Department of Family Medicine

Complexity of Using Multiple Data Sources for Population Management in Colorectal Cancer Screening: The Experience of SATIS-PHI/CRC

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Introduction

The Systems Approach to Tracking and Increasing Screening for Public Health Improvement of Colorectal Cancer (SATIS-PHI/CRC)

- a six-step, evidence-based, system-level redesign of the way in which colorectal cancer (CRC) screening and follow-up are conducted in a community-based network of primary care practices.

- intended to assist primary care practices to better provide guideline-based preventive health care to their age-appropriate patients, who are at average risk for CRC and who are not up to date in their screening for it.

- intervention is intended to be conducted by a central entity, such as a health care delivery system, accountable care organization, or insurer, affiliated with a network of primary care practices on behalf of and in conjunction with those practices.

- task funded by CDC through AHRQ's ACTION program and implemented by the CNA Health ACTION Partnership, which included Thomas Jefferson University and Lehigh Valley Health Network. The task order was carried out between Oct. 2007 and July 2010

Methods

The task was carried out in 15 practices of the Lehigh Valley Physician Hospital Organization (LVPHO), whose practices included

- Hospital-owned practices.
- Hospital clinics.
- Independent private practices.
- Private practices in a large group association.

Eligible patients of each practice were invited to screen for colorectal cancer by colonoscopy or stool blood test (SBT) in accordance with 2008 guidelines published by the American Cancer Society.

Results of screening were tracked via the same databases used to determine initial eligibility, supplemented by lab reporting and chart review (both paper and electronic).

Research Question

What complexities arise when implementing a multi-practice population screening task with data from multiple sources?

Figure 1. Steps for conducting SATIS-PHI/CRC. Steps 3 through 5 involved coordination of practices and multiple support services.

Step 1. Recruit Practices Obtain endorsement from all physicians to represent their practice and contact their patients.
Step 2. Conduct Academic Detailing Bring physician knowledge and physician/practice behavior in line with 2008 ACS guidelines for colorectal cancer screening and follow-up.
Step 3. Identify Eligible Patients Develop patient list and identify eligible patients by electronic records review and eligibility assessment.
Step 4. Mail Screening Materials Mail screening invitation, information, and materials to eligible patients on behalf of the practice. Mail a reminder to initial non-respondents.
Step 5. Track Screening Review electronic records review and audit charts to report completed screening tests.
Step 6. Provide Feedback Notify practices of screening results and recommended follow-up.

Patient Outcomes: Screening by colonoscopy or stool blood test and follow up of positive stool blood tests.

Findings

Steps 3, 4 and 5 (Fig. 1) involved coordination of the multiple practices and their support services by EPICnet, with complexities occurring at each step.

These complexities created delay in implementation, resulted in errors that required correction, or required training and support of individuals engaged in the task. Complexities were apparent in three major areas:

1. **Organizational:** complexities involving to the function of an organization and its priorities as related to the task or the involved practices.

2. **Information Systems:** complexities relating to I/S personnel, data systems and data components necessary to the task.

3. **Human Factors:** complexities relating to the knowledge, experience, and performance of people acting on behalf of the task in the implementation phase, in patient screening, and in the tracking phase.

Figure 2. Data sources for identifying the patient population in SATIS-PHI/CRC

EMR	Billing	Claims
1. Centricity Physician Office (hospital-owned)	1. IDX (hospital owned)	1. LVPHO
2. Next Gen (hospital-owned)	2. IDX (hospital owned, but outsourced)	
3. Next Gen (large group-owned)	3. Private practice systems	
4. Next Gen (private practice)		

Note: While the same software product may have been installed in multiple organizations, its coding and customization was unique to each organization.

Step 3. Identify Eligible Patients. Develop patient list by electronic records review and eligibility assessment.

Organizational Factors	1. Claims data obtained for all practices from LVPHO required delays to account for periods of open-enrollment, where patients had the opportunity to choose a new insurance product and/or practice. Requests for information needed to wait until the end of open enrollment.
	2. Billing and EMR data obtained from practices with a larger parent organization required queuing data requests after priority organization reports could be completed.
Information System Factors	1. Queries to obtain population data to assess patient eligibility for CRC screening were not an existing part of the system, leading to a trial-and-error method to develop accurate data queries.
	2. Operating systems in practices that were independent of a large parent organization did not have I/S support to develop queries, resulting in a limited ability to capture patient data.
	3. Data fields relating to CRC screening or CRC risk were absent, coded in multiple places, or not coded for tracking, limiting ability to report data on eligibility status without manual chart audit.
	4. There was no standard format for data organization or formatting for reports among the fifteen practices.
Human Factors	1. When appropriate data fields did exist, some data was absent (e.g. demographic data relevant to the task). When these fields required text entry, data were missing, "dirty" (i.e. of uncertain meaning) or lacking metadata (e.g. screening reported as "up to date," but method of screening, or date, or result were missing).
	2. When two databases were used for a practice, some data was found to be in conflict (e.g. two addresses for one patient).
	3. Patients names were duplicated due to subtle differences in data entry (e.g. "John Doe" and "John A. Doe," but with same DOB, SNN, and address).

Figure 3. Elimination of patients from the initial electronic records review to develop the colorectal cancer screening intervention registry.

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Initially eligible patients (15 Intervention Practices)	10,063
Patient ineligible due to conflicting or absent information in the electronic record review (EMR, billing, claims). For example, conflicting addresses when two data sources were used; absent demographics such as DOB.	328
Patients ineligible due to information discovered on manual chart review. For example, evidence of screening or high risk discovered in chart but not documented in appropriate data fields; data fields completed but lacking appropriate metadata context such as screening method.	73
Patients ineligible due to self-report of up-to-date screening or high risk.	1,342
Patients ineligible due to returned mailings ,i.e. address in registry deemed to be inaccurate	55
Total number of patients eliminated due to above factors	1798
Total number of eligible patients after above elimination. (Note: an additional 300 eligible patients chose to opt out of screening).	8,265

Step 4. Mail Screening Materials. Mail screening invitation, information, and materials on behalf of the practice. Mail a reminder to initial non-respondents.

Organizational Factors	1. Contracted mail services provider queued CRC patient mailings behind other competing prioritized mail.
Information System Factors	1. Information Systems Factors were minimally at issue in this step.
Human Factors	1. Due to time lag, practice personnel required a "booster" to remind them of task processes for the practice and its patients, including support for patient questions about screening and support in helping patients successfully screen for CRC.
	2. New practice personnel required orientation to the task.

Step 5. Track Screening. Review electronic records review and audit charts to report completed screening tests.

Organizational Factors	1. Billing and EMR data obtained from practices with a larger parent organization once again required queuing data requests behind priority organization reports.
	2. One parent organization initiated a change in its EMR operating system, placing practices in transition between systems as task results were being tracked.
	3. One practice underwent a change in its practice affiliation during the results phase.
Information System Factors	1. For the practices that changed their EMR operating system, recent data relating to task results needed to be obtained from "archived" EMR and combined with the current EMR.
	2. Personnel who had previous run queries related to the task had left their jobs, resulting in the need to orient new personnel to the task. Often, this required re-developing the information queries.
Human Factors	1. In all practices, results received for both SBT and colonoscopy needed to be entered manually into appropriate data fields or flowsheets. Some data received from an outside source was never entered into the appropriate field or flowsheet, and needed to be captured by manual chart audit.
	2. In some paper charts, flowsheets did not exist.
	3. When screening data was entered In practices using an EMR, some data was entered in error, was incomplete, or was missing metadata (e.g. SBT completed, but no result; colonoscopy completed, but no date or diagnosis).

Table 1. Sources for tracking results of screening, by number of practices using each source. Results in 10 practices with EMR and 5 practices with paper charts were confirmed by chart audit.
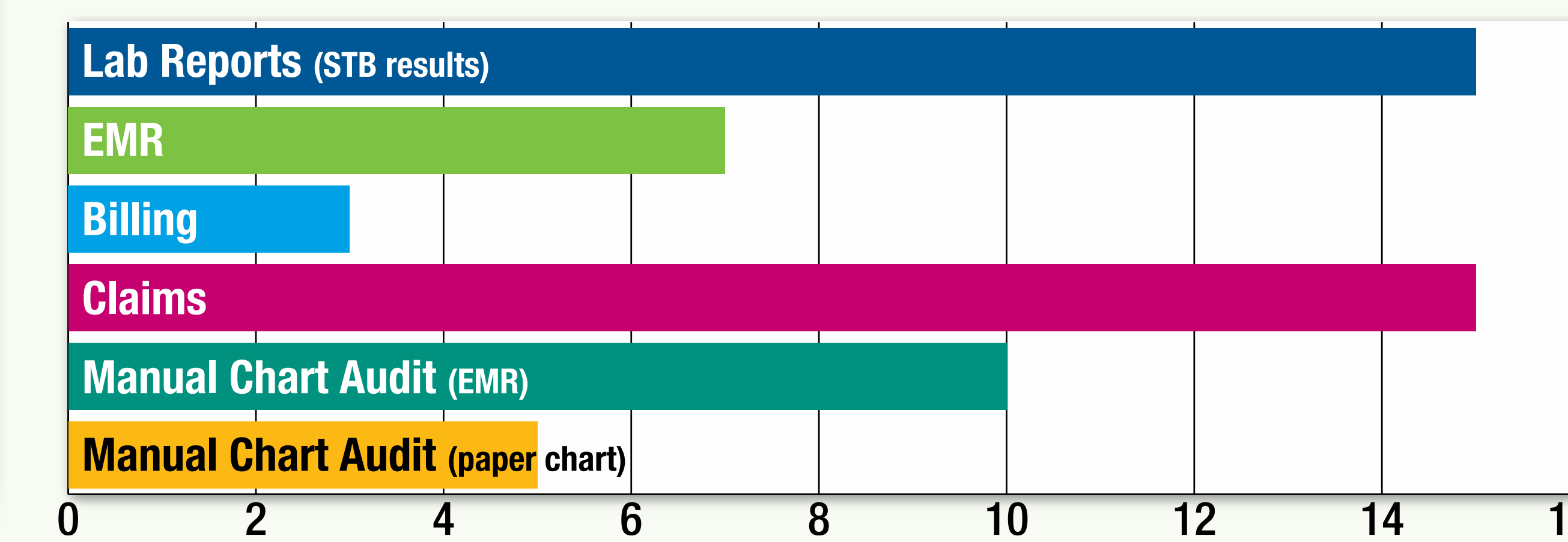
Discussion

- LVPHO is an open-model medical system involving multiple practices models, with each member or group using its own databases for managing patient care.

- Databases did not share a common operating system, common coding, or common data entry guidelines. Many practices still use paper charts for the medical record.

- This resulted in a need to manually aggregate and clean population data to make it useful for SATIS-PHI/CRC.

- The practice entities and the multiple support systems each had their own internal timelines and priorities, changes in operating systems, and changes in personnel, creating delays in any request for electronic records review or in preparing population mailings.

- Human factors at the practice level in entering billing and EMR data led to challenges in cleaning data or searching for data to determine patient eligibility and track results of CRC screening.

- These factors impacted the ability to access and extract data from the various sources and systems, resulting in a time delay from the time data was requested until it was prepared for implementation of the task. That delay was as long a six months for the development of the initial patient eligibility list.

Conclusions

Implementation of a population intervention in an open-model medical system can be a time-intensive and labor-intensive task due to the complex interaction of organizational factors, information system factors, and practice factors. Awareness of these complexities, and the time and support to manage them, may be keys to an organization's ability to provide care based population data, as in an Accountable Care Organization model.

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