

## Automated Data from Electronic Health Records Is Variably Accurate in Assessing Quality of Heart Failure Care

Baker DW, Persell SD, Thompson JA, et al. Automated review of electronic health records to assess quality of care for outpatients with heart failure. *Ann Intern Med* 2007;146:270–7.

### Study Overview

**Objective.** To assess the accuracy of automated data extracted from an electronic health record (EHR) to measure quality of heart failure care.

**Design.** Retrospective observational study.

**Setting and participants.** 517 patients aged  $\geq 18$  years who were diagnosed with congestive heart failure as determined by ICD-9 codes entered into an EHR and who were seen  $\geq 2$  times in a single academic general internal medicine clinic between July 2003 and December 2004. Four of 11 quality of care measures were evaluated: measurement of left ventricular ejection fraction (LVEF),  $\beta$ -blocker use in patients with LVEF  $< 40\%$ , use of angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers in patients with LVEF  $< 40\%$ , and warfarin use in patients with comorbid atrial fibrillation.

**Main outcome measures.** Performance on each of the 4 quality measures extracted from the EHR as compared with a structured manual chart review (“hybrid” review).

**Main results.** The automated EHR review correctly identified 92% of patients with heart failure. Rates of documenting LVEF were similar using both measurement techniques (95% for automated EHR review versus 97% for hybrid review). Approximately half (49%) of patients had a documented depressed LVEF based on hybrid review. Among these patients, 91% met the  $\beta$ -blocker performance measure according to EHR data compared with 93% using the hybrid review. Similarly, 94% met the ACE inhibitor measure using the automated EHR data compared with 99% using the hybrid review. Only 70% of patients achieved the warfarin measure based on automated EHR data as compared with 94% based on hybrid review. This latter difference was largely due to the low sensitivity (49%) of the automated EHR data in detecting valid exclusion criteria.

**Conclusion.** Compared with hybrid review, automated EHR data performed reasonably well in assessing measurement

of LVEF and the appropriate use of  $\beta$  blockers and ACE inhibitors. However, automated EHR data significantly underestimated rates of appropriate use of warfarin therapy.

### Commentary

Gaps in the delivery of high-quality care are a persistent problem in the U.S. health care system [1]. EHRs provide increased access to clinical information at the point-of-care and interactive clinical decision support and are often promoted as promising tools to bridge these gaps [2]. As the adoption of EHRs continues to increase [3], it is vital to understand how these systems can be used to assess quality of care in the ambulatory setting.

This study by Baker et al provides an intriguing glimpse into the benefits of using automated data extracted from an EHR as well as the limitations of this technique. The findings indicate that the automated EHR data compared reasonably well with the more labor-intensive hybrid review method for 3 of the 4 quality measures. Discrepancies between the 2 methods were largely related to the inability of the automated data extracted from the EHR to reliably identify exclusion criteria related to appropriate medication use. This was particularly apparent in the assessment of appropriate warfarin use, where exclusion criteria can be complex and are often not coded in a medical record.

Perhaps the most notable limitations of this study are the scope and setting. The analyses were conducted within a single medical practice using a single EHR system and assessed quality measures in only 1 disease. It is unclear whether the findings generalize to other settings, other EHR systems, or other diseases. Data available within an EHR are critically dependent on the commitment of physicians using the system to enter clinical information, and this commitment likely varies across settings. In addition, the authors pointed out that the EHR could not be easily used to assess measures that require more detailed clinical information not captured in coded format, such as patient compliance. Even in the current analysis, a manual chart review was required to document LVEF before performance could be assessed accurately using an automated method. This limitation will likely become apparent when using automated data from an

EHR to assess quality of care for other chronic diseases that require staging of disease severity, such as asthma management.

### Applications for Clinical Practice

Accurate and reliable quality measurement is fundamental to any quality improvement program. The increasing use of EHRs creates a potential opportunity to automate a labor-intensive process; however, this method may have significant limitations. Health systems interested in using EHR data to assess quality of care should conduct careful analyses to ensure that these data are reliable before using them as the

sole means of quality measurement.

—Review by Thomas D. Sequist, MD, MPH

### References

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