Value of Health Information Exchange in Ambulatory Care

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Principal Investigator:
J. Marc Overhage, MD, PhD; Director, Regenstrief Institute Medical Informatics; Regenstrief Professor of Medicine, Indiana University School of Medicine

Team members:
Blackford Middleton, MD, MSc, MPH, Corporate Director, Clinical Informatics Research & Development; Chairman, Center for Information Technology Leadership (C!TL), Partners Healthcare System, Boston, Massachusetts

Performing Organization:
Indiana University School of Medicine; Regenstrief Institute

Project Officer:
Teresa Zayas Cabán, PhD

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The Agency for Healthcare Research and Quality (AHRQ)
U.S. Department of Health and Human Services
540 Gaither Road
Rockville, MD 20850
www.ahrq.gov

Abstract

Purpose: The purpose of this project was to develop and disseminate health IT evidence and evidence-based tools to support patient-centered care, and use of health information to improve quality of care.

Scope: We applied a previously developed economic model for benefits of health information exchange (HIE) to a specific geographic community (Indianapolis MSA) in order to determine expected savings for the community.

Methods: We expanded an existing HIE, the Indiana Network for Patient Care (INPC) to include ambulatory care settings to create a "laboratory" in which to test the model in a randomized controlled trial.

Results: We learned a variety of lessons during the course of our study. First, our experience implementing HIE with ambulatory practices reinforced our appreciation for how resource limited these environments are, particularly in terms of management attention. Second, while the INPC contains a considerable amount of data for patients being seen in these practices and can organize and synthesize it efficiently, providers subjectively found only marginal value for most patient encounters. We initiated the randomized, controlled trial during 2008, continue to support the infrastructure and end users, obtained the claims data that will be used to analyze the randomized controlled data, and are preparing to carry out the analysis.

Key Words: Health information exchange; ambulatory care setting; economic model of health information exchange; Center for Technology Leadership and Technology (C!TL); Indiana Network for Patient Care (INPC); Transforming Healthcare Quality Through Information Technology (THQIT); knowledge creation

Final Report

Purpose

Objectives of Study

The specific aims of this project were to:

- Apply a previously developed economic model for the benefits of HIE to a specific geographic community or Metropolitan Statistical Area (Indianapolis MSA) in order to determine the expected savings for the community.

- Identify, through utilization of the model, the categories of data (e.g., laboratory, radiology, administrative) that contribute the most to these savings and which participants (e.g., physicians, hospitals, payers) benefit.

- Create "laboratory" to measure the value of HIE, building upon an existing HIE.

- Conduct a randomized, controlled trial to measure the value that result from HIE. Value will be measured in terms of reduced costs of care and selected quality measures.

Scope

Background

Clinical data is required in order to derive value from most health information technology, but often these clinical data are fragmented and not available at the point of care. Health information exchange (HIE) is the term used to describe efforts to aggregate clinical data for patients across disparate organizations in order to form a more complete picture of their care that improves clinical care and quality, research, and public health. The existing HIE (the Indiana Network for Patient Care) was used as the foundation for this project. An economic model previously developed by the Center for Information Technology Leadership (C!TL)[1] was utilized to characterize the benefits of health information exchange (HIE), to identify the categories of data (e.g. laboratory, radiology, administrative) that contribute the most to these savings and which participants (e.g. physicians, hospitals, payers) would benefit.

Context

The economic model of HIE, developed by the Center for Information Technology Leadership (C!TL) from a national perspective, was modified to support its use on a regional

basis and then to validate the model using data from this project's randomized trial. We refined and applied the C!TL economic model to a specific geographic community (Indianapolis MSA) in order to determine the expected savings for the community.

C!TL consultants provide expertise to this project to review and improve where possible the accuracy of the key input variables and clarify the savings in the model. In addition C!TL has incorporated many of the insights and learning points from this work into their core models so that they all reflect this learning.

Settings

The existing Health Information Exchange (HIE), the Indiana Network for Patient Care (INPC), was expanded to ambulatory care settings to create a "laboratory" of physician practices and data sources for the randomized controlled trial to enable the measurement of the effects and assess the value of HIE in the ambulatory setting.   This "laboratory" was modeled after the emergency department model which had previously been used for two large trials.

The Indiana Network for Patient Care (INPC) is a 13 year old health information exchange operated in Indiana by the Regenstrief Institute. Investigators at the Regenstrief Institute created the Indianapolis Network for Patient Care (INPC) in 1995 with the goal of providing clinical information at the point of care for the treatment of patients. The INPC is an operational state-wide secure data exchange and includes clinical data from a total of over 35 hospitals located across the state, the public health departments, local laboratories and imaging centers, and a few large group practices closely tied to hospital systems, and efforts continue to-date to expand across the state.

The INPC long-term goals are to demonstrate the feasibility and value of HIE. One measure of our success is to create a sustainable funding model for HIE in Indiana, but the most important measure of success is whether providers use the information to improve the care their patients' receive, so another measure of success is how much the HIE is used.

Participants

This study was carried out in Marion County, centrally located in the State of Indiana, and location of Indianapolis, the state capital and largest city in the county. According to U.S. Census Bureau, 2006-2008, 3-year American Community Survey Estimate, the population of Marion County is ethnically diverse with approximately 68% of the population white, 25% African America, and 7% Hispanic or Latino. Approximately 11% of the population is 65 years of age or older. The median household income is $45,269.

To build the HIE laboratory, we chose the Methodist Medical Group (MMG) primary care practice group as the ambulatory care setting. The MMG network of almost 200 primary care physicians practice in Internal Medicine, Family Practice, Pediatrics, and Obstetrics/Gynecology. In 2009, the MMG practice group became part of the newly formed, Indiana Clinic, jointly developed by Clarian Health and the IU School of Medicine. Indiana Clinic is a new multi-specialty physician group, comprised of IU School of Medicine faculty, physicians employed by Clarian Health and some private physician groups.

Early in the project, we worked with MMG and payers to determine which specialty physicians the MMG primary care physicians refer to most often and attempted to engage those top four (4) specialty practices. The top four specialty practices identified were: (1) Respiratory

& Critical Care Consultants; (2) The Care Group, LLC; (3) American Health Network Hematology/Oncology; and, (4) Diabetes & Endocrinology Associates.

In addition to the INPC ambulatory care settings, a payer (Wellpoint) was engaged in this project in order to provide claims data to allow us to measure effects on costs, and also to lay the foundation for changes in reimbursement models based on the findings. The source of claims data that we originally planned to work with ceased operations during the grant project period, and we had to identify an alternative source for this data late into the project.

Incidence

Roughly 80,000 (or approximately 1/3 of MMG/Indiana Clinic patients) carry Wellpoint/Anthem insurance. We will match the Anthem provider codes with the MMG providers.

Prevalence

We expect to find savings through decreased diagnostic testing and/or decreased resource utilization (referrals, etc.); decreased hospitalizations; and decreased adverse drug events (which can cost $1500 each).

Methods

Study Design

The aim of this project was to refine an established economic model of health information exchange (HIE), create a "laboratory" in which we can test that model, and, finally, test the model's predictions in a randomized controlled trial. An existing HIE (the INPC) was used as the foundation for this project.

The macro-model approach (derived from the C!TL model described earlier) was used to gauge the aggregate savings and to identify areas of highest value was bridged with an empirically-based micro-approach to examine the results in more detail. We recognize that laboratory and radiology savings are two clear areas where savings may be found. The projected savings in laboratory and radiology are estimated at more than $100M for the Indianapolis MSA or about $12M for our population. We will not realize all of these savings of course since not every provider who orders tests for the patient will have access to the community wide data and, more importantly we won't change all of the behaviors. We reviewed the categories and selected the 5 or 6, including laboratory and radiology that we thought we might influence. We wanted to limit the number of categories to reduce the number of comparisons we are making and control our risk of Type II error.

Data Sources/Collection

We designed a randomized controlled trial of HIE in the ambulatory setting by delivering clinical data to providers from across the entire Indianapolis community. The Methodist Medical Group information services staff set up an outbound interface from their patient registration system. This interface provided the electronic message to INPC to open access to these providers to the community data available for these patients with scheduled primary care visit appointments.

We were able to integrate data from the Indiana Network for Patient Care, our locally developed health information exchange, into the MMG ambulatory practices. However, because MMG (Indiana Clinic) initiated an implementation of a new EMR in the past year and due to the business re-organization of this practice group, we were unable to set up the additional outbound interface as planned to deliver the MMG laboratory results system data to the INPC.

We also anticipated four specialty care clinics would set up an outbound interface from their registration and appointment scheduling system, but were unable to engage the specialty groups for several reasons including competing priorities for time and financial resources within each of the specialty practice groups, internal and external technology challenges, a physical move of one of the practices, implementation of an EMR, and plans to merge or sell one of the practice groups.

Interventions

In order to measure the value of making these data from the HIE available, we randomly allocated access to these data by patient which allowed us to control for practice and provider characteristics which we have identified as important covariates in our previous studies of HIE value.

The Indiana Health Information Exchange (IHIE) provided in office training and support for the physicians in the study through their clinical information specialists that are already supporting these clinicians in their practices. We continue to support the infrastructure and end users to ensure that the practices are using the available information management tools to their fullest.

Measures

This project continues today in the data extraction and analysis phase. Health information exchange is a critical component of any broad health information technology effort. Any health information technology based application requires the appropriate data and it is rare that all of the data required is generated within that technology or a single care delivery organization particularly in the ambulatory setting.

The Wellpoint/Anthem claims data (July 1, 2007 to June 30, 2009) is being used to measure any reduction in charges that result from the intervention. The data manager has obtained the claims and clinical data from their respective source systems and is reformatting and coding the data as necessary for analysis. The clinical data will include demographics, severity of illness, usage of HIE for the patient (data accessed), and whether case or control. Claims data may include data related to amounts billed/charged by health care providers, payments to health care

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providers on behalf of health plans, and data related to the types of claims being billed and/or paid (e.g., whether the claim originated in an inpatient or outpatient setting, the location of services such as operating room, emergency room, laboratory, ambulatory surgery center, physician office, pharmacy, etc.). The types (or category) of claims data being billed is determined by the place of service code. After completing some exploratory, descriptive analyses, and stratifications, a fixed effect analysis will be completed with some covariates and we will look at the total cost, and cost in each category that we were able to identify in the data.

Only a subset of patients may be affected by the use of health information exchange from INPC. We will attempt to learn whether we can prospectively identify the patients more likely to benefit from HIE by: (1) Looking at a subset of patients with a specific co-morbidity index; (2) Looking at ambulatory care sensitive conditions; and, (3) Looking at specific quality of care measures.

In addition, we have created a revised model of the value of health information exchange based on initial work by the Center for Information Technology and Leadership (CITL). We parameterized the model for Indianapolis, the market in which we are conducting the trial, and validated the model's predictions with practice managers and hospital financial experts in the market.

Limitations

As we were unable to engage the top specialty practices that MMG primary care physicians most often referred to, we are unable to obtain encounter or claims data for this population for the study.

Results

Principal Findings

We have learned a variety of lessons during the course of our study that could be of broader interest. First, our experience implementing HIE with ambulatory practices reinforced our appreciation for how resource limited these environments are particularly in terms of management attention. Second, while the INPC contains a considerable amount of data for patients being seen in these practices and can organize and synthesize it efficiently, providers subjectively found only marginal value for most patient encounters. A third important lesson that we have learned is how to think about the results of economic models for health information exchange more precisely. Specifically, we now categorize projected savings into three categories – hard saving, soft savings and shadow savings. Hard savings are those that a practice can actually expect to achieve. Soft savings are those that free resources for other purposes but don't actually result in a reduction of expenditures. An employee function for which the model predicts a 10% FTE reduction for example would be treated as a soft saving since, at least in a small practice setting, the time savings are too small to expect an actual staff reduction but the person's time might be reallocated to other useful functions. Finally, shadow savings are those that the model predicts the practice should achieve but in fact the practice isn't doing those

activities so no savings will occur. From a very pragmatic standpoint, only hard savings are meaningful to the practice.

Outcomes

There were two main drivers for the perception by providers that only marginal value can be found in most patient encounters. First, for many patients there were some important data sources that INPC does not include reducing the value and second, for most patients, the provider already had all of the relevant data (in part as a result of the DOCS4DOCS® results delivery system that is part of the exchange which electronically delivers data to providers). There were certainly examples where the data available in the INPC where highly relevant and important but not for the majority of patients. This perception led the providers to implement a "pull" approach – looking up data on patients when they identified a need – rather than a "push" approach that we initially proposed.

Discussion

Another related development was to explore, using the model, the benefits that we expect from deploying access to community wide data through a lightweight EMR which is basically a viewer versus a heavyweight EMR as was assumed in C!TL's original models. The preliminary results included below highlight the early benefits and very long timeframe (17 years) before heavyweight EMR begins to provide more value than lightweight EMR – at least based on our assumptions including a rollout schedule that includes 12% of providers adopting in years 1-3, 24% in year 3 and the remainder 40 % in year 5.

Figure 1. 12-12-12-24-40 National rollout without ACPOE
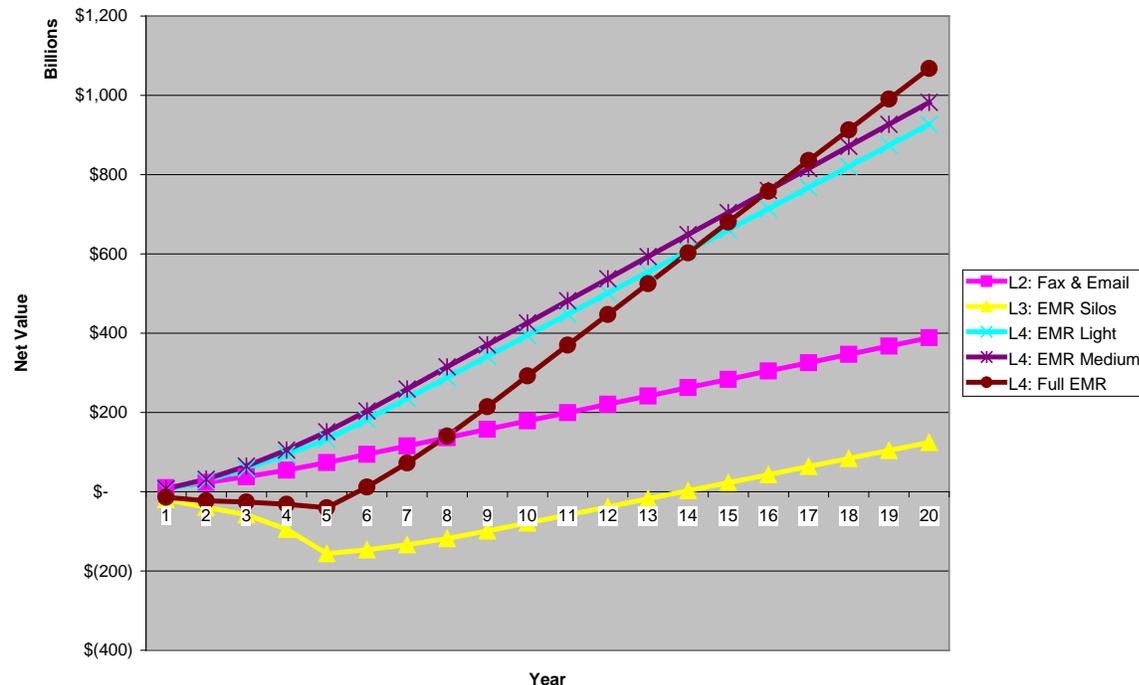
Conclusions

We continue to learn there is more work to do, that it is not as straightforward as one might think, to identify the value to providers of additional data made available to them for their patients through a health information exchange.

Significance

We created a revised model of the value of HIE based on initial work by the C!TL. We parameterized the model for Indianapolis, the market in which we are conducting the trial, and validated the model's predictions with practice managers and hospital financial experts in the market. One of our key insights from this effort was that significant portions of the savings predicted by the model are "shadow costs." Shadow costs are costs that would occur if the organization were carrying out the activity. The C!TL model, for example, assumes that providers are forwarding patient information to consultants for every referral, which obviously would require an investment of staff time and other resources, such as facsimile transmission and mailing. Our validation highlighted that, in fact, the practice is often not sending these data and, therefore, not incurring these costs, and so they will not achieve any savings from HIE by eliminating this task. It has value but will not reduce the practice's expenses.

Implications

Given the incentives investments included in the American Recovery and Reinvestment Act (ARRA), it is important to understand the return that we may expect to gain from investments in health information exchange, particularly at the level of the individual physician practice, and our study should provide some of this important information.

References

1. Walker J, Pan E, Johnson D, Adler-Milstein J, Bates DW, and Middleton B. The Value of Health Care Information Exchange and Interoperability. Health Aff (Millwood). 2005 Jan-Jun;Suppl Web Exclusives:W5-10-W5-18.

List of Publications and Products

None are available at this time. A number of presentations at state and community organizations were prepared and presented to share our learning and mistakes to-date. We are participated in the Connecting for Health Prototype to create a plan to standardize the exchange of health information, the HHS ONC NHIN project, and the Health IT Standards Committee (Federal Advisory Committee).