Reviewer's report

Title: Evolving health information technology and the timely availability of clinical diagnostic data from ambulatory visits: A natural experiment in an integrated delivery system

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Reviewer: Blackford Middleton

Overview

This is a very good paper submitted by Naomi Bardach et al. titled “Evolving health information technology and the timely availability of clinical diagnostic data from ambulatory visits: a natural experiment in an integrated delivery system”. It is interesting, well-written, and timely contribution to the knowledgebase in clinical informatics.

The paper aims to identify correlations between information availability and the adoption of progressively sophisticated healthcare information technology systems for capturing patient level diagnostic data. The paper takes advantage of a natural experiment in the environment at Kaiser Permanente in Northern California where the basic administrative data management system was complemented by the adoption of two information systems for clinical data management. The first, so-called intermediate system was a web-based technology with limited documentation capabilities but did support order processing and results review. The advanced technology analyzed was the EpicCare fully integrated electronic medical record. Over the course of the adoption period for Intermediate and Advanced HIT systems adoption, the authors correlate distinct system utilization with the capture and timely availability of patient level diagnostic information (ICD-9).

Comments

The authors focus on bio- and syndromic-surveillance as key benefits from more timely availability of patient level diagnostic information in clinical information systems. This reviewer would suggest that these are second-order benefits, and suggests to the authors that they focus more clearly on immediate benefits of the more timely availability of patient level diagnostic information in clinical information systems. This would include, for example, a more complete problem list which may support improved coordination of care among providers, and across time for both acute and chronic care management. In addition improved availability of patient level diagnostic information if inclusive of disease states and conditions, laboratory tests and examinations, and a comprehensive medication list should improve clinical decision support, and help to reduce duplicate tests and procedures, drug drug interactions and other adverse drug events, identification of potential drug lab, drug allergy, and drug symptom interactions,
and improved disease state management across providers, and across time for acute and chronic care conditions as mentioned previously.

Most importantly for the typical healthcare delivery setting, however, is the fact that timely availability of patient level diagnostic information is essential for efficiently creating the bill and submitting an administrative claims transaction for reimbursement. The authors acknowledge that this is less relevant in the Kaiser health care delivery system, but it would be useful for them to discuss to make the generalizability and interpretation of their findings more useful to the healthcare delivery community at large.

Major compulsory revisions

• It would be useful for the authors to clearly define “electronic diagnostic data”. They should be explicit about which diagnostic is captured in administrative versus the two different clinical systems, and how it is captured, and by whom, in the context and typical workflow of each system. A major potential confounding factor, of course, is that a data entry clerk may enter different data, as well as enter data in a more timely fashion, than a clinician.

• The paper is well written but it could be improved if it were more clear about which databases the authors refer to in the discussion. For example an architectural diagram depicting the administrative database(s), as opposed to the intermediate clinical information system, and the advanced clinical system databases, could make interpretation of this discussion easier for the reader.

• A key result graphic which this reader was looking for but is not presented is a combination graph which shows the impact of different HIT system utilization as the left Y-axis, over time as the X-axis, with a right-sided Y-axis depicting time to data availability. Such a combination graph would allow the reader to better interpret the data.

Minor essential revisions

• The authors suggest that the large patient sample should wash out any potential biases arising from patient or a practitioner mix over time, however, a subtle association (inverse) may exist between increasingly complex patients and accuracy and timeliness of patient level diagnostic data capture. This could be considered and discussed.

Discretionary revisions

• It would be useful if the authors can correlate timely acquisition of patient level diagnostic data with improved decision support, clinical process or outcomes, or administrative data management. In particular, more readily available patient level diagnostic information might arise in decreased redundant tests and procedures, improved clinical decision-support compliance, and if medication data are considered, potentially decreased drug allergy, or drug-drug adverse reactions.

• It would be useful to briefly describe the method of data entry for patient level diagnostic information in all three systems: administrative, intermediate clinical,
and advanced clinical.

- It would be useful to distinguish for patient level diagnostic data which are entered in batch mode, and on what schedule, versus those which are entered at the time of each clinical encounter.

- The introduction and background literature review of the paper could be strengthened. The authors do not review or cite the study by Tang at all which assessed the completeness and availability of the clinical record, nor do they cite or discuss the study by Leape at all at Harvard which analyzed the quality of care delivered and the association of information availability.

Recommendation for next step

- Revise, and resubmit

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.