

Adverse inpatient outcomes during the transition to a new electronic health record system: observational study

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Abstract

Objective To assess the short term association of inpatient implementation of electronic health records (EHRs) with patient outcomes of mortality, readmissions, and adverse safety events.

Design Observational study with difference-in-differences analysis.

Setting Medicare, 2011-12.

Participants Patients admitted to 17 study hospitals with a verifiable “go live” date for implementation of inpatient EHRs during 2011-12, and 399 control hospitals in the same hospital referral region.

Main outcome measures All cause readmission within 30 days of discharge, all cause mortality within 30 days of admission, and adverse safety events as defined by the patient safety for selected indicators (PSI)-90 composite measure among Medicare beneficiaries admitted to one of these hospitals 90 days before and 90 days after implementation of the EHRs (n=28 235 and 26 453 admissions), compared with the control group of all contemporaneous admissions to hospitals in the same hospital referral region (n=284 632 and 276 513 admissions). Analyses were adjusted for beneficiaries’ sociodemographic and clinical characteristics.

Results Before and after implementation, characteristics of admissions were similar in both study and control hospitals. Among study hospitals, unadjusted 30 day mortality (6.74% to 7.15%, P=0.06) and adverse safety event rates (10.5 to 11.4 events per 1000 admissions, P=0.34) did not significantly change after implementation of EHRs. There was an unadjusted decrease in 30 day readmission rates, from 19.9% to 19.0% post-implementation (P=0.02). In difference-in-differences analysis, however, there was no significant change in any outcome between pre-implementation and post-implementation periods (all P≥0.13).

Conclusions Despite concerns that implementation of EHRs might adversely impact patient care during the acute transition period, we found no overall negative association of such implementation on short term inpatient mortality, adverse safety events, or readmissions in the Medicare population across 17 US hospitals.

Reviewer: 2 - Patient and Public Reviewer

Comments: This seems very relevant to patients and caregivers. We hear all the time about the implementation of EHRs and this is a valid question - whether the "focus" of caregivers is diverted and that patients can suffer adverse outcomes. Great concept.

Caveat: this is my first peer review so the below are largely my thoughts. This seems to be a well designed study so I'm not sure how I can be helpful; these were just questions that came up for me.

The July effect and the weekend effect are mentioned - does their study correct for these effects? One hospital reported a more than doubling of mortality in the five months after implementing an EHR. (Citation 17) Their evidence seems to show that it may not have been due to the implementation of the EHR, but the introduction of this single case doesn't fit with the overall findings of the paper, and these effects aren't discussed. Maybe outside the scope of this paper, but these notes do seem to run counter to the findings of their study and further explanation of "why" would be interesting. These are noted more in the discussion I see.

I see they identified hospitals in subgroup analyses, but are there different results between their two criteria: hospitals which implemented EHRs and hospitals which switched to a new one? As a patient, am I better off seeking treatment at a hospital that has just implemented an EHR, or one that has just switched vendors?

Might these results be different for different demographic patient populations? They used medicare data, but in facilities that see largely privately insured patients, would the hospital be more or less equipped to manage their patients and the EHR implementation? Possibly another study.

Also possibly another study, but their results beg the question of whether Epic systems are simply easier to implement. If the 14 epic sites were implementing product from a different vendor, would the results change? Maybe that's for marketing folks to figure out, but as a patient, I think it would be relevant to me to know if I'm admitted to a hospital that is implementing an Epic EHR I have less to worry about statistically than if I'm admitted to one implementing an EHR from Cerner.

Further discussion of advanced planning and clinical resiliency would be beneficial to readers planning to implement.

I may have missed a note on geographical distribution of the hospital regions that were studied, but this may bear mentioning in the limitation if the sites were geographically localized.

I think the first word in this sentence of the abstract should be "The": This purpose of this study was to assess the short-term impact of inpatient EHR implementation on patient outcomes of mortality, readmissions and adverse safety events.

Additional Questions:

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