State and Regional Demonstration in Health Information Technology: Indiana

Final Contract Report

Indiana Health Information Exchange: Evaluation Report

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None of the investigators has any affiliations or financial involvement that conflicts with the material presented in this report.

Preface

This project was one of six State and Regional Demonstrations in Health Information Technology (IT) contracts funded by the AHRQ Health IT Portfolio. The goals of the projects were to identify and support data sharing and interoperability activities aimed at improving health care for patients and populations on a discrete State or regional level. These States and their respective health information organizations (HIOs) are as follows:

- Colorado: Colorado Regional Health Information Organization (CORHIO)
- Delaware: Delaware Health Information Network (DHIN)
- Indiana: Indiana Network for Patient Care (INPC)
- Rhode Island: current*care*
- Tennessee: Mid-South e-Health Alliance (MSeHA)
- Utah: Utah Health Information Network (UHIN)

For more information about these projects, including a cross-project summary of lessons learned, please visit http://healthit.ahrq.gov/stateandregionalhie.

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Background

The Quality Gap

The accessibility, affordability, and quality of health care are major issues facing the citizens of the United States. Furthermore, the three issues are clearly interrelated. Accessibility, as measured by the number of uninsured, has continued to worsen, partly, at least, because of the rapidly rising cost of health care. In addition, much evidence supports the concept that higher quality health care is actually more cost effective.

For several decades, the needs of the American public have been shifting away from predominately acute, episodic care and toward focusing more on patients with chronic diseases. Chronic conditions are now the leading cause of illness, disability, and death. They affect almost half of the U.S. population and account for the majority of health care expenditures. However, there remains a dearth of clinical programs with the infrastructure required to provide the full complement of services needed by people with heart disease, diabetes, asthma, and other common chronic diseases. The fact that more than 40 percent of people with chronic conditions have more than one chronic disease argues the need for more sophisticated mechanisms to communicate and coordinate care.

Unfortunately, physician groups, hospitals, and other health care organizations operate as silos, often providing care without the benefit of complete information about the condition, medical history, service provided in other settings, or medications prescribed by other clinicians. The defects and failures in the current health care delivery system, as documented by the Institute of Medicine (IOM) in *To Err is Human* and *Crossing the Quality Chasm*, are pervasive, and their consequences add to the burden of illness borne by Americans and their families. It is not a lack of caring, competent and dedicated professionals that is to blame for the current state of health care. Instead, it is fragmentation that makes continuity in care very difficult, and it is a lack of systems designed to protect against the likelihood of human error.

Numerous published research studies have documented the gap between evidence-based medicine and actual practice-based medicine. In 2003, a large national study[*] describing the quality of care observed, "Our results indicate that, on average, Americans receive about half of the recommended medical care processes." Given the prevalence of chronic diseases in the United States, the cost to the health care system due to suboptimal care is enormous. Unfortunately, under the current reimbursement methodology, health care providers are financially driven by the volume, and not the quality, of the services that they render. Physicians' relative financial compensation favors managing people with simple medical problems and not those with time-consuming, medically complex chronic diseases. Clearly, one attractive solution to the current health care crisis involves restructuring the reimbursement system to reward physicians for adhering to evidence-based guidelines and attaining recommended clinical outcomes for their patients.

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[*] McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. N Engl J Med 2003 Jun 26;348(26):2635-45.

Physician Quality Improvement

Good clinical care includes continuous quality improvement in which clinicians use data from their own practice to improve process. We have come to believe that quality and safety are largely characteristics of the systems in which we practice rather than of individuals. Quality improvement methods provide insight into a practice's functions and relationships. As physicians participate in quality improvement activities, they deepen their understanding of the processes they rely on and discover ways to improve those processes. Over time, quality improvement changes the culture as well as the processes so that quality improvement becomes an intrinsic part of the practice. Quality improvement has always been part of a physician's obligation and normal health care operations.

In addition to physicians, improving patient care through quality improvement (QI) and measures of physician performance is of interest to several important stakeholders in the U.S. health care system: accrediting and licensing bodies, purchasers, consumer advocates, and medical and specialty societies. Nonetheless, there is some evidence that physicians have resisted full engagement in QI activities. Historically, physicians have tended to react with skepticism to changes that directly affect the way they practice. For example, when practice guidelines were first introduced, physicians resisted adopting them based on issues such as agreement, self-efficacy, and environmental factors. Barriers to the adoption of practice guidelines, such as increased costs, poor reimbursement, and insufficient staff support, also stand in the way of physicians' adoption of QI methods. Also, some have commented that the medical profession has failed to take on QI actions, because quality problems lack public visibility. In a recent review, Richard Grol suggests that part of the solution may be building bridges among professional pride, payor profit, and patient satisfaction.

Thirty percent of U.S. physicians are in solo practice or in groups of three or less. Sixty percent are in groups of 6 or less and are often the only source of medical care in rural areas and small cities. In these settings, physicians may have little or no opportunity for readily available consultation, supervision, or observer/peer pressure. It is in these offices of independent physicians that most decisions affecting the quality of care are made. One patient, one doctor, one moment, one decision, regularly accountable to no one else. It is easy to understand why there is such a gigantic range of quality in actual medical practice.

The "normal" structural and process mechanisms that the medical profession and the various purchasers, providers, payers, patients, and regulators have put in place for assessing, controlling, and assuring the quality of practice provided in physician offices are heavily dependent upon the intelligence, education, skill, competence, honesty, integrity, and ethical behavior of individual physicians. The control mechanisms extant include a vast and expensive effort in medical school admission and graduation criteria, testing by the National Board of Medical Examiners, State licensing agency functions, postgraduate education, board certification, professional associations, and professional liability legal actions in the courts. That seems like a lot of controls, and it is, but those of us deeply involved with medicine have long recognized gaps, sometimes huge, within and between each control. For example, more than 20 percent of U.S. physicians graduated from medical schools outside the purview of the U.S. Liaison Committee for Medical Education (LCME). Tens of thousands of U.S. physicians have never satisfactorily completed any residency program approved by the Accreditation Council for Graduate Medical Education (ACGME). Some 75 percent of U.S. physicians choose not to be

members of the American Medical Association and thus may or may not ascribe to the Principles of Medical Ethics. Many thousands of practicing US physicians are not members of any branch of organized medicine, thus potentially falling outside of the peer evaluation, discipline, and education process that is a part of the membership process of such organizations. By one account, among all active physicians (n = 836,156), 32.3 percent are not certified by any medical board. Yet, a grand total of 793,146 physicians are listed as certified by one of the 26 boards of the American Board of Medical Specialties.

A variety of factors are key for physicians to improve the quality of care they deliver.

Physicians' Access to Practice-Level Data

Fewer than half of the physicians can easily identify patients in their practices by age group and 14 percent said that they could not identify these patients at all. Forty-four percent can easily generate patient registries, that is, lists of patients grouped by certain clinical diagnoses. More than four-fifths of physicians find it difficult or are unable to find out which of their patients have abnormal laboratory results or to identify patients taking certain high-risk medications (and who may require closer followup).

Physicians involved in fewer than 20 hours of direct patient care per week are less likely to easily generate any practice data, compared with physicians doing 40 hours per week or more (p < .05). Size of practice is relevant too: half of solo physicians can easily generate those types of data, compared with 61 percent of physicians in large groups (p < .05). Physicians who use EMRs routinely or occasionally were more likely than those who did not to say that data about their practices can easily be generated (p <.05).

Physicians' Access to Quality-of-Care Data

Only one-third of physicians receive any data (process, outcome, or patient surveys) about the quality of care they provide. The most common type of data received available are patient survey results (25 percent).

Physicians in larger practices and those who devote more hours per week to direct patient care are more likely than their peers in smaller practices or doing less direct patient care to receive quality-of-care data. About one-fifth of physicians in solo practice receive data, compared with almost half of those who practiced in groups of 50 or more (p < .05).

Also, salaried physicians are more likely than non-salaried physicians to have access to quality-of-care data (p < .05). Nearly half of primary care physicians get quality-of-care data, compared with just one-quarter of specialists (p < .05).

Commercial insurance companies and health plans are by far the most common sources of data about quality of care: 25 percent of physicians report receiving data from such groups. Only, thirteen percent generate their own quality-of-care data. Larger practices are more likely than smaller ones to generate their own performance data (p < .05). Nearly twice the percentage of salaried as non-salaried physicians generated their own data (p < .05).

Participation in Quality Improvement Activities

Only one-third of physicians report having engaged in redesign efforts to improve the performance of the system of care in which they practice. Nearly twice the percentage of physicians in practices with more than fifty members said that they have engaged in redesign compared with solo physicians ($p < .05$). Salaried physicians also were more likely than nonsalaried physicians to engage in redesign, as were physicians who spent more hours providing direct patient care. Primary care physicians were engaged in redesign efforts more often than specialists ($p < .05$).

Sharing Performance Data

Nearly three-quarters of physicians agree (definitely or probably) that information about their clinical performance should be shared with the medical leadership of the health systems in which they work. Slightly more than half agree that performance data should be shared with patients, but only 13 percent were in definite agreement. More than two-thirds said that the "general public" should probably or definitely not have access to such information. With the exception of willingness to share data with medical leadership, these opinions varied little by physician or practice characteristics.

## Factors Affecting Physicians' Involvement in Clinical Redesign Efforts

In one study, the factors that independently increased the odds of physicians' involvement in redesign efforts included larger practice size, being a primary care physician (as opposed to a specialist), longer hours per week devoted to direct patient care, and being recertified in one's specialty. Physicians in practice for 10 to 15 years were more likely to be involved in redesign than those in practice for fewer than 10 years or for more than 15 years. Physicians in groups larger than 50 were more likely than solo physicians to have engaged in redesign (OR = 2.17, $p < .01$). Board recertified physicians also were more likely than noncertified physicians or certified but not recertified physicians to be involved in redesign (OR = 1.31, $p < .05$).

Quality Health First Overview

The Indiana Health Information Exchange created a multi-payor, value-based pay-for-performance program called Quality Health First® (QHF) layered on top of the Indiana Network for Patient Care (INPC). The program was designed to improve the quality of care provided to patients by exposing providers to clinically relevant, credible information about their patients with the capability to "drill down" to the individual patients included in the summary so that they could intervene with those patients who were not meeting quality criteria. In addition, payors used the program's data as the basis for pay for performance programs that offered significant incentives to providers who were high performing or who improved the quality of their care (Figure 1). Further, providers could quality for up to 20 hours of CME credit annually for using QHF as part of their practice based quality improvement efforts. As an additional incentive, providers could elect for the QHF program to report quality scores on their behalf to the CMS PQRI program further aligning incentives. Recognizing the importance of provider "buy in" to any type of feedback on quality of care processes, we relied on a Clinical Advisory Committee (called the Measures Committee by QHF participants) which consists of representatives of

primary care physicians and physicians that represent payors have chosen 26 measures drawn from the nationally developed and vetted measures such as the AQA's starter set. In addition, there was a significant "run in" period during which the providers reviewed and critiqued the results before payors started to provide incentives.

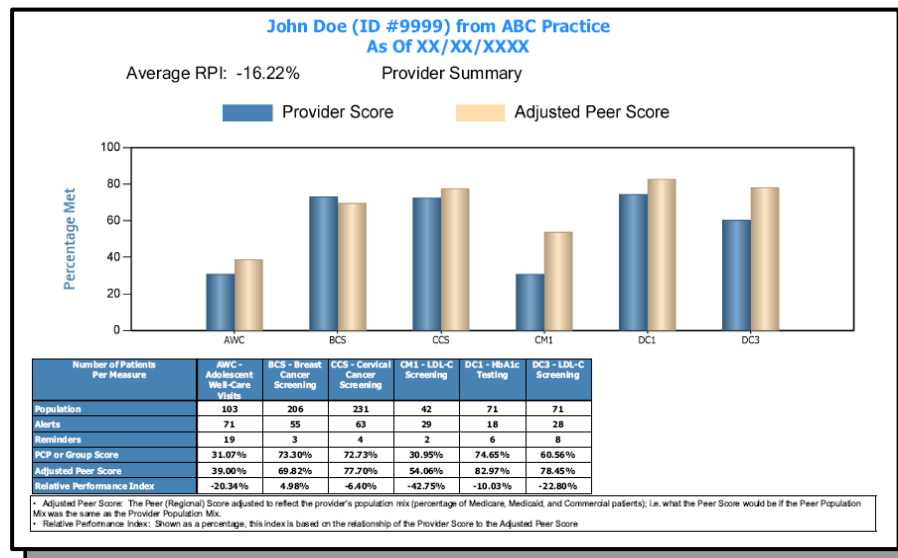**Figure 1. Block diagram of data flows in the QHF program**
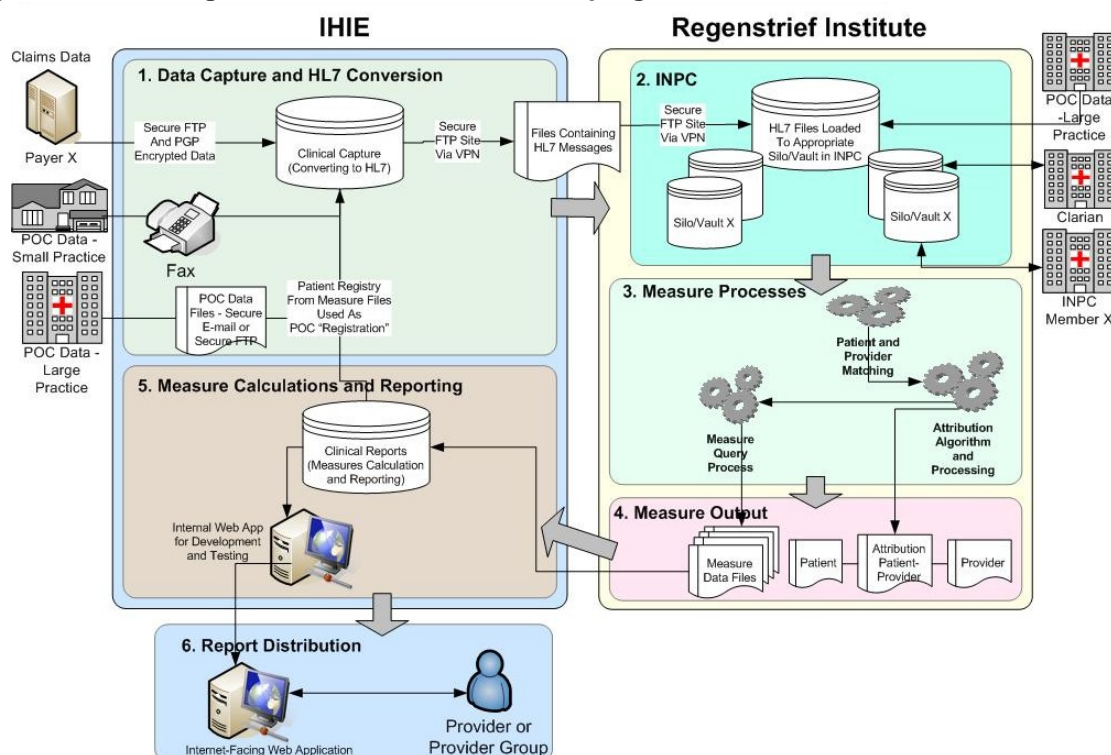
The data used to compute quality measures were drawn from the Indiana Network for Patient Care which is a multistakeholder health information exchange operating in Indiana. In order to support the QHF program we added two additional sources of data to the INPC: claims data and data reported by providers as a result of reviewing the QHF reports. Claims data were obtained from payors and converted into HL7 messages containing the relevant data including diagnoses, encounters, procedures, and medications. These HL7 messages were then processed into the INPC in the same fashion as all other data. Provider entered data was initially data entered from paper forms on which the providers had recorded data not available in the INPC and these results were also converted to HL7 messages and processed into the INPC. Later, this process was converted to an entirely on-line process in which providers entered data into web based forms but they were still sent to the INPC using HL7 messages.

IHIE used an algorithm based on the data to associate each patient with a primary care provider (some patients cannot be associated of course) and used these data to create a series of summaries that allow a provider to review their own performance on each measure and see their performance in the context of all other provider's performance, along with reminders about past due or upcoming interventions for patients (Figure 2). These reports are delivered to physicians through their groups' medical director if they have one or through "physician liaisons"—nurses trained in quality improvement. Payors are offering "pay for play" incentives for providers who

participate and "pay for performance" incentives for providers who perform well or improve.

Figure 2. Example of a provider summary report*

John Doe (ID #9999) from ABC Practice
As Of XX/XX/XXXX

Average RPI: -16.22%   Provider Summary

Number of Patients Per Measure	AWC - Adolescent Well-Care Visits	BCS - Breast Cancer Screening	CCS - Cervical Cancer Screening	CM1 - LDL-C Screening	DC1 - HbA1c Testing	DC3 - LDL-C Screening
Population	103	206	231	42	71	71
Alerts	71	55	63	29	18	28
Reminders	19	3	4	2	6	8
PCP or Group Score	31.07%	73.30%	72.73%	30.95%	74.65%	60.56%
Adjusted Peer Score	39.00%	69.82%	77.70%	54.06%	82.97%	78.45%
Relative Performance Index	-20.34%	4.98%	-6.40%	-42.75%	-10.03%	-22.80%

- Adjusted Peer Score: The Peer (Regional) Score adjusted to reflect the provider's population mix (percentage of Medicare, Medicaid, and Commercial patients); i.e. what the Peer Score would be if the Peer Population Mix was the same as the Provider Population Mix.
- Relative Performance Index: Shown as a percentage, this index is based on the relationship of the Provider Score to the Adjusted Peer Score

*Illustrates how the provider's performance data are presented in the context of other similar providers in the same geographic area

Figure 3 provides an example of how individual patient-level data are presented to providers and the mechanism for entering clinical data relevant to the quality measures, which is eventually fed back into the QHF program process.

Figure 3. Online version of the provider reconciliation report

Figure 4 is a sample paper reconciliation form, which was used initially to provide feedback to the provider and to allow them to enter data relevant to the quality measure that was used for the next iteration of measures.

Figure 4. Sample paper reconciliation form

IHIE solicited participation in the program through mailings to providers from payors providing incentives for participation, through presentations at county and State medical society meetings, through presentations at meetings organized by the larger practice groups and through announcements and publication in the medical press and local business news publications. In order for providers to participate they had to sign a participation agreement that committed them to actively engage in the program as well as addressing various essential legal and privacy issues. Once they had agreed to participate, nurses who acted as liaisons to the practices meet face to face with practice management and physicians to explain the program and answer questions. Subsequently they meet with practice staff to review and reconcile lists of patients attributed to the practice and to answer followup questions. Once the patient list had been reconciled, the reports summarizing performance on quality measures were delivered to the practice for review and discussion. Physician liaisons continued to deliver the reports in person for as long as the practices desired but the need for face to face support typically diminished over time though the physician liaisons continued to be available for consultation, explanation and trouble shooting.

Methods

The IUPUI IRB approved evaluation of the QHF program.

Since QHF relies primarily on data captured through the Indiana Network for Patient Care (INPC), we were able to measure historical performance and use a before-after model to measure the effect of the program on quality scores. In addition, as a result of the gradual growth of the QHF program and the manner in which providers were solicited to participate, we believe that by comparing the performance of providers who were participating with those who were not we were able to use the quality scores for nonparticipating providers as a covariate to help account for secular trends.

We extracted data for the evaluation from operational systems that support the QHF program, including (1) the provider registry maintained by the Indiana Health Information Exchange to support its DOCS4DOCS® service. This registry includes data about the provider's demographics, specialty, and identifiers such as NPI, the practice including location and affiliations; (2) spreadsheets containing listings of providers that participated in practice groups that participated in QHF; and (3) the QHF reporting data warehouse which includes the patient level data used to compute quality measures for the QHF program including numerator and denominator data and attributed providers. Because measure definitions evolved over the life of the program, we recomputed historical measure scores using the most recent measure definitions in order to make the data more comparable over time. We merged the data using the provider identifiers from these data sources in order to create an analysis data set that contained data about providers and their practice, participation status and date, quality measure, month and year, numerator and denominator. We imported these data into R for statistical analysis.

Some providers began receiving the intervention October 1, 2009, but others started over time so analyzed the data by using the date the providers began participating in QHF and creating as "zero time." We treated the first date for which we had data from control providers as "zero time."

We used mixed models that included time trend and adjusted for preintervention (quality measure scores before the provider began participating in QHF) and concurrent performance by matched control providers.

In addition, through the physician liaisons, we solicited qualitative feedback about the program throughout the process. The feedback was recorded contemporaneously.

Results

In the last month included in the analysis, 3,853,548 patients were included in the denominator of one or more quality measures. As shown in Table 1, the number of patients included in the denominator for different quality measures provides both a sense of the scale of the program and the potential depth of impact.

Table 1. Number of patients included in the denominator for several different quality measures
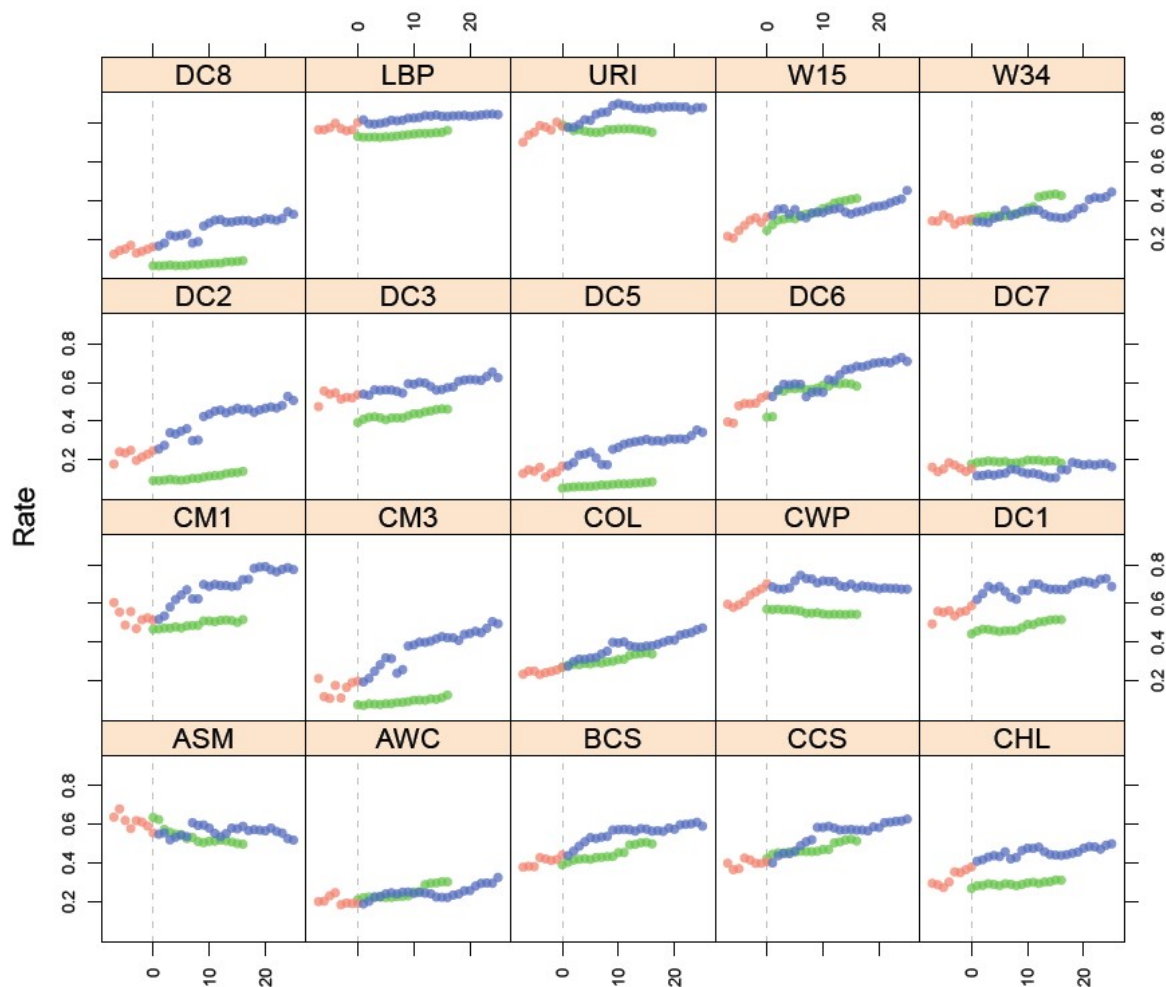
Quality Measures	No. of Patients
Adolescent Well-Care Visits (12–21 years)	814,216
Breast Cancer Screening	956,177
Cervical Cancer Screening	1,608,287
Chlamydia Screening in Women	130,930
Cholesterol Mgmt for Patients with Cardiovascular Conditions	54,872
Colorectal Cancer Screening	1,286,665
Comprehensive Diabetes Care	242,604
Use of Appropriate Medications for People with Asthma	97,460
Use of Imaging Studies for Low Back Pain	90,846
Well-Baby Visits (Birth–15 months)	115,587
Well-Child Visits (3–6 years)	354,282

Because quality measures scores were only evaluated for providers with more than 30 patients attributed to them who were eligible for a measure, the number of providers included in any given measure varied, but a total of 1,505 participating providers were included in the analysis and data from 306 nonparticipating but matched providers were used in the model.

Our primary finding was that providers participating in QHF had higher quality scores and were improving faster than those who did not. Participating providers quality scores improved 2.5 percent per year faster than before they started participating even after adjusting for improvements over time in matched control providers. In addition, we found a very early increase of approximately 5 percent on average across all measures which we attributed to improved data capture through the reconciliation process.

Figure 5 is a scatter plot matrix showing the performance on the 20 quality measures that were in place continuously from the beginning of the QHF program over time (in months).

Figure 5. A scatter plot matrix showing the performance on the 20 quality measures*

*The vertical axis represents the proportion of patients that meet the quality measure. Red points represent the intervention provider's performance prior to participating in QHF. The blue points represent the providers' performance after starting to participate in QHF. Green points represent matched control providers' performance over time which was used in the analysis to adjust for secular trends in quality**.**

Qualitative assessments reinforced these findings.

> *Our practice elected to participate in the Quality Health First Program because of the standardized measurement of medical quality and outcomes across health plans. This comprehensive program gives us a practice-wide view of care needed for all of our patients, rather than just a segment of our patient population.*
>
> **Sandy DeWeese, Southern Indiana Pediatrics, Bloomington, Ind**

> *The reports we receive help us to find patients who are not getting regular care for either routine services or chronic disease management. As a result, we mail reminders or make phone contact with the patients based on the reports."*
>
> **Dr. Louis Winternheimer, Raphael Health Center, Indianapolis, Ind.**

> *"As a result of our participation in the Quality Health First Program, our practice has established enhanced protocols, especially in our cancer screenings. We now have a tool to complement the kind of detailed information we need to truly identify gaps in care. The program is a great way of making sure our patients get the attention they need and deserve."*
>
> **Dr. G. Alan Von Stein, Meridian Gynecological Center, Mooresville, Ind.**

Discussion

We believe these data may be the first report of the effect of using community-wide health information exchange to support a community quality improvement program. While the rate of improvement at 2.5 percent annually may not seem to be a large improvement given the gaps in quality that we know exist, we are encouraged by the fact that these increases have been sustained over 2 years, resulting in a cumulative improvement of 5 percent. Of course, improvements are even larger for some measures. Even a 5-percent improvement translates into substantial numbers of patients receiving improved care. For LDL control in patients with cardiovascular disease, this means almost 2,750 individuals whose LDL is at goal.

Secondarily, the evaluation demonstrated that the feasibility of using a community health information exchange as the foundation for a community-wide quality improvement initiative.

Lessons Learned

We learned a number of important lessons related to using a community based health information exchange for quality improvement. First, providers were very excited about having a tool to provide visibility into and to help them manage the health of their patients. Second, the claims data proved very useful to providers for clinical care. They definitely benefited from improved data about encounters with other provider and additional diagnoses. Third, aligning incentives was very powerful and the engagement and dialog that the program fostered among providers, payors and employers was both gratifying and helpful. While a burden to providers, the reconciliation process proved critical. Despite the extensive number of data sources contributing the INPC a large proportion of important data were not being captured. When we examined the impact of these data we found that "missing data" were reduced from 34 to 8 percent or less with corresponding improvements in scores on measures.

Challenges

We encountered a variety of challenges including the heavy computational burden that the processing imposed and the difficulty of developing and adequately testing measures. Free riders, payors who chose not to participate but whose beneficiaries still gained from the program made financially sustaining the program difficult and the QHF never contributed its fair share financially to support the health information exchange process. Engaging providers proved more challenging than we thought due to a variety of factors including small practices being reluctant to contract without having their own legal review, the burden of reconciliation, the payor mix and our inability to gain Medicaid/s full participation.

Appendix A. Quality Health First Quality Measures Summary

Quality Health First℠ Measures

Catg	Code	Measure	Definition
AT	ASM	ASTHMA TREATMENT: Use of Appropriate Medications for People with Asthma	Percentage of patients 5–56 years of age identified as having persistent asthma that were dispensed appropriate medication during the previous 12 months.
CH	W15	CHILDREN'S HEALTH: Well-Child Visits in the First 15 Months of Life	Percentage of children who had 6 or more well-child visits with a primary care practitioner by their 15-month birthday.
CH	W34	CHILDREN'S HEALTH: Well-Child Visits for Children Three to Six Years of Age	Percentage of children 3–6 years of age who received 1 or more well-child visits with a primary care practitioner during the year.
CH	AWC	CHILDREN'S HEALTH: Adolescent Well-Care Visits	Percentage of adolescents 12–21 years of age who had at least 1 comprehensive well-care visit with a primary care practitioner or an OB/GYN during the year.
CH	CIS	CHILDREN'S HEALTH: Childhood Immunization Status	Percentage of children 2 years of age who had 4 DTaP/DT, 3 IPV, 1 MMR, 3 H influenza type B, 3 hepatitis B, 1 chicken pox (VZV), and 4 pneumococcal conjugate vaccines by their 2nd birthday.
CH	AIS	CHILDREN'S HEALTH: Adolescent Immunization Status	Percentage of adolescents 13 years of age who had a 2nd dose of MMR, 3 hepatitis B, and 1 chicken pox (VZV) vaccine by their 13th birthday.
CH	CWP	CHILDREN'S HEALTH: Appropriate Testing for Children with Pharyngitis	Percentage of children 2–18 years of age diagnosed with pharyngitis and dispensed an antibiotic that were tested for group A streptococcus (strep). The strep test can be done within 3 prior to diagnosis, the day of diagnosis, or within 3 days after diagnosis.
CH	URI	CHILDREN'S HEALTH: Appropriate Treatment for Children with Upper Respiratory Infection	Percentage of children 3 months–18 years of age diagnosed with upper respiratory infection (URI) and were not dispensed an antibiotic prescription on or within 3 days after the diagnosis date.
DC	DC1	DIABETES CARE: HbA1c Testing for Patients with Diabetes	Percentage of patients 18–75 years of age with type 1 or type 2 diabetes who had Hemoglobin A1c (HbA1c) testing during the previous 12 months.
DC	DC8	DIABETES CARE: HbA1c Good Control <7%	Percentage of patients 18–75 years of age with type 1 or type 2 diabetes with good HbA1c control (<7.0%) on their most recent HbA1c testing during the previous 12 months.
DC	DC2	DIABETES CARE: HbA1c Poor Control >9%	Percentage of patients 18–75 years of age with type 1 or type 2 diabetes with poor HbA1 control (>9.0%) on their most recent HbA1c testing during the previous 12 months.
DC	DC3	DIABETES CARE: LDL-C Screening for Patients with Diabetes	Percentage of patients 18–75 years of age with type 1 or type 2 diabetes who had LDL-C screening performed during the previous 12 months.
DC	DC5	DIABETES CARE: LDL-C Controlled at <100 mg/dL for Patients with Diabetes	Percentage of patients 18–75 years of age with type 1 or type 2 diabetes whose most recent LDL-C during the previous 12 months was controlled at <100 mg/dL.
DC	DC6	DIABETES CARE: Kidney Disease Monitored for Patients with Diabetes	Percentage of patients 18–75 years of age with type 1 or type 2 diabetes who were monitored for kidney disease (nephropathy) during the previous 12 months.
DC	DC7	DIABETES CARE: Retinal Eye Exam for Patients with Diabetes	Percentage of patients 18–75 years of age with type 1 or type 2 diabetes who had a retinal eye exam during the previous 12 months, or a negative retinal eye exam during the previous 24 months.

Quality Health First℠ Measures

Catg	Code	Measure	Definition
HH	CM1	HEART HEALTH: LDL-C Screening for Patients with Cardiovascular Conditions	Percentage of patients 18–75 years of age who were discharged alive for acute myocardial infarction (AMI), coronary artery bypass graft (CABG), percutaneous transluminal coronary angioplasty (PTCA), or with a diagnosis of Ischemic Vascular Disease (IVD) in the year prior to the measurement year that had LDL-C screening during the previous 12 months.
HH	CM3	HEART HEALTH: LDL-C Control at <100 mg/dL for Patients with Cardiovascular Conditions	Percentage of patients 18–75 years of age who were discharged alive for acute myocardial infarction (AMI), coronary artery bypass graft (CABG), percutaneous transluminal coronary angioplasty (PTCA), or with a diagnosis of Ischemic Vascular Disease (IVD) in the year prior to the measurement year whose most recent LDL-C screening during the previous 12 months was controlled at <100 mg/dL.
HH	BBH	HEART HEALTH: Ambulatory Beta-Blocker Treatment After a Heart Attack	Percentage of patients 35 years of age and older who were hospitalized and discharged alive with a diagnosis of acute myocardial infarction (AMI) and received an ambulatory prescription for beta-blockers upon discharge.
HH	PBH	HEART HEALTH: Persistence of Beta-Blocker Therapy After a Heart Attack	Percentage of patients 35 years of age and older who were hospitalized and discharged alive in the year prior to the previous year with a diagnosis of acute myocardial infarction (AMI) and received persistent beta-blocker treatment for 180 days.
MH	AM1	MENTAL HEALTH: Antidepressant Medication Management—Effective Acute Phase Treatment	Percentage of patients 18 years of age and older diagnosed with a new episode of depression and treated with antidepressant medication that remained on an antidepressant drug during the entire 84-day (12 weeks) Acute Treatment Phase.
MH	AM2	MENTAL HEALTH: Effective Antidepressant Medication Treatment During the Continuous Stage	Percentage of patients 18 years of age and older diagnosed with a new episode of depression and treated with antidepressant medication that remained on an antidepressant drug for at least 180 days (6 months).
MH	AM3	MENTAL HEALTH: Antidepressant Medication Management—Optimal Practitioner Contacts During the Acute State	Percentage of patients 18 years of age and older diagnosed with a new episode of depression and treated with antidepressant medication that had at least 3 follow-up contacts with a practitioner, coded with a mental health diagnosis, during the 84-day (12 weeks) Acute Treatment Phase.
OM	COL	OTHER MEASURES: Colorectal Cancer Screening	Percentage of adults 50–80 years of age that had appropriate screening for colorectal cancer (CRC). FOBT=12 months; DCBE=5 years; Flex Sig=5 years; Colonoscopy=10 years.
OM	LBP	OTHER MEASURES: Use of Imaging Studies for Low Back Pain	Percentage of patients 18–50 years of age with a new episode of low back pain during the previous 12 months and did not receive imaging studies.
WH	BCS	WOMEN'S HEALTH: Breast Cancer Screening	Percentage of women 40–69 years of age that had a mammogram to screen for breast cancer during the previous 24 months.
WH	CCS	WOMEN'S HEALTH: Cervical Cancer Screening	Percentage of women 18–64 years of age that received 1 or more Pap tests to screen for cervical cancer during the previous 36 months.
WH	CHL	WOMEN'S HEALTH: Chlamydia Screening in Women	Percentage of women 16–25 years of age identified as sexually active that had at least 1 test for Chlamydia during the previous 12 months.

Appendix B. The Effect of Cohort Changes in Quality Measures

Through its Quality Health First (QHF) program, the Indiana Health Information Exchange (IHIE) currently produces results for over 20 measures. Participating payers use these quality measures in their physician pay-for-performance programs. IHIE also reports aggregate program results, which are computed by simply dividing total numerators by total denominators. For example, Table 1 shows aggregate results for glycemic control for two periods.

Table 1. Aggregate resultsfor glycemic control for two periods

HbA1c (<=9%)	1Q 2010	3Q 2011	Change
Denominator	39,196	61,149	
Ratio	73.44%	74.26%	0.82%
Numerator	28,786	45,409	

When we focused on improvement, we noticed that aggregate improvement seemed to lag what we were reporting for various subpopulations. Using glycemic control as an example, we found that the change in the aggregate average (0.82 percent) was far below the rates of change for the three subpopulations that combine to form the total.

Table 2. Rates of change in glycemic control for three subpopulations

HbA1c Control	1Q10	3Q11	Change
Medicare	78.61%	82.87%	4.26%
Commercial	75.39%	77.10%	1.71%
Medicaid	59.52%	62.00%	2.48%
Averages	73.44%	74.26%	0.82%

We noticed two additional things. First, that performance levels among the populations were very different. For example, glycemic control (at the 9 percent level) was just 62 percent for Medicaid patients but over 77 percent for commercial patients. We also noted the large increase in the number of participating patients with diabetes (the first chart above). This led us to review the growth rate of the subpopulations.

The number of patients with diabetes increased by 56 percent between the first quarter of 2010 and the third quarter of 2011, but this increase was not uniform among the populations.

Table 3. Rates of change in the number of patients with diabetes

Patients With Diabetes	3/31/10	9/30/11	Change
Medicare	8,535	9,888	15.85%
Commercial	24,484	35,982	46.96%
Medicaid	6,177	15,279	147.35%
Total	39,196	61,149	56.01%

As QHF expanded both by adding new physicians in existing areas and enrolling physicians in new communities, the Medicare population grew slowly because it was confined to the greater Indianapolis area. The commercial population grew consistent with increased physician participation while the Medicaid population grew explosively, a combination of recession-related growth in eligibility along with increased participation by providers who serve this population. The upshot is extremely fast growth in the population with the lowest performance scores.

There are a number of ways to adjust for distortions resulting from differential grow in the populations. When reporting changes in measures over time, we chose to use the current population to produce a weighted average for all periods because this answers the question: What is the change in performance as it affects patients enrolled in the program today? Continuing with the glycemic control example, the use of the current population to evaluate both time periods increased reported improvement in performance to 2.3 percent from 0.8 percent, which is clearly more consistent with the changes observed in each population.

Table 4. Rates of change in glycemic control measure over time among populations

HbA1c Control	Ending Population	3/31/10	9/30/11	Change
Medicare	9,888	78.61%	82.87%	4.26%
Commercial	35,982	75.39%	77.10%	1.71%
Medicaid	15,279	59.52%	62.00%	2.48%
Total	61,149	71.95%	74.26%	2.31%

We applied this method to other measures with similar results.

Table 5. Rates of change in other measures over time

Revised Reporting	1Q10	3Q11	Current Reporting	Population Adj Change	Relative Change
HbA1c Control	71.95%	74.26%	0.82%	2.31%	3.22%
LDL-C Control	50.51%	51.51%	-0.49%	0.99%	1.96%
Colorectal CA Screening	56.08%	60.40%	3.72%	4.32%	7.71%
Cervical CA Screening	77.30%	79.22%	1.79%	1.92%	2.48%

The "population adjusted change(s)" in the above chart are materially different from "current reporting" methodology. These adjustments can go in either direction—raising rates of reported change or lowering them. We believe this adjustment more accurately reflect rates of change in quality for today's participating patients.

We also noted that there is another choice as to how to report improvement. One is to simply subtract a previous score from a current score to show an absolute difference (as we show in both the "current reporting" and "population adjusted change" columns above). Another would be to show a relative change, i.e., the percentage by which this measure changed. This would be computed by dividing the current by the previous score and subtracting one. Either method might be used if the language is sufficiently clear.