electronic discharge instructions were more complete than the paper-based instructions, with near perfect overall compliance (97.3%, 146/150) with the OP-19 performance metric. The electronic discharge instructions were twice as likely to achieve overall OP-19 compliance than the paper-based instructions. Major procedures and tests performed was the major missing OP-19 element of the paper-based discharge instructions; moving to electronic discharge instructions increased major procedures/tests performed compliance to 100%.

These findings confirm our hypothesis that electronic discharge instructions are more complete than paper-based discharge instructions as measured by the OP-19 quality metric. To our knowledge, this is the first study to evaluate the completeness of ED discharge instructions using an established national quality metric. Prior studies assessed the quality of electronic discharge instructions without the use of an established quality metric and have yielded conflicting results. Specifically, previous research has shown that electronic discharge instructions lead to more thorough clinician documentation, decreased documentation errors, and increased workflow efficiency, which increases the quality of discharge instructions.[24, 32, 33] In contrast, Callen and colleagues found no significant difference in the quality of electronic and handwritten discharge instructions [34].

The electronic discharge module's use of required fields and automated electronic data entry methods helps explain the observed increase in discharge instruction completeness, particularly for documentation of major procedures and tests performed, which had the largest improvement and was the most important contributor to the overall increased OP-19 compliance. The electronic discharge instructions module used a standardized template comprised of a combination of required free-form text fields and check boxes [35–38]. In the event a required field was left incomplete, the emergency provider was prompted to complete the missing field in order to finalize the discharge instructions. The paper-based discharge instructions form also used a standardized template with sections for each of the OP-19 elements, including test results. However, the paper form did not have the ability to ensure all sections were completed. Furthermore, the electronic discharge instructions module interfaced with, retrieved, and inserted patient data directly from the LMR into the electronic discharge instructions document. As a result, many required sections of the electronic discharge instructions (i.e., chief complaint, images, and test results) were automatically generated or required minimal user effort, increasing efficiency by streamlining the input of relevant patient data [17].

Having ED clinicians closely involved in the design process and customizing the system to meet OP-19 quality metric requirements also contributed to the success of our electronic discharge module. Lack of physician involvement is a common cause for electronic health record (EHR) failure or dissatisfaction. We were fortunate to have clinicians engaged throughout the design and development process. Further, we took advantage of our custom development environment and specifically designed the system to improve compliance with OP-19. Vendor systems are often highly configurable and may achieve similar results by incorporating elements of our design into their systems. While many EHR vendors contractually prohibit content sharing, we have shared our screen shots (► Figure 2) and design decisions to allow others to freely use and improve upon our designs in their systems [39].

5.1 Limitations

Our findings should be interpreted in light of their limitations. This was a single center study performed using a homegrown information system, which may reduce the generalizability of our findings. Chart reviewers were not blinded to the electronic or paper-based format of the discharge instructions. In addition, the OP-19 scoring methodology stresses the overall completeness of discharge instructions with minimal emphasis on the presence of appropriate content. Therefore, discharge instructions that report incorrect, incomplete, or inappropriate information may achieve full OP-19 compliance. We did not assess the usability of the electronic discharge instructions module or the impact of the new system on workflow and efficiency. Furthermore, our study did not evaluate patient comprehension or compliance with ED discharge instructions. Finally, we did not measure the impact on patient outcomes after discharge or assess subsequent health care system utilization, such as repeat ED visits or hospitalizations.

6. Conclusions

Transition from a paper-based discharge instructions form to an electronic discharge instructions module improved the performance of ED discharge instructions on the OP-19 quality measure in our ED. We saw compliance improvements in all elements of the OP-19 quality metric, particularly in the major procedures and tests performed OP-19 subsection. EHR vendors or EDs with the ability to configure their emergency department information systems can build on our system design. Future studies may evaluate the impact of these electronic ED discharge instructions on patient outcomes and healthcare costs.

Clinical Relevance Statement

ED patient discharge instructions play a critical role in patient outcomes and should provide the patient with their diagnosis, procedures/tests performed, new or changed medications, patient care instructions, and follow-up instructions. Information technology is a promising tool to assist clinicians with preparing complete patient discharge instructions. This study shares how a well-designed ED electronic discharge instructions module can improve the completeness of ED patient discharge instructions and performance on a national quality measure.

Conflicts of Interest

Dr. Schuur is on the ACEP Quality and Performance Committee and has helped issue comments on OP-19; he has no financial conflicts of interest. No other authors have conflicts of interest.

Protection of Human and Animal Subjects

This study required medical record review. The Partners HealthCare Human Research Committee reviewed and approved this study.

Acknowledgements

We thank the Brigham and Women's Hospital Emergency Department Information Systems team for their hard work designing, developing, and implementing this electronic patient discharge instructions module.

Hole 1/4 2 3/4 - 3 Hole 1/4 4 1/4

ABOUT YOUR EMERGENCY DEPARTMENT VISIT:

Note to provider: Please remember to use plain language, not medical terms

Patient: Please bring this with you when you go to any doctor or clinic or return to the emergency department

The name of the doctor or physician's assistant who cared for you _____ MD/PA
(please print)

What we think the problem is: _____

Test results: _____

Some of your tests will be looked at by another doctor. Please tell your primary care doctor or clinic to check on these tests. Tests to check on: _____

What to do: _____

We are giving you more information on _____.

Please read this information **now**. If you need help or have questions, please ask before you leave the emergency department.

Medications:

☐ You should keep taking all of your medications

☐ You need to start taking new medication(s). Follow the directions on the medication label: _____

☐ Stop taking _____

After you leave the emergency department:

☐ Please call your doctor or clinic and tell them that you were seen in the emergency department and you need to be seen in _____ days.

☐ Please call this specialty doctor or clinic _____.
Make sure you tell them you were seen in the emergency department and need to be seen in _____ days.

☐ If you don't have a doctor or clinic, call the Brigham Physician Referral line at 1-800-294-9999. They will help you find a doctor.

If you have questions or concerns, call your doctor or clinic or return to the emergency department.

Patient Signature: _____

These instructions were given to you by:

Date _____ Time _____ Signature _____ MD/RN/PA CID

--	--	--	--	--

MEDICAL RECORDS

0600037 (1/09)

EMERGENCY DEPARTMENT

Fig. 1 Brigham and Women's Hospital Emergency Department Paper Discharge Instructions Form

Diagnoses, Procedures, Treatment

Diagnoses

Patient Stated Chief Complaint
Chest Pain

Enter Diagnosis Patient-Friendly term for patient instructions

Comments about Diagnoses

Procedures Performed and Treatment Rendered

Procedures Performed All Major procedures performed must be listed here

☐ **NONE**

Select Procedure Enter/Edit Patient Friendly Description

Comments to Patient about Procedures Performed

Treatment Rendered

Comments to Patient about Treatment and Consults Received

A

Fig. 2 Brigham and Women's Hospital Emergency Department Electronic Discharge Instructions Module: Chief Complaint/Diagnosis (A); Major Procedures and Tests Performed (B); Follow-up Instructions (C); Medications (D); and Patient Care Instructions (E)

Tests Performed

☐ NONE

Laboratory Tests Performed

The categories of labs performed during the visit must be selected here for display on the patient's discharge instructions.

Select All Categories of Labs Performed

☐ Complete Blood Count ☐ Chemistry Studies ☐ Liver Function Tests ☐ Cardiac Tests
☐ Coagulation Studies ☐ Urinalysis ☐ Thyroid Studies ☐ CSF Studies
☐ Toxicology Tests ☐ Rapid (Point of Care) Tests ☐ Pregnancy Test ☐ Microbiology Tests
☐ Other

Retrieve Labs

Comments on Test Results

Please specify abnormal results that require follow-up

Pending Laboratory Tests

Pull In/Refresh Pending Tests

NOTE: Clicking Pull In/Refresh Pending Tests will overwrite the data in this text box.

Comments/Follow-up Plan for Pending Tests

List of Pending Tests

Instructions to patient on where/when to get these results

Imaging Tests Performed

Imaging tests performed during the visit must display on the patient's discharge instructions.

Please select relevant tests to be included.

Refresh Imaging Results

No Imaging Lab results are found as of 5/20/2013 12:09:00 PM

Other images / Comments to patients:

Other Tests Performed

ECG Stress Test Vascular Testing

B

Fig. 2 Continued

Follow-Up, Notifications

☐ NONE REQUIRED

Follow-Up and Notifications

Select Provider or Clinic

☐ PCP: JEN CENTER, ORANGE TEAM

☐ Provider search

☐ Clinic search

☐ Other

☒ Referral Line

Medications

Medications

☐ There are NO changes to current medications

☒ There are changes to current medications

New Medications

Write Rx in LMR Pull in/Refresh Recent LMR Medications

Over The Counter Medications

Tylenol 500mg	Tylenol 650mg	Tylenol 1g
Ibuprofen 600mg	Ibuprofen 800mg	

Enter comments here for over the counter medications only

Changed Medications

Medication: Instructions:

Add Changed Medication to Discharge Instructions

Stopped Medications

Medication: Instructions:

Add Stop/Hold Medication to Discharge Instructions

Additional Medication Comments

Fig. 2 Continued

Patient Instructions

▼ Instruction Templates - **Patient Instructions are Required**

Please select a template or add your own patient instructions using the [Add New Instructions](#) link below.

Please select a Discharge Instruction template:

- Abdominal Pain
- Abdominal Pain Epigastric (SP)
- Abscess
- Abscess (SP)
- Abscess Incision and Drainage

[Preview Patient Instructions](#)

Disabled/grayed out filter indicates no matching patient instruction templates for that filter term.

Filter by Diagnosis
No diagnoses entered in [Diagnoses](#) section

Filter by Medications
No new or changed medications entered in [Medications](#) section

Filter by Keyword
Add Keyword [Clear](#)

[Add Template to Discharge Instructions](#)

▼ Instructions To Patient [Add New Instruction](#)

If you print a Care Notes for the patient outside this application, please check this box and enter the name of the Care Notes provided.

☐ English or Other Language Care Notes printed separately for patient on

Fig. 2 Continued

Table 1 Overall and individual CMS OP-19 compliance before and after implementation of electronic discharge instructions

Performance Measure	Compliance		Risk Ratio (95% CI)	Risk Difference (95% CI)
	Paper-based (n = 150) # of Records (%)	Electronic (n = 150) # of Records (%)		
Overall OP-19	70 (46.7)	146 (97.3)	2.09 (1.75 – 2.48)	50.7% (42.3 – 59.1)
• Diagnosis or Chief Complaint	148 (98.7)	150 (100)	1.01 (0.995 – 1.03)	1.3% (-0.5 – 3.2)
• Major Procedures and Tests	90 (60)	150 (100)	1.67 (1.46 – 1.90)	40% (32.2 – 47.8)
• Patient Care Instructions	139 (92.7)	146 (97.3)	1.05 (0.997 – 1.11)	4.7% (-0.2 – 9.6)
• Follow-up Instructions	137 (91.3)	150 (100)	1.09 (1.04 – 1.15)	8.7% (4.2 – 13.2)
• Medications	139 (92.7)	150 (100)	1.08 (1.03 – 1.13)	7.3% (3.2 – 11.5)

CMS = Centers for Medicare and Medicaid Services

OP-19 = Outpatient Measure 19

References

1. National Hospital Ambulatory Medical Care Survey: 2010 Emergency Department Summary Tables. Hyattsville, MD: National Center for Health Statistics; 2013. p. 29.
2. Yu KT, Green RA. Critical aspects of emergency department documentation and communication. *Emergency medicine clinics of North America* 2009; 27(4): 641–654, ix. PubMed PMID: 19932398.
3. Taylor DM, Cameron PA. Emergency department discharge instructions: a wide variation in practice across Australasia. *J Accid Emerg Med* 2000; 17(3): 192–195. PubMed PMID: 10819382. Pubmed Central PMCID: PMC1725372. eng.
4. Samuels-Kalow ME, Stack AM, Porter SC. Effective discharge communication in the emergency department. *Ann Emerg Med* 2012; 60(2): 152–159. PubMed PMID: 22221840. eng.
5. Tsilimingras D, Bates DW. Addressing postdischarge adverse events: a neglected area. *Jt Comm J Qual Patient Saf* 2008; 34(2): 85–97. PubMed PMID: 18351193. eng.
6. Were MC, Li X, Kesterson J, Cadwallader J, Asirwa C, Khan B, et al. Adequacy of hospital discharge summaries in documenting tests with pending results and outpatient follow-up providers. *Journal of general internal medicine* 2009; 24(9): 1002–1006. PubMed PMID: 19575268. Pubmed Central PMCID: 2726888.
7. Coleman EA, Mahoney E, Parry C. Assessing the quality of preparation for posthospital care from the patient's perspective: the care transitions measure. *Medical care* 2005; 43(3): 246–255. PubMed PMID: 15725981. Epub 2005/02/24. eng.
8. Kripalani S, LeFevre F, Phillips CO, Williams MV, Basaviah P, Baker DW. Deficits in communication and information transfer between hospital-based and primary care physicians: implications for patient safety and continuity of care. *JAMA: the journal of the American Medical Association* 2007; 297(8): 831–841. PubMed PMID: 17327525.
9. VanSuch M, Naessens JM, Stroebel RJ, Huddleston JM, Williams AR. Effect of discharge instructions on readmission of hospitalised patients with heart failure: do all of the Joint Commission on Accreditation of Healthcare Organizations heart failure core measures reflect better care? *Quality & safety in health care* 2006; 15(6): 414–417. PubMed PMID: 17142589. Pubmed Central PMCID: PMC2464879. Epub 2006/12/05. eng.
10. Forster AJ, Murff HJ, Peterson JF, Gandhi TK, Bates DW. The incidence and severity of adverse events affecting patients after discharge from the hospital. *Ann Intern Med* 2003; 138(3): 161–167. PubMed PMID: 12558354. eng.
11. Coleman EA, Berenson RA. Lost in transition: challenges and opportunities for improving the quality of transitional care. *Ann Intern Med* 2004; 141(7): 533–536. PubMed PMID: 15466770.
12. Roy CL, Poon EG, Karson AS, Ladak-Merchant Z, Johnson RE, Maviglia SM, et al. Patient safety concerns arising from test results that return after hospital discharge. *Ann Intern Med* 2005; 143(2): 121–128. PubMed PMID: 16027454. eng.
13. Engel KG, Buckley BA, Forth VE, McCarthy DM, Ellison EP, Schmidt MJ, et al. Patient understanding of emergency department discharge instructions: where are knowledge deficits greatest? *Academic emergency medicine : official journal of the Society for Academic Emergency Medicine* 2012; 19(9): E1035–E1044. PubMed PMID: 22978730. eng.
14. Walz SE, Smith M, Cox E, Sattin J, Kind AJ. Pending laboratory tests and the hospital discharge summary in patients discharged to sub-acute care. *Journal of general internal medicine* 2011; 26(4): 393–398. PubMed PMID: 21116868. Pubmed Central PMCID: PMC3055980. Epub 2010/12/01. eng.
15. Kripalani S, Jackson AT, Schnipper JL, Coleman EA. Promoting effective transitions of care at hospital discharge: a review of key issues for hospitalists. *J Hosp Med* 2007; 2(5): 314–323. PubMed PMID: 17935242.
16. McMillan TE, Allan W, Black PN. Accuracy of information on medicines in hospital discharge summaries. *Internal medicine journal* 2006; 36(4): 221–225. PubMed PMID: 16640738. Epub 2006/04/28. eng.
17. Callen J, McIntosh J, Li J. Accuracy of medication documentation in hospital discharge summaries: A retrospective analysis of medication transcription errors in manual and electronic discharge summaries. *International journal of medical informatics* 2010; 79(1): 58–64. PubMed PMID: 19800840.
18. Forster AJ, Murff HJ, Peterson JF, Gandhi TK, Bates DW. Adverse drug events occurring following hospital discharge. *Journal of general internal medicine* 2005; 20(4): 317–323. PubMed PMID: 15857487. Pubmed Central PMCID: PMC1490089. eng.
19. Forster AJ, Clark HD, Menard A, Dupuis N, Chernish R, Chandok N, et al. Adverse events among medical patients after discharge from hospital. *CMAJ* 2004; 170(3): 345–349. PubMed PMID: 14757670. Pubmed Central PMCID: PMC331384. eng.
20. Coleman EA, Smith JD, Raha D, Min SJ. Posthospital medication discrepancies: prevalence and contributing factors. *Arch Intern Med* 2005; 165(16): 1842–1847. PubMed PMID: 16157827. eng.

21. Snow V, Beck D, Budnitz T, Miller DC, Potter J, Wears RL, et al. Transitions of Care Consensus policy statement: 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. *J Hosp Med* 2009; 4(6): 364–370. PubMed PMID: 19479781. eng.
22. National Quality Measures C. Care transitions: percentage of patients, regardless of age, discharged from an emergency department (ED) to ambulatory care or home health care, or their caregiver(s), who received a transition record at the time of ED discharge including, at a minimum, all of specified elements Rockville MD: Agency for Healthcare Research and Quality (AHRQ); [5/20/2013]. Available from: <http://www.qualitymeasures.ahrq.gov/content.aspx?id=28142>.
23. Hospital Outpatient Quality Reporting Specifications Manual [Version 5.0a]. American Medical Association; 2011. p. 2–105.
24. O'Leary KJ, Liebovitz DM, Feinglass J, Liss DT, Evans DB, Kulkarni N, et al. Creating a better discharge summary: improvement in quality and timeliness using an electronic discharge summary. *J Hosp Med* 2009; 4(4): 219–225. PubMed PMID: 19267397. Epub 2009/03/10. eng.
25. Frimpong JA, Jackson BE, Stewart LM, Singh KP, Rivers PA, Bae S. Health information technology capacity at federally qualified health centers: a mechanism for improving quality of care. *BMC health services research* 2013; 13: 35. PubMed PMID: 23363660. Pubmed Central PMCID: PMC3570359. Epub 2013/02/01. eng.
26. Temporary Suspension of Hospital Outpatient Quality Reporting Measure OP-19: Transition Record with Specified Elements Received by Discharged Patients. Centers for Medicare & Medicaid Services; 2012.
27. Gilbert EH, Lowenstein SR, Koziol-McLain J, Barta DC, Steiner J. Chart reviews in emergency medicine research: Where are the methods? *Ann Emerg Med* 1996; 27(3): 305–308. PubMed PMID: 8599488. eng.
28. Sinclair JC, Bracken MB. Clinically useful measures of effect in binary analyses of randomized trials. *J Clin Epidemiol* 1994; 47(8): 881–889. PubMed PMID: 7730891. eng.
29. Schechtman E. Odds ratio, relative risk, absolute risk reduction, and the number needed to treat--which of these should we use? *Value Health* 2002; 5(5): 431–436. PubMed PMID: 12201860. eng.
30. Shrout PE. Measurement reliability and agreement in psychiatry. *Statistical methods in medical research* 1998; 7(3): 301–317. PubMed PMID: 9803527.
31. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977; 33(1): 159–174. PubMed PMID: 843571.
32. Boast P, Potts C. Connecting cost and quality through automated discharge instructions. *Healthcare financial management: journal of the Healthcare Financial Management Association* 2011; 65(8): 114–118. PubMed PMID: 21866729.
33. Schabetsberger T, Ammenwerth E, Andreatta S, Gratl G, Haux R, Lechleitner G, et al. From a paper-based transmission of discharge summaries to electronic communication in health care regions. *International journal of medical informatics* 2006; 75(3–4): 209–215. PubMed PMID: 16112892. Epub 2005/08/23. eng.
34. Callen JL, Alderton M, McIntosh J. Evaluation of electronic discharge summaries: a comparison of documentation in electronic and handwritten discharge summaries. *International journal of medical informatics* 2008; 77(9): 613–620. PubMed PMID: 18294904.
35. Humphreys T, Shofer FS, Jacobson S, Coutifaris C, Stenhagen A. Preformatted charts improve documentation in the emergency department. *Ann Emerg Med* 1992; 21(5): 534–540. PubMed PMID: 1570909.
36. D VN, Rajavelu P, Rajagopalan A. Pre-formatted written discharge summary-a step towards quality assurance in the emergency department. *International journal of emergency medicine* 2008; 1(4): 321–325. PubMed PMID: 19384649. Pubmed Central PMCID: 2657266.
37. Isaacman DJ, Purvis K, Gyuro J, Anderson Y, Smith D. Standardized instructions: do they improve communication of discharge information from the emergency department? *Pediatrics* 1992; 89(6 Pt 2): 1204–1208. PubMed PMID: 1594378.
38. Hayrinen K, Saranto K, Nykanen P. Definition, structure, content, use and impacts of electronic health records: a review of the research literature. *International journal of medical informatics* 2008; 77(5): 291–304. PubMed PMID: 17951106. Epub 2007/10/24. eng.
39. Health IT and Patient Safety: Building Safer Systems for Better Care: The National Academies Press; 2012.