Republished original article: Resident-initiated interventions to improve inpatient heart-failure management

James Oujiri,1,2 Abdul Hakeem,3 Quinn Pack,4 Robert Holland,1 David Meyers,1 Christopher Hildebrand,1 Alan Bridges,1 Mary A Roach,2 Bennett Vogelman2

Background: Third-year internal medicine residents participating in a quality improvement rotation identified gaps between the Joint Commission’s ORYX quality guidelines and clinical practices for the inpatient management of heart failure (HF) at the William S. Middleton Memorial Veterans Hospital. Residents focused on the performance metrics associated with tobacco-cessation counselling documentation, ejection fraction assessment and angiotensin-converting enzyme inhibitor/angiotensin receptor blocker prescriptions.

Methods: After analysing data collected by the External Peer Review Program, residents reviewed the institution’s admissions and discharge processes with the aim of improving quality and compliance. In redesigning these processes, residents created an admissions template and a discharge face sheet, and compared specific ORYX measure compliance rates before and after institution-wide implementation.

Results: Following implementation of the tobacco-cessation admissions template, 100% of HF patients who used tobacco received documented cessation counselling, compared with 59% prior to intervention (p<0.01, n=32). Following implementation of the mandatory discharge face sheet, 97% of HF patients (compared with 92% preintervention, p<0.05) received comprehensive discharge instruction; LV function assessment went from 98% to 100% (p<0.05); and angiotensin-converting enzyme inhibitor/angiotensin receptor blocker prescription for left ventricular systolic dysfunction at discharge (or documentation of a contra-indication) went from 82% to 100% (p<0.01, n=48).

Discussion: By implementing a standardised admissions template and a mandatory discharge face sheet, the hospital improved its processes of documentation and increased adherence to quality-performance measures. By strengthening residents’ learning and commitment to quality improvement, the hospital created a foundation for future changes in the systems that affect patient care.

INTRODUCTION

In 2002, the Joint Commission (formerly JCAHO) implemented evidence-based measures that set a national standard for the care of hospitalised patients with heart failure (HF).1 The US Department of Veterans Affairs (VA) had previously introduced similar compliance measures and established a system to track institutional performance. The VA system includes: (a) a nationwide integrated comprehensive electronic health record (EHR) (Computerised Patient Record System (CPRS)), (b) an independent External Peer Review Program (EPRP) for monitoring performance, (c) a retrospective review process to identify systems-based problems, and (d) accountability at the local level for meeting improvement goals.2 In 2007, the University of Wisconsin Internal Medicine Residency programme, as part of its Education Innovation Project, collaborated with the William S. Middleton Memorial VA hospital to create a patient safety and quality improvement rotation for senior residents.3 In this paper, we describe two resident-initiated quality improvement projects that changed systems and increased compliance with measures of healthcare quality: Project no 1: The Tobacco Cessation Project (QP) intervened during the admissions process to improve counselling for patients with HF; Project no 2: The HF Management Project (JO and AH) intervened during the discharge process to improve compliance with HF quality measures. Both projects required analysis of institutional practices, collaboration with interdisciplinary personnel and design of systems-based interventions.
The nursing admissions template was revised to include standardised mandatory tobacco screening questions and counselling. The new mandatory template served to educate the nursing staff about tobacco use counselling, provided automatic and standardised documentation of counselling by nursing staff, and generated an inpatient physician clinical reminder that showed up on the cover sheet for any patient who screened positive for tobacco use. A standardised tobacco section was also added to the physician admission history and physical section of the chart. By devising mandatory screening within the EHR, information became electronically retrievable and did not require labour-intensive chart review.

Project no 2: HF management

The residents identified current institutional processes and outcomes on HF quality measures at discharge. They were concerned that although the computerised physician order entry to discharge a patient included a reminder to address each diagnosis, physicians were not actively prompted to follow the guidelines when treating hospitalised patients with HF. In addition, discharge orders were not contained within the usual notes or orders sections, which made retrieval of the discharge data tedious (particularly after the patient was discharged from the hospital) and made demonstration of compliance with HF quality measures less reliable.

An initial flow diagram confirmed a lack of standardisation and a failure to systematically address core performance measures at discharge. Although most resident-physicians strived to follow medical practice guidelines, individual provider diligence was not inherently reliable. Even when physicians followed appropriate measures, they often failed to document their activities. As a result, information was often dispersed throughout the medical records, making it challenging for an auditor to find the necessary information and document compliance. Interviews with resident-physicians indicated that compliance seemed to be reliant on care team training, physician memory and vigilance prior to discharge.

The residents worked with stakeholders (ie, cardiology, information technology, nursing, residents, faculty, VA administration) to identify potential interventions. Initial barriers were encountered because Information Technology personnel did not have the capacity to create an order within CPRS. Ultimately, a CPRS compatible ‘discharge face sheet’ was designed with a forcing function to increase compliance with quality measures on discharge, provide clear cut accountability, ensure that best evidence-based measures were used regardless of levels of education among the care team and collate the notes section of the CPRS record.
documentation. The discharge face sheet was embedded into the notes section of the electronic medical record as a mandatory requirement institution-wide for all hospital discharges.

Discharging physicians, who in this system include interns and residents, used the templated face sheet to enter the diagnosis, medication reconciliation, discharge instructions, follow-up and other routine items. If a patient had the diagnosis of HF, the physician clicked through a menu and documented whether compliance to each measure was met or identified the contraindication as to why compliance could not be met (eg, history of significant bleeding or allergy for aspirin therapy). If a patient did not have a diagnosis of HF, the provider was not prompted and could complete the discharge template as usual. Once completed, an order to discharge was automatically generated as well as a standardised note that consolidated the discharge information into a single location in the ‘notes’ section of the EHR. This saved the information that previously had been difficult to find with a discharge order and provided a standardised format for communicating information to the next provider. Responses to the interventions by health unit coordinators and nurses were not measured, but institution-wide implementation of the new discharge process appeared to be well received.

**Data analysis**

The EPRP conducted the institutional abstraction for the VA and evaluated charts for compliance with ICD-9 coded diagnoses. Each quarter, an independent reviewer was given a list of patients randomly selected with the diagnosis of heart failure (HF, 428). The reviewer searched the chart for documentation of compliance or contraindications to compliance with quality measures. Internal institutional reviewers were then given the list of patients who did not meet the performance measures, and were allowed to review the charts. Documentation of compliance was either established or not established, and the external and internal reviewers discussed and compiled a database accordingly.

**Tobacco-cessation counselling**

Data collected by the EPRP were tabulated for a 13-month period from 1 October 2006 to 30 October 2007. Based on the EPRP data reported to the Office of Quality and Performance, published at http://www.oqp.med.va.gov/, tobacco-cessation counselling for patients with the diagnoses of HF was targeted for improvement. Changes in admissions procedures were implemented on 1 November 2007. The EPRP database was then re-examined for a 16-month period from 1 December 2007 to 31 January 2009.

**HF management**

Data collected by the EPRP were tabulated for a 16-month period from 1 October 2006 to 31 January 2008. Discharge measures for patients with the diagnoses of HF were targeted for improvement. A discharge face sheet was implemented on 1 February 2008. The EPRP database was then re-examined for a 12-month period from 1 February 2008 to 31 January 2009.

Control charts were constructed to demonstrate variance in quality measure compliance before and after implementation of the new procedures. z Tests for proportions were conducted to compare documented compliance rates before and after implementation of the admissions template (Tobacco Cessation Counselling) and the discharge face sheet (HF management).

**RESULTS**

**Tobacco-cessation counselling**

Examination of baseline preintervention data collected by EPRP showed that an average of 59.1% (n=26 of 44) of hospitalised patients with HF received tobacco-cessation counselling. Following implementation of the new admissions template and counselling procedures, results indicated a consistent 100% documentation rate (n=26) for counselling tobacco users with HF in the hospital. A test for proportions (Z=3.5) indicated that this improvement was statistically significant (p<0.01). Figure 1 demonstrates a control chart for the EPRP data of tobacco-cessation counselling documentation 13 months before and 16 months after the intervention was implemented.

**HF management**

Examination of baseline preintervention data collected by EPRP in patients with HF indicated that an average of 92% (n=140 of 153) of patients received comprehensive HF discharge instructions; 98% (n=161 of 164) of patients received ejection fraction (LV) measurement; and 82% (n=40 of 49) of patients received angiotensin-converting enzyme inhibitor (ACEI)/angiotensin receptor blocker (ARB) prescriptions at discharge. Following implementation of the mandatory discharge electronic face sheet, comprehensive discharge instructions had a compliance rate of 97% (n=134 of 138); LV function assessment was 100% (n=134); and ACEI/ARB prescription for left ventricular systolic dysfunction at discharge (or documentation of a contraindication) was 100% (n=48). z Tests for proportions indicated that improvement in ACEI/ARB prescription at discharge was statistically significant (Z=2.77, p<0.01), although no significant improvement was documented in HF discharge instructions or ejection fraction measurement (p>0.05). Figure 2 shows a control chart for ACEI/ARB prescription at
discharge for HF patients displaying the percentage compliance with quality measures for 16 months before implementation of the new discharge face sheet compared with percentage compliance for 12 months after implementation of the new discharge process.

**DISCUSSION**

As part of a quality improvement rotation at the VA, residents developed standardised platforms for improving inpatient tobacco-cessation counselling.
directing the discharge process according to accepted guidelines, and capturing information used by physicians to make disease-specific management decisions in standardised fields. User-friendly templates merged with the admissions and discharge summaries for HF allowed for easy standardised documentation of data collected from multiple sources and users, and captured exclusion criteria concerning patient or medical reasons for forgoing treatment, saving the time previously required to manually sort through non-standardised patient records. In sum, resident-led innovations led to improved compliance with admissions and discharge processes at a single VA hospital within which over 100 house staff and attending physicians rotate over the course of 1 year.

To provide all patients with an optimal quality of care, physicians must have access to precise measurement systems and must follow standardised procedures in documenting the care they provide to their patients. Although EHRs hold great promise for the continuous improvement of quality and safety,6 7 residents in this study learnt that these records are beset by lack of standardisation and heterogeneity in data sources.8 9 For example, automated reviews of EHRs accurately identify patients’ current medications but are less sensitive for detecting exclusion criteria.10 Similarly, an assessment of the validity of performance measures for coronary artery disease revealed that 15% to 81% of apparent quality failures in EHRs were actually audit failures,11 leading to questions about whether differences in performance reflect measurement or documentation errors as opposed to actual differences in quality of care.12 As residents wrestled with problems in clinical decision support13 14 and feedback systems,15—17 they discovered how to modify standardised codes,13 15 18 physician alerts and clinical reminders to aid in their own decision-making and improve their own quality of patient care.

Limitations
Interventions within a single VA hospital limit the applicability of our findings to other institutions. The possibility that other quality improvement efforts may have occurred simultaneously within the hospital also limits our ability to infer causality for improved outcomes. Sample sizes in this study were small; reliability was not assessed through a double chart audit; and there was no follow-up to see if patient prescriptions were actually filled, or to assess whether changes in the system significantly affected patient outcomes. Although smoking cessation counselling documentation increased significantly, and even brief counselling has been shown to improve cessation rates,19 we do not know the quality, time spent and effectiveness of the counselling. Finally, work flow interruption and physician and staff satisfaction were not evaluated, making it difficult to estimate how variability among clinicians’ and staff approaches to the admissions and discharge processes may contribute to medical practices.

Conclusions
Implementation of resident-initiated quality improvement projects directly benefited the VA hospital by positively impacting the care and safety of patients throughout the institution. Capture of standardised clinical data increased efficiency and reduced the burden for physicians. Standardisation of clinical data documentation facilitated communication of patient information to subsequent providers aiding their ability to efficiently care for their patients. But perhaps even more important than improving the care of these patients, the VA was instrumental in helping its front-line providers (ie, resident trainees) master the process of quality improvement. By generating their own ideas for quality improvement, conducting process mapping of the current system, identifying solutions and sharing their experiences with their peers, these residents established that physicians are ultimately accountable for ensuring that a system is in place to provide optimal quality healthcare. Considerable initiative, effort and commitment from residents, faculty leaders and administrators are required to move residents’ proposed modifications to hospital-wide implementation. By investing the necessary resources and tracking month-to-month increases in the VA hospital’s compliance with nationally accepted quality performance measures following these interventions, the hospital helped residents see that they were personally responsible for successful changes in the process of patient care, thereby creating champions for healthcare quality improvement5 and building a foundation for future changes in the systems that affect patient care.

Funding Completion of this paper was made possible by a grant from the Medical Education and Research Committee (MERC) of the University of Wisconsin-Madison School of Medicine and Public Health as well as by the support of the Education Innovation Project of the Residency Review Committee for Internal Medicine, of which we are a participating residency. These QI projects received widespread support from the William S Middleton Memorial Veterans Administration Hospital, especially the director, D Thompson, and personnel in the Information Technology, Pharmacy, Nursing and Organisation Improvement departments. Results of these projects were shared at the Association of Program Directors in Internal Medicine (APDIM) meeting in April, 2009. We also wish to acknowledge the support of the University of Wisconsin Institute for Clinical and Translational Research, funded through an NIH Clinical and Translational Science Award (CTSA), grant no 1 UL1RR025011.

Competing interests None.

Ethics approval Ethics approval was provided by the University of Wisconsin Health Sciences Institutional Review Board—categorised as exempt.

Provenance and peer review Not commissioned; externally peer reviewed.
REFERENCES
Republished original article: Resident-initiated interventions to improve inpatient heart-failure management

James Oujiri, Abdul Hakeem, Quinn Pack, et al.

Postgrad Med J 2011 87: 700-705
doi: 10.1136/pgmj.2009.39339rep

Updated information and services can be found at:
http://pmj.bmj.com/content/87/1032/700.full.html

These include:

References
This article cites 17 articles, 9 of which can be accessed free at:
http://pmj.bmj.com/content/87/1032/700.full.html#ref-list-1

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Topic Collections
Articles on similar topics can be found in the following collections

- Immunology (including allergy) (275 articles)
- Drugs: cardiovascular system (247 articles)
- Journalology (45 articles)
- Patients (51 articles)

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/