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Medicare Health Care Quality (MHCQ) Demonstration Evaluation

Indiana Health Information Exchange

Final Year 3 Evaluation Report

Prepared for

Normandy Brangan
Centers for Medicare & Medicaid Services
The Center for Medicare and Medicaid Innovation
Mail Stop WB-06-05
7500 Security Boulevard
Baltimore, MD 21244

Prepared by

Michael Trisolini, PhD, MBA
John Kautter, PhD
Joseph Burton, MS
Cordon Newhart, MA
Jenya Kaganova, PhD
Aleksandra Petrovic, BS
RTI International
3040 E. Cornwallis Road
Research Triangle Park, NC 27709

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MEDICARE HEALTH CARE QUALITY (MHCQ) DEMONSTRATION EVALUATION
INDIANA HEALTH INFORMATION EXCHANGE
FINAL YEAR 3 EVALUATION REPORT

By:

Michael Trisolini, PhD, MBA
John Kautter, PhD
Joseph Burton, MS
Cordon Newhart, MA
Jenya Kaganova, PhD
Aleksandra Petrovic, BS

Federal Project Officer: Normandy Brangan

RTI International

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EXECUTIVE SUMMARY

Introduction

The Medicare Health Care Quality (MHCQ) demonstration was developed to address concerns about the U.S. health care system, which typically fragments care while also encouraging both omissions in and duplication of care. To rectify this situation, Congress directed the Centers for Medicare & Medicaid Services (CMS) to test major changes to the health care delivery and payment systems to improve the quality of care while also increasing efficiency across the health care system.

Four sites have participated in the MHCQ demonstration at various time periods (see **Table ES-1**). Because each MHCQ demonstration site has a different and self-defined plan for its intervention, the evaluation of each site is presented in a separate report. This report presents evaluation results for the Indiana Health Information Exchange (IHIE).

Table ES-1
MHCQ demonstration sites

Participating site	Focus of the MHCQ demonstration	Date of implementation	End date
Indiana Health Information Exchange (IHIE)	Quality Health First program	July 1, 2009	January 31, 2013
North Carolina Community Care Network (NC-CCN)	Medical home program for dually eligible Medicare-Medicaid enrollees	January 1, 2010	December 31, 2012
Gundersen Health System (GHS)	Advanced disease coordination program	February 1, 2010	April 30, 2014
Meridian Health System (MHS)	Meridian Care Journey program	July 1, 2012	June 30, 2016

SOURCE: RTI International.

This IHIE Year 3 evaluation report reviews both quantitative and qualitative evaluation data regarding its structure, goals, and performance. Since IHIE's participation in the MHCQ demonstration ended on January 31, 2013, this is the final evaluation report for IHIE.

Quantitative information includes descriptive statistical profiles and multivariate statistical analysis of the IHIE demonstration's impacts on cost, quality, and utilization. The quantitative analysis includes IHIE's performance year 3 (PY3) and performance year 4 (PY4). However, the PY4 analysis is more limited in scope than the analysis for PY3 because IHIE withdrew from the MHCQ demonstration in the middle of PY4, so available data are more limited for PY4. The qualitative data focus on RTI International's site visit to IHIE, IHIE's reports to CMS for its MHCQ implementation contract, CMS reports on IHIE, and internal site-specific analysis and reports on demonstration and related implementation and performance assessment efforts.

Administration and Infrastructure

IHIE is a nonprofit, 501(c)(3) organization formed in 2004 to support Indiana's communities by providing medical information and data-sharing services. IHIE represents a

broad coalition of health care stakeholders in the Indianapolis region, including hospitals, physician groups and practices, other health care providers, public and private payers, and other stakeholders. The IHIE MHCQ demonstration included the nine-county metropolitan Indianapolis area. The IHIE MHCQ demonstration was intended as a 5-year project that began in 2009 and was scheduled to end in 2014, but IHIE decided to withdraw from the MHCQ demonstration as of January 31, 2013.

The IHIE MHCQ demonstration was focused on IHIE's Quality Health First (QHF) program, which provided reports on quality of care to physicians, physician groups, payers, and the public. QHF was built on the Indiana Network for Patient Care's (INPC's) data repository system, which aggregated data from health insurance claims and enrollment information, hospital medical records, physician group medical records, and other clinical data. A central goal of IHIE's MHCQ demonstration was to integrate Medicare claims data, along with data from third-party payers and Medicaid, into QHF, making its reports on quality of care more comprehensive and representative of an entire patient population.

The MHCQ demonstration was contained within the QHF program, which was in turn contained within IHIE. As a result, the MHCQ demonstration used the administration and infrastructure developed for IHIE and QHF. IHIE did not develop any separate administration or infrastructure solely for the MHCQ demonstration.

The MHCQ demonstration did not include any funding for administration or infrastructure. For IHIE, the MHCQ demonstration included a shared savings incentive design, which required that IHIE change utilization patterns enough to produce savings for Medicare. If IHIE's financial savings performance met specified targets, Medicare would share a portion of the savings with IHIE. An additional portion of the savings would be shared if IHIE also met specified targets for quality performance. The financial performance target was calculated each year by comparing the Medicare claims costs of the IHIE-assigned beneficiaries to the Medicare claims costs of similar beneficiaries identified in comparison regions.

Health Information Technology

IHIE staff reported that they received data from more than 15 different data sources for INPC and QHF in the course of a month, including hospitals, physician groups, laboratories, Medicare, Medicaid, and private health insurance companies. Under the initial implementation of the QHF program, physician offices were required to manually code any data corrections they found into paper reports and fax them back to IHIE for entry into the INPC database. To allow for better reporting and data collection, by 2012 users could submit relevant information for data corrections or additions through the QHF Web site.

Staff at most of the medical groups interviewed during the demonstration period said that they reviewed and reconciled the data for all of the patients included in their QHF reports because some private payers used the all-payer population quality measure scores in their pay-for-performance incentive systems. However, IHIE expressed concern that this level of reconciliation might not be sustained because a large private payer was changing its incentive system to focus on its own covered lives only, instead of the all-payer population scores available through QHF. That private payer planned to change because some other payers

participating in QHF focused only on their own covered lives for incentive payments and not on community-wide quality performance improvement by using all-payer quality performance results.

The new QHF Web application also provided patient care alerts and reminders to providers online. The providers could click on patients or quality measures and drill down online to review data the QHF program used to derive the quality measure results. The providers could sort and search results by different criteria, including physician group, individual provider, quality measure, patient name, and gender. IHIE reported that the patient-level alert and reminders tools were widely used by providers in managing the care of their patient populations.

However, large physician groups and independent practice associations (IPAs) reported that they found the QHF quality reports less useful and less timely than the internal reports they developed using their in-house EHRs. Their internal data systems enabled more rapid access to data for clinical interventions that required day-to-day decision making by providers. As more providers join ACOs, the prevalence of stronger internal data systems is likely to increase, and the future role of external data systems such as QHF may become less important.

In 2011, IHIE began public reporting of QHF community-wide quality measure results. The data were published on IHIE's Web site, http://www.ihie.org/. In the fall of 2012, IHIE began publicly posting quality measure results at the practice-site level for the practice sites that opted in for this level of public reporting. The public reporting included 21 quality measures and both quantitative and graphical comparisons of the quality measure scores for the community and for practice sites. By 2013, the public reporting had expanded to cover the State of Indiana and included breakdowns by six regions in the state and individual practice sites in each region.

Provider and Beneficiary Participation

IHIE reported to CMS that the number of primary care providers (PCPs) participating in the QHF program as a whole had grown over time to reach a total of 2,141 statewide by June 2012. However, the number of PCPs participating in QHF did not grow significantly in the nine-county demonstration area, because IHIE already had approximately 75 percent of the PCPs in that area participating At the same time, several physician groups ended participation in the MHCQ demonstration (but not in QHF) to join Accountable Care Organizations (ACOs). Because ACOs are Medicare programs that also have a shared savings financial incentive design, physician groups were not permitted by Medicare to participate in both an ACO and the MHCQ demonstration. CMS required physician groups to choose between participating in either an ACO or the MHCQ demonstration. Of the five largest primary care groups in the MHCQ demonstration, three terminated their participation in the MHCQ demonstration program in 2012 (but not their participation in IHIE's QHF program) to join ACOs that had larger geographical footprints than the nine-county MHCQ demonstration area.

The quantitative analysis for provider and beneficiary participation includes descriptive statistics from Medicare claims to provide profiles of the IHIE MHCQ demonstration providers and assigned beneficiaries. For PY3, this included data on the IHIE pre-base year (pre-BY), which was from July 2007 to June 2008; the base year (BY), which was from July 2008 to June 2009; and PY3, which was from July 2011 to June 2012. PY4 data were added for the time

period that IHIE continued participation in the MHCQ demonstration, from July 2012 to January 2013.

Providers who joined the IHIE MHCQ demonstration in PY2 were termed Panel 2 providers to differentiate them from the original providers participating in PY1, who were termed Panel 1. Similarly, providers who joined MHCQ in PY3 were termed Panel 3 providers and providers who joined in PY4 were termed Panel 4 providers.

In contrast to QHF, that only included PCPs, the CMS attribution method applied in the IHIE MHCQ demonstration included both participating PCPs and specialist physicians providing primary care services and billing Medicare through the same tax identification number as the participating PCPs. Descriptive data on these MHCQ demonstration providers for PY3 show that Panel 1 included 497 providers, Panel 2 included 268 providers, and Panel 3 included 399 providers. PCPs were 79 percent of the total for Panel 1, whereas non-PCP providers were 20 percent of those in Panel 1. Panel 2 had 49 percent PCPs and 51 percent non-PCPs. Panel 3 had 59 percent PCPs and 41 percent non-PCPs. In PY3 across all panels, 1,164 physicians (PCPs and specialists) were participating in the demonstration. This was a decline from the PY2 total of 1,413 participating providers.

Descriptive data on the MHCQ demonstration providers for PY4 show that each of the first three panels had some attrition due to departures of physicians from the MHCQ demonstration. In PY4 Panel 1 included 419 providers, Panel 2 included 232 providers, Panel 3 included 323 providers, and Panel 4 included 232 providers. PCPs were 78 percent of the total for Panel 1, whereas non-PCP providers were 22 percent of the providers in Panel 1. Panel 2 had 47 percent PCPs and 53 percent non-PCPs. Panel 3 had 56 percent PCPs and 44 percent non-PCPs. Panel 4 had 44 percent PCPs and 56 percent non-PCPs. In PY4 across all panels, 1,206 physicians were participating in the demonstration.

For the MHCQ demonstration, intervention group beneficiaries were identified using a "one-touch" assignment (attribution) algorithm agreed upon by CMS and IHIE, meaning beneficiaries had to have at least one primary care visit with an IHIE MHCQ demonstration provider. Descriptive statistics for CMS-assigned beneficiaries indicate that both the IHIE intervention group and the comparison group had very large numbers of assigned beneficiaries for statistical analysis. In PY3, they totaled 121,215 for the intervention group and 348,210 for the comparison group. Having a comparison group more than two times the size of the IG adds statistical power for the multivariate statistical analysis of demonstration outcomes.

Demographic data presented in Table 3 of this report show that in PY3 the assigned beneficiaries were mostly older than age 65, had a higher percentage of females than males, and had Medicare eligibility mainly a result of being aged, consistent with the national demographic and Medicare eligibility patterns in the Medicare population. In PY3, CMS-assigned beneficiaries included more than 27 percent with diabetes, more than 15 percent with chronic obstructive pulmonary disease, more than 17 percent with vascular disease, more than 14 percent with congestive heart failure, and more than 13 percent with cancer. Similar patterns were found for PY4.

In PY3, descriptive statistics on utilization and costs for the assigned beneficiaries showed that hospital admissions per 1,000 beneficiaries had a generally consistent pattern across most of the intervention and comparison groups in the pre-BY, BY and PY3, ranging from 406 to 461. The 30-day readmission rates were also consistent, ranging from 14 percent to 15 percent. Emergency department (ED) visits per 1,000 beneficiaries ranged from 846 to 924 for the intervention group, although they were lower for the comparison group, where the range was 700 to 773. Assigned beneficiaries had about $9,400–$11,100 in Medicare expenditures per year, consistently across the intervention group and comparison group. The percentage of assigned beneficiaries who had any inpatient Medicare expenses was generally consistent as well, at 23–26 percent. Similar patterns were found for PY4.

Cost and Savings Results

To determine whether the IHIE MHCQ demonstration achieved Medicare savings, CMS contracted with an implementation contractor (independent of the RTI evaluation contract) to calculate Medicare savings according to the terms and conditions in the demonstration protocol. The IHIE PY3 financial reconciliation report prepared by the implementation contractor determined that IHIE's Medicare savings did not exceed the minimum savings requirement of the demonstration protocol, so IHIE did not earn a performance payment from Medicare for the MHCQ demonstration for PY3. A financial reconciliation report was not prepared for PY4 since IHIE only participated in the MHCQ demonstration for part of that year.

The MHCQ evaluation analysis included multivariate statistical analysis of the impact of the IHIE MHCQ demonstration intervention on financial outcomes in PY3 and in PY4. This evaluation analysis showed that per capita costs increased between the pre-BY and BY to PY3 compared with the increase in the comparison group during the same time periods, and the results were statistically significant. This was an unfavorable impact of the IHIE demonstration. These evaluation results were consistent with the results of the PY3 IHIE MHCQ demonstration financial reconciliation.

Very similar results were found for PY3 when the analysis was conducted separately for the same time periods for beneficiaries assigned to Panel 1 providers, Panel 2 providers, and Panel 3 providers. As a result, for PY3 no evidence was found to support the hypothesis that providers who participated longer in the MHCQ demonstration, such as Panel 1 providers, would have better outcomes.

To test whether Medicare savings would have occurred if beneficiaries were assigned based on a plurality of touches with an IHIE practice, as opposed to the one-touch rule used for beneficiary assignment for IHIE in the MHCQ demonstration, another analysis was conducted as a sensitivity test with reassigned beneficiaries. A plurality assignment methodology similar to the methodologies used in the CMS Physician Group Practice demonstration and for the Medicare Shared Savings Program ACOs was used. This analysis found that per capita costs increased less between the pre-BY and BY to PY3 for assigned beneficiaries compared to the trend in costs found in the comparison group, but the results were not statistically significant.

When the impact of the IHIE MHCQ demonstration on per capita expenditures was analyzed by subpopulations for PY3, significant effects were found for 26 of 60 subgroups

analyzed, and all but one of the 26 significant effects showed cost increases that were unfavorable impacts of the MHCQ demonstration. Multivariate analysis of costs by expenditure components also showed statistically significant effects for about half of the component and panel combinations analyzed. There were a few cost decreasing effects, but 18 of 22 significant effects were for cost increases that were unfavorable effects of the IHIE demonstration.

The multivariate cost outcomes analysis for PY4 found that for beneficiaries assigned to Panel 1, 2, and 3 providers who participated in the demonstration in PY4, per capita costs changed by only small amounts, and none of the changes were statistically significant between the pre-BY, BY, and PY4 compared with the increase in the comparison group during the same time period. For beneficiaries assigned to Panel 4 providers, there was a statistically significant decrease in costs. As a result, here again for PY4 no evidence was found to support the hypothesis that providers who participated longer in the MHCQ demonstration, such as Panel 1 providers, would have better outcomes.

In addition, the overall cost impact of the IHIE demonstration when Panels 1, 2, 3, and 4 were combined was a small cost increase that was statistically significant. This was an unfavorable overall effect of the IHIE demonstration.

To test again whether Medicare savings would have occurred if beneficiaries were assigned based on a plurality of touches with an IHIE practice, as opposed to the one-touch rule used for beneficiary assignment for IHIE in the MHCQ demonstration, another analysis was done in PY4 as a sensitivity test with the reassigned beneficiaries, using the same methodology as applied in PY3. This analysis found results that were not statistically significant, so no impact of the IHIE demonstration was found in this sensitivity analysis for PY4. Analysis of costs by subgroups and expenditure components were also conducted for PY4, with results again showing no evidence of improvement in outcomes for panels with longer participation in the MHCQ demonstration.

Quality Results

IHIE's internal quality measures for the MHCQ demonstration, which were assessed against targets agreed upon with CMS and not against a comparison group, showed limited improvement. Even with modest targets in PY1, PY2, and PY3—2 percentage points' improvement over prior-year values for most of the measures, except for three measures in PY3 whose targets ranged from 0.9 to 1.5 percentage points' improvement—the results were mixed. IHIE reported meeting quality targets for 6 of the 10 eligible quality measures in PY1, for 5 of the 10 eligible measures for PY2, and for 7 of the 12 eligible measures in PY3. Thus, by PY3, IHIE was still meeting quality targets for only 58 percent of eligible quality measures. Moreover, IHIE had agreed in the original MHCQ demonstration protocol to implement 14 quality measures in PY1, 14 measures in PY2, and 20 measures in PY3. Thus, by PY3 IHIE had still not implemented the number of quality measures originally required for the MHCQ demonstration for PY1.

The PY3 evaluation analysis included multivariate statistical analysis of the impact of the IHIE demonstration on five claims-based quality measures that have also been used in other CMS demonstration projects. These claims-based measures enable the analysis to assess IHIE's

quality performance in relation to the comparison group because quality measure performance results can also be calculated for the comparison group using Medicare claims data. This analysis found effects for seven quality measure and individual panel group combinations that were statistically significant for PY3. However, the results were unfavorable for five of the seven significant effects, indicating that the IHIE demonstration was associated with a lower probability of receiving the indicated care. Moreover, none of the multivariate statistical analysis results showed overall significant effects, either favorable or unfavorable, for the combined results across beneficiaries assigned to physicians in all three panels.

PY4 for the IHIE MHCQ demonstration was originally slated to cover the period July 2012 through June 2013. However, since IHIE decided to withdraw from the MHCQ demonstration as of the end of January 2013, so there were only 7 months of PY4 demonstration experience available for the evaluation analysis instead of the planned 12 months. This meant that some types of analysis were less meaningful, such as for quality measures that are based on clinical guidelines specifying care to be provided over a 1-year time period, and utilization results that focus on utilization over a 1-year time period. As a result, the MHCQ evaluation analysis for PY4 was more limited in scope than the analysis for PY3, and focused only on cost and savings outcomes, so multivariate statistical analyses of quality and utilization outcomes were not conducted for PY4.

Utilization Results

The multivariate regression analysis included results for utilization outcomes in terms of hospital admissions, 30-day readmissions, and ED visits. The IHIE demonstration results for PY3 showed some statistically significant and favorable effects for all three of these utilization measures, with reductions in utilization for each of them compared to the comparison group. However, it seems that these reductions were not large enough to offset cost increases in other areas for the IHIE demonstration, as described above.

Lessons Learned and Implications for Future Programs

A variety of lessons learned and implications for Medicare can be gleaned from the results of the IHIE MHCQ demonstration. These lessons are drawn from the results of the multivariate statistical analyses of the IHIE demonstration's impact on cost, quality, and utilization outcomes and the results of qualitative assessments and descriptive statistics regarding the structure and processes of IHIE's interventions.

The quantitative analysis of IHIE demonstration impacts showed mixed results. These multivariate analyses were all conducted in comparison to performance by the comparison group on the same outcomes and controlling statistically for other factors that could affect the outcomes. The cost impacts of the demonstration were mostly increases in costs to Medicare or were not statistically significant. The overall effects of the IHIE demonstration in the later performance years, PY3 and PY4, both showed increases in costs that were statistically significant. These represent unfavorable effects of the IHIE demonstration on cost outcomes. IHIE reported that one of its challenges for achieving cost savings for this demonstration was the difference in the population of the Medicare beneficiaries who were actively managed by IHIE providers and the Medicare beneficiaries who were included in the MHCQ demonstration financial reconciliation process. IHIE indicated that this discrepancy resulted from the

differences between the MHCQ demonstration one-touch rule for patient assignment to providers and the QHF program plurality rule for patient assignment to QHF providers, and from the retrospective nature of the MHCQ assignment process. To test whether Medicare savings would have occurred if beneficiaries were assigned based on a plurality of touches with an IHIE practice, the evaluation conducted another analysis as a sensitivity test that reassigned beneficiaries using a plurality assignment methodology similar to that used in the CMS Physician Group Practice demonstration and in the Medicare Shared Savings Program ACO program. This analysis found a smaller increase in costs than the analysis using a one-touch assignment, but it was not statistically significant.

The quality results are mixed even though quality feedback reports were the centerpiece of the IHIE MHCQ demonstration intervention. The multivariate analysis of quality impacts of the IHIE demonstration for Medicare claims-based quality measures in the latest performance year with quality analysis available, PY3, found no statistically significant overall impacts on the five claims-based quality measures included in this analysis. This indicates that the IHIE demonstration had no overall impact on these quality outcomes. IHIE's internal quality measures for the MHCQ demonstration, which were assessed against targets agreed upon with CMS and not against a comparison group, showed only limited improvement. Even with modest targets in PY1, PY2, and PY3—2 percentage points' improvement over prior-year values for all of the measures, except for three measures in PY3 whose targets were lower and ranged from 0.9 to 1.5 percentage points' improvement—IHIE was not able to meet the targets for many measures and was not able to implement all of the internal quality measures originally planned. By PY3 IHIE was meeting quality targets for only 58 percent of eligible quality measures and had not implemented the number of quality measures originally planned for PY3.

These quality results indicate that this type of health information exchange (HIE) intervention, attempting to bring together multiple payers and providers who are otherwise fierce competitors, may not be effective (or not effective by itself) for producing improved quality performance for Medicare beneficiaries.

The multivariate analysis of utilization impacts of the IHIE demonstration, found some statistically significant overall impacts for three utilization measures in the latest performance year with utilization analysis available, PY3. Hospital admissions, ED visits, and 30-day readmissions all had lower utilization. However, the magnitude of the reductions was not sufficient to offset cost increases in other areas for the IHIE demonstration, as noted.

Qualitative analysis and descriptive statistics for the MHCQ demonstration also provided a number of lessons learned and implications for future programs. A major issue was the exit of many physicians from the MHCQ demonstration in PY3, when several large physician groups left the demonstration to join ACOs. Because CMS required that physician groups not be in two different Medicare shared savings programs at the same time (e.g., in both the MHCQ demonstration and in an ACO), the groups had to choose one or the other. The lack of financial incentive payments in the MHCQ demonstration was one factor in this decision, but physician groups also viewed the demonstration as too limited in focusing only on the nine-county Indianapolis region. ACOs were able to define larger and more flexible service areas. Notably, those physician groups remained in IHIE's QHF program, even while leaving the MHCQ

demonstration, because of QHF's continuing involvement with private payers that did not include geographic restrictions.

In addition, large physician groups and independent practice associations (IPAs) found the QHF quality reports less useful and less timely than the internal reports they developed using their in-house EHRs. Their internal data systems enabled more rapid access to data for clinical interventions that required day-to-day decision making by providers. As more providers join ACOs, the prevalence of stronger internal data systems is likely to increase, and the future role of external data systems such as QHF may become less important.

On the positive side, both providers and IHIE staff indicated that the ability to add Medicare claims data to the QHF reports was a benefit for the development of IHIE and QHF because Medicare patients are a large part of most physicians' practices. Without Medicare data, the QHF reports would have been unable to provide comprehensive quality information covering the complete range of a provider's patients, including those covered by private health insurance, Medicaid, and Medicare.

These results from the MHCQ demonstration indicate that HIEs that bring multiple and competing providers and payers together may not be effective for pay-for-performance programs such as MHCQ. However, HIEs may continue to be useful for public reporting. The internal IHIE processes took a long time to develop consensus among stakeholders and to develop data systems for implementing new quality measures. It may be that multiprovider and multipayer HIEs are better suited for public reporting and public accountability programs, as IHIE has implemented with state-wide, regional, and practice site-specific quality data publicly reported on the IHIE Web site. These public reporting systems provide community accountability for providers without requiring the rapid data feedback to providers across multiple quality measures for clinical interventions as was provided for the large physician groups by their internal EHR data systems. The broad range of trust among stakeholders IHIE built up enabled their reports to be the focal point for public reporting of quality results that merge data from competing payers and providers. CMS should continue to participate in these public reporting efforts by HIEs; the public reports should include data from all payers and all providers serving patients in a community to provide comprehensive public reports on the quality of care for a community and for practice sites.

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SECTION 1
INTRODUCTION

The Medicare Health Care Quality (MHCQ) demonstration was developed to address concerns about the U.S. health care system, which typically fragments care while also encouraging both omissions in and duplication of care. To rectify this situation, Congress directed the Centers for Medicare & Medicaid Services (CMS) to test major changes to the health care delivery and payment systems to improve the quality of care while also increasing efficiency across the health care system. This goal could be achieved through several types of interventions: adoption and use of information technology and decision support tools by physicians and their patients, such as evidence-based medicine guidelines, best practice guidelines, and shared decision-making programs; reform of payment methodologies; improved coordination of care among payers and providers serving defined communities; measurement of outcomes; and enhanced cultural competence in the delivery of care.

Section 1866C of the Social Security Act, as amended by Section 646 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (P.L. 108-173, Section 1866C[b]), requires the Secretary of the Department of Health and Human Services to establish a 5-year demonstration under which the Secretary may approve demonstration projects that examine health delivery factors that encourage improved quality in patient care. This section also authorizes the Secretary to waive compliance with such requirements of Titles XI and XVIII of the Social Security Act (42 U.S.C. 1395 et seq.) as may be necessary for the purposes of carrying out the demonstration project.

Three types of "health care groups" were eligible to participate in the MHCQ demonstration: (1) groups of physicians, (2) integrated health care delivery systems, and (3) organizations representing regional coalitions of groups or systems. The MHCQ demonstration is designed to examine the extent to which major, multifaceted changes to traditional Medicare's health delivery and financing systems lead to improvements in the quality of care provided to Medicare beneficiaries without increasing total program expenditures.

Four sites have participated in the MHCQ demonstration at various times (see **Table 1**). Because each MHCQ demonstration site has a different and self-defined plan for its intervention, the evaluation of each site is presented in a separate report. This report presents evaluation results for the Indiana Health Information Exchange (IHIE).

Table 1
MHCQ demonstration sites

Participating site	Focus of the MHCQ demonstration	Implementation date	End date
Indiana Health Information Exchange (IHIE)	Quality Health First program	July 1, 2009	January 31, 2013
North Carolina Community Care Network (NC-CCN)	Medical home program for dually eligible Medicare-Medicaid enrollees	January 1, 2010	December 31, 2012
Gundersen Health System (GHS)	Advanced disease coordination program	February 1, 2010	April 30, 2014
Meridian Health System (MHS)	Meridian Care Journey program	July 1, 2012	June 30, 2016

SOURCE: RTI International.

1.1 Objectives and Structure of This Year 3 Evaluation Report

This Year 3 Evaluation Report for the IHIE reviews both quantitative and qualitative evaluation data regarding its structure, goals, and performance. Since IHIE's participation in the MHCQ demonstration ended on January 31, 2013, this is the final evaluation report for IHIE.

Section 2 includes the detailed evaluation of IHIE performance year 3 (PY3) and performance year 4 (PY4) using qualitative and quantitative data and analysis. The focus of the quantitative analysis is on multivariate statistical analysis of the impacts of the IHIE demonstration on cost, quality, and utilization outcomes. The PY4 analysis uses similar methods but is more limited in scope than the analysis for PY3 because IHIE withdrew from the MHCQ demonstration in the middle of PY4, so data are more limited for PY4. The qualitative analysis describes the goals, governance, and interventions as well as the barriers and challenges that IHIE experienced in implementing its interventions. Section 3 includes the lessons learned from the IHIE MHCQ demonstration, and implications for future programs.

1.2 Evaluation Methods

1.2.1 Quantitative Analysis

To evaluate improvements in quality, utilization, and costs in the IHIE demonstration, it is necessary to specify a comparison group of beneficiaries not subject to the IHIE intervention. This enables the evaluation to assess whether the observed effects on quality, utilization, and costs would have happened even in the absence of the IHIE demonstration.

We used the same intervention and comparison groups that the implementation contractor used for the financial reconciliation analysis to maintain consistency between the two analyses. The methodology for determining the comparison group is outlined in more detail in IHIE's demonstration protocol. There were two basic steps to match the intervention group and comparison group beneficiaries. The first step was to identify counties with metropolitan areas that were similar to the Indianapolis area in regard to the sociodemographic characteristics of their Medicare populations. The counties found to be most similar to the demonstration area and agreed upon with IHIE in their demonstration protocol are:

- Wisconsin: Milwaukee, Ozaukee, Washington, and Waukesha
- Ohio: Delaware, Fairfield, Franklin, Licking, Madison, Morrow, and Pickaway
- Indiana: Clark, Floyd, Harrison, and Scott
- Kentucky: Bullitt, Jefferson, and Oldham

The second step was to retrospectively identify beneficiaries in the comparison counties who met the eligibility criteria for the IHIE demonstration.[1] The comparison group includes beneficiaries who met the requirements for participation in the IHIE demonstration, who resided in a defined comparison group county, and who received a qualifying treatment in the pre-base year (pre-BY), the base year (BY), or a performance year (PY). Because the IHIE participating providers changed over demonstration years, the intervention group beneficiaries were separated into those treated by an initial panel of physicians (Panel 1) who began participation in the IHIE MHCQ demonstration in PY1, those beneficiaries treated by another panel of physicians (Panel 2) who began participation in the demonstration in PY2, those treated by another panel of physicians (Panel 3) who began participation in the demonstration in PY3, and those treated by another panel of physicians (Panel 4) who began participation in the demonstration in PY4. Separate CGs were also selected for each of the panels.

Quantitative information includes descriptive statistical profiles and multivariate statistical analysis of IHIE demonstration outcomes. The descriptive statistical profiles include the IHIE intervention group and matched comparison group beneficiaries, the BY and PY3 and PY4 time periods, and data on beneficiary demographic, Medicare enrollment, and disease characteristics. The pre-BY time period included July 2007 to June 2008, the BY included July 2008 through June 2009, PY1 covered July 2009 through June 2010, PY2 covered July 2010 through June 2011, and PY3 covered July 2011 through June 2012. PY4 was intended to include July 2012 through June 2013, but as noted in **Table 1** IHIE withdrew from the MHCQ demonstration at the end of January 2013. **Table 3** in Section 2.3.2 shows how the intervention group and CGs are similar in terms of demographics, risk scores, and chronic disease patterns for the PY3 analysis. **Table 5** in Section 2.3.2 shows how the intervention and comparison groups are similar in terms of demographics, risk scores, and chronic disease patterns for the PY4 analysis.

The multivariate statistical analysis methodology involved two main methods. First, propensity scores were estimated and propensity score weights applied to the data to balance the intervention and comparison groups with respect to key beneficiary characteristics before conducting the impact analyses. Second, a multivariate regression model combining data from the intervention group and comparison group, over multiple time periods including the pre-BY and BY, as well as PY3 was used to estimate the impact of the demonstration on Medicare expenditures, quality, and utilization for the PY3 analysis. PY4 data were used for the PY4 analysis and as noted the focus was on the impact of the demonstration on Medicare expenditures for that PY. This multivariate difference-in-differences regression model estimated the effect of the IHIE demonstration on an outcome of interest during the demonstration period after controlling for beneficiary characteristics, comparison group performance on the same outcome, and time trends throughout the entire observation period. Further details of the statistical analysis methods are included in the MHCQ Demonstration Evaluation Design Report (Trisolini et al., 2013).

[1] Eligibility criteria for beneficiaries included: 1) no months of Part A-only or Part B-only Medicare enrollment; 2) no months of Medicare Advantage enrollment; 3) no months of coverage under an employer-sponsored group health insurance plan; and 4) has a valid Medicare enrollment file record.

1.2.2 Qualitative Analysis

The qualitative data in this report include information provided to RTI International during a site visit to IHIE, IHIE's reports to CMS, CMS reports on IHIE, and internal site-specific analysis and reports on demonstration and related implementation and performance assessment efforts.

The IHIE site visit was conducted through in-person meetings in Indianapolis and the surrounding region in November 2012. The interviews were guided by unique protocols tailored to specific types of interviewees, representing IHIE staff; data users; data providers; and external stakeholders such as employers.

1.2.3 Assessing Lessons Learned and Implications for Future Programs

Assessing lessons learned and implications for future programs relied on several aspects of the IHIE evaluation, including the quantitative and qualitative data analysis. The evaluation team synthesized these analyses to identify key themes, opportunities, barriers, and lessons learned to inform future demonstration projects and the Medicare program.

SECTION 2
ANALYSIS FOR PERFORMANCE YEARS 3 AND 4

2.1 Administration and Infrastructure

The IHIE is a nonprofit, 501(c)(3) organization formed in 2004 to support Indiana's communities by providing medical information and data-sharing services. IHIE represents a broad coalition of health care stakeholders in the Indianapolis region, including hospitals, physician groups and practices, other health care providers, public and private payers, and other stakeholders. The IHIE MHCQ demonstration included the nine-county metropolitan Indianapolis area and was intended as a 5-year project. It began in 2009, but IHIE decided to withdraw from the MHCQ demonstration as of January 31, 2013.

Development of IHIE's data repository began in 1995, when the Regenstrief Institute developed a clinical data-sharing network that linked hospitals and other clinical providers, called the Indiana Network for Patient Care (INPC). By 2012, the INPC had expanded to include health insurance claims and clinical data that follow patients regardless of where they receive health care. IHIE provides data reporting and quality improvement programs to physician groups, physician practices, and public and private health insurance organizations using the INPC database.

The IHIE MHCQ demonstration was focused on IHIE's Quality Health First (QHF) program, which provided quality reports to physicians, physician groups, payers, and the public. A central goal of IHIE's MHCQ demonstration was to integrate Medicare claims data, along with data from third-party payers and Medicaid, into QHF, making the quality reports more comprehensive and representative of an entire patient population.

QHF was a community-wide health care quality reporting, quality improvement, and disease management service. It helped physicians identify and prioritize necessary health screenings and other testing to ensure that patients receive recommended preventive care and to ensure that chronic diseases are appropriately monitored and managed. QHF was built on INPC's data repository system, which aggregates data from health insurance claims and enrollment information, hospital medical records, physician group medical records, and other clinical data. QHF provided a variety of quality reports to providers, including the Measure Metrics Report, Measure Payer Metrics Report, Result Matrix Report, Quarterly Score Report, and Provider Graphic Summary Report.

The MHCQ demonstration was contained within the QHF program, which was in turn contained within IHIE. As a result, the MHCQ demonstration used the administration and infrastructure developed for IHIE and QHF. IHIE did not develop any separate administration or infrastructure solely for the MHCQ demonstration.

A group of employers reported during the November 2012 site visit that the impetus for the creation of QHF was from a combination of employers, health care systems, and insurance companies that came together. The benefit for them was that no other place could combine all of the clinical and claims data into one system. Physicians would actively read and use the QHF reports if they included all of their patients and not just a small slice of their patients from just one payer. Physicians also reported to the employers that they liked having just one set of

quality measures, not different sets of measures from different payers. The employers reported that some third-party payers paid additional incentives to physicians demonstrating high quality of care, as measured by QHF reports. Many physicians could benefit financially from their participation in QHF because of the performance incentives paid by commercial carriers using QHF for their pay-for-performance programs. However, the employers were concerned about the number of "free riders" of QHF—that is, insurance companies that did not provide payment incentives to physicians. For example, some physicians complained to IHIE that they had to review and correct (reconcile) data reports for the populations whose insurance companies did not provide incentive payments, including Medicaid and Medicare.

IHIE reported to the evaluation team that some private payers were providing incentive payments to physicians based on the QHF reports for their pay-for-performance programs. Another private payer contributed data and paid an administrative fee to IHIE but did not use the QHF reports in its incentive program (although it used similar quality measures). Medicaid provided claims and administrative data to IHIE but did not use QHF for a pay-for-performance program and did not pay administrative fees to IHIE.

Under the MHCQ demonstration program, Medicare offered the potential for shared savings incentives for IHIE. This payment method included targets for both financial and quality performance. The financial performance incentive was calculated by comparing the Medicare claims costs of the IHIE-assigned beneficiaries to the Medicare claims costs of similar beneficiaries identified in comparison regions. An additional portion of the savings would be shared if IHIE also met specified targets for quality performance.

2.2 Health Information Technology

IHIE staff reported that they received data from more than 15 different data sources for INPC and QHF in the course of a month, including hospitals, physician groups, laboratories, Medicare, Medicaid, and private health insurance companies. The data were converted into a common data format known as Health Level Seven (HL7). This common data format allowed IHIE to create standardized reports.

When the IHIE MHCQ demonstration began, physician offices were required to manually code data corrections (reconciliations) into paper reports and fax them back to IHIE for entry into the INPC database. To allow for better reporting and data collection, IHIE developed a Web site application, so users could submit relevant information for data corrections or additions electronically. Providers reported to the evaluation team that they found the Web-based reconciliation system much easier to use than the former paper-based system.

The QHF Web application also provided patient care alerts and reminders to providers online. Providers could click on patients or quality measures and drill down online to review data the QHF program used to derive the quality measure results. The providers could sort and search results by different criteria, including physician group, individual provider, quality measure, patient name, and gender. IHIE reported that the patient-level alert and reminders tools were widely used by providers in managing the care of their patient populations.

Staff at a community health center reported to the evaluation team that each month they received from QHF through the Web portal a lengthy report (around 48 pages) that contained

alerts for the previous month. Because QHF pooled a patient's medical information across a variety of settings (hospitals, insurers, etc.), the QHF reports allowed the community health center to identify patients who were missing important tests as well as to identify patients with conditions, such as diabetes, that were not already known to them. For example, the diabetic coordinator could identify which diabetic patients were missing important tests and put a note in their medical record. QHF's access to data from health insurance claims and medical records from other providers treating the same patient alerted them to the patient's disease status, so they were able to identify health conditions that their own records did not capture. The community health center also used QHF to identify women in need of an annual physical examination. Overall, the community health center staff reported to the evaluation team that they believed using QHF led to providing better care for patients.

The reports produced under the QHF program also provided this community health center with a relative performance index so staff could see how they were performing on quality measures relative to other providers. To make the performance index more meaningful, it was adjusted for payer mix (i.e., it accounted for the proportion of the health center's patients who were Medicare-, Medicaid-, and privately insured in comparison to other providers). The quality scores produced by QHF were also used by the community health center when writing grant applications.

In contrast, a large physician network's staff interviewed during a site visit reported that they needed to have preferably five or more payers participating in QHF-based incentive contracts with them to make QHF a more viable long-term option to track quality measures, because they were concerned about tracking quality metrics for a multitude of different groups (QHF and multiple private insurers).While QHF sent alerts and reminders to this large physician network regarding important medical information for their patients, such as indicating if they had a missing test or screening, the network already had its own internal alert system, so its providers did not need to use QHF's system. The network staff indicated that the QHF alerts and QHF in general was more useful for smaller practices, especially those that still had all of their medical records on paper.

In 2011, IHIE began public reporting of QHF community-wide quality measure results. The data were published on IHIE's Web site, http://www.ihie.org/. Starting in the fall of 2012, IHIE began publicly posting quality measure results at the practice-site level for the practice sites that opted in for this level of public reporting. The public reporting included 21 quality measures and both quantitative and graphical comparisons of the quality measure scores for the community and for practice sites. By 2013, the public reporting had expanded to cover the State of Indiana and included breakdowns by six regions in the state and individual practice sites in each region.

2.3 Provider and Beneficiary Participation

2.3.1 Providers

Patients were attributed to a primary care provider (PCP) as part of the QHF quality performance reporting process. The PCP was then held accountable for quality measure performance for that patient. PCPs who participated in the QHF program included physicians,

nurse practitioners, and physician assistants; their fields of practice include internal medicine, family medicine, general practice, geriatrics, obstetrics and gynecology, and pediatrics. To verify which providers were PCPs, QHF checked the provider's specialty designation from the National Plan and Provider Enumeration System, created and maintained by CMS, and also checked to see if the provider was billing for primary care evaluation and management (E&M) services. QHF received periodic updates (lists) of PCPs who wanted to participate in the QHF program. Some of the larger physician groups and hospitals gave twice-monthly or even weekly updates of their providers who wanted to participate in QHF.

IHIE reported to CMS that the number of PCPs participating in the QHF program as a whole had grown over time to 2,141 statewide by June 2012. However, the number of PCPs did not grow significantly in the nine-county MHCQ demonstration area, because QHF already had approximately 75 percent of the physicians in that area enrolled. This also meant that the MHCQ demonstration project had limited additional growth potential in PCPs. At the same time, several physician groups ended participation in the MHCQ demonstration (but not in QHF) to join Accountable Care Organizations (ACOs).

Because ACOs are Medicare programs that also have a shared savings financial reconciliation model, physician groups were not permitted by Medicare to participate in both an ACO and the MHCQ demonstration. CMS required that physician groups choose between participating in either an ACO or the MHCQ demonstration. Of the five largest primary care groups in the MHCQ demonstration, three terminated their participation in the MHCQ demonstration program in 2012 (but not their participation in IHIE's QHF program) to join ACOs that had larger geographical footprints than the nine-county MHCQ demonstration area.

Staff from an IPA reported to the evaluation team that they had decided to leave the MHCQ demonstration and become a Medicare Shared Savings Program ACO. Because the ACO program was viewed as the wave of the future, they wanted to join an ACO and they learned from Medicare that they could not become an ACO with Medicare and also stay in the MHCQ demonstration. The ACO also offered some financial incentives that they had not received from their participation in the MHCQ demonstration. The IPA's staff indicated that they would continue to participate in QHF after they became an ACO and left the MHCQ demonstration because they did receive some financial incentives for participating in QHF from a private health insurance company.

In contrast to the IHIE QHF program, the IHIE MHCQ demonstration assigned beneficiaries to all types of physicians who provided primary care services and billed CMS through the same tax identification number as the PCPs participating in the MHCQ demonstration. As a result, the MHCQ demonstration assigned beneficiaries to both PCPs and to specialist physicians who practiced with the participating PCPs, and we use the broader term "providers" to include both PCPs and specialist physicians to whom the MHCQ demonstration beneficiaries were assigned.

Because some physicians were added (and some withdrew) from the MHCQ demonstration each performance year, and new beneficiaries were assigned to the providers each year, panels of physicians were defined by CMS for the different performance years to identify the assigned beneficiaries associated with the different groups of providers. The new set of providers who joined the IHIE MHCQ demonstration in PY2 were termed Panel 2 providers to

differentiate them from the original providers participating in PY1, who were termed Panel 1. Similarly, providers joining MHCQ in PY3 and PY4 were called Panel 3 and Panel 4 providers, respectively.

Table 2 presents descriptive data on the MHCQ demonstration providers for PY3 and PY4. **Table 2** shows that in PY3 Panel 1 included 479 providers, Panel 2 included 268 providers, and Panel 3 included 399 providers. PCPs were 79 percent of the total for Panel 1, and non-PCP providers were 20 percent. Panel 2 had 49 percent PCPs and 51 percent non-PCP providers. Panel 3 had 59 percent PCPs and 41 percent non-PCPs. For the IHIE MHCQ demonstration, PCPs were defined using specialty codes for family medicine, internal medicine, general practice, physician assistant, nurse practitioner, and clinical nurse specialist.

Table 2 shows that in PY4 Panel 1 included 421 providers, Panel 2 included 232 providers, Panel 3 included 323 providers, and Panel 4 included 234 providers. **Table 2** shows that in PY4, PCPs were 78 percent of the total for Panel 1, and non-PCP providers were 22 percent. Panel 2 had 47 percent PCPs and 53 percent non-PCP providers. Panel 3 had 56 percent PCPs and 44 percent non-PCPs. Panel 4 had 44 percent PCPs and 56 percent non-PCPs. The PY4 percentages of PCPs and non-PCPs for Panels 1, 2, and 3 were similar to those in PY3 for the same panels.

In sum, in PY3 across all panels, 1,164 physicians (PCPs and specialists) were participating in the demonstration. This was a decline from the PY2 total of 1,413 participating providers. In PY4 across all panels, 1,206 physicians were participating in the demonstration.

Panel 1 had the most providers and the highest percentage of PCPs in both PY3 and PY4. Panel 3 had the next largest number of providers and percentage of PCPs. Panels 2 and 4 had the lowest number of providers, only about half as many as Panel 1, and the lowest percentage of PCPs. As a result, the Panel 2 providers looked different from the Panel 1 providers, with Panel 3 also looking somewhat different from Panel 1. In addition, for each of the first three panels the number of providers changed from year to year due to departures of providers from the MHCQ demonstration. These changes in the number of providers in each panel over time means that analysis of the impacts of the IHIE demonstration require different base years and different comparison groups by panel.

2.3.2 Beneficiaries

For the MHCQ demonstration, CMS assigned beneficiaries to participating MHCQ demonstration–participating providers if the beneficiary had at least one qualifying E&M visit with that provider, or to another provider billing under the same tax identification number, during the given performance year. This "one-touch" attribution rule was applied after the performance year was completed, looking back at the claims data reported for the prior year. This retrospective method kept the attribution accurately focused on patients who received services from providers participating in the demonstration. However, this method also meant that IHIE did not receive information on new MHCQ assigned patients during a performance year, and that information was not available to IHIE for up to a year after the end of the performance year.

Table 2
IHIE MHCQ demonstration providers by panel in performance year 3 and performance year 4

Types of providers	PY3 Panel 1 no.	PY3 Panel 1 percent	PY3 Panel 2 no.	PY3 Panel 2 percent	PY3 Panel 3 no.	PY3 Panel 3 percent	PY4 Panel 1 no.	PY4 Panel 1 percent	PY4 Panel 2 no.	PY4 Panel 2 percent	PY4 Panel 3 no.	PY4 Panel 3 percent	PY4 Panel 4 no.	PY4 Panel 4 percent
PCPs	392	79%	130	49%	234	59%	328	78%	108	47%	181	56%	101	44%
Specialists	100	20%	138	51%	164	41%	89	22%	124	53%	142	44%	129	56%
Unknown	5	1%	0	0%	1	0%	2	0%	0	0%	0	0%	2	1%
Total	497	100%	268	100%	399	100%	419	100%	232	100%	323	100%	232	100%

NOTES:

IHIE = Indiana Health Information Exchange; MHCQ = Medicare Health Care Quality; PY3 = performance year 3. PY4 = performance year 4

Performance year 3: July 1, 2011–June 30, 2012

Performance year 4: July 1, 2012–January 31, 2013

SOURCE: RTI International analysis of July 2008–January 2013 100% Medicare claims files and enrollment datasets.

Both the intervention and comparison groups had very large numbers of assigned beneficiaries for statistical analysis. In PY3, they totaled 121,215 for the intervention group (the sum of the totals for each of the three panels for PY3) and 348,210 for the comparison group. The comparison group is more than two times the size of the intervention group, which adds statistical power for the multivariate statistical analysis of MHCQ demonstration outcomes that is presented in the following sections.

Descriptive statistics for assigned beneficiaries for PY3 and PY4 are shown in **Tables 3–6** on the following pages. **Table 3** shows that in PY3 the assigned beneficiaries were mostly older than age 65, had a higher percentage of females than males, and had Medicare eligibility mainly as a result of being aged. These patterns were consistent across the pre-BY, BY, PY3, intervention group, and comparison group. They are also consistent with the national demographic and Medicare eligibility patterns in the Medicare population, which also show most beneficiaries as older than age 65 (84 percent), with a higher percentage of females (55 percent), and mostly eligible for Medicare as a result of being aged (84 percent; MEDPAC, 2012).

Table 3 also presents mean risk scores for the upper 10 percent and upper 25 percent of the hierarchical condition category (HCC) risk score distribution among assigned beneficiaries in PY3. They illustrate how those groups had significantly higher severity of illness than the average for the Medicare population, which is set by the HCC risk scoring methodology at 1.0. As expected, the upper 10 percent group had a higher severity of illness than the upper 25 percent group.

Table 3 also shows the percentages of PY3 assigned Medicare beneficiaries with chronic diseases of interest, which have high prevalence or high costs. IHIE assigned beneficiaries include more than 27 percent with diabetes, more than 15 percent with chronic obstructive pulmonary disease, more than 15 percent with vascular disease, 14 percent or more with congestive heart failure, and more than 13 percent with cancer across the different beneficiary groupings. These percentages are mostly similar to those for the national Medicare beneficiary population, which show 28 percent with diabetes, 12 percent with chronic obstructive pulmonary disease, and 16 percent with congestive heart failure, although the national percentage with cancer is somewhat lower at 8 percent (CMS, 2012). Notably, more than 61 percent of intervention group beneficiaries had at least one of the seven chronic diseases highlighted in **Table 3**, and the percentages are almost as high in the comparison group.

Table 4 presents descriptive statistics on utilization and expenditures for the PY3 assigned beneficiaries across a range of pre-BY, BY, PY3, intervention group, and comparison group groupings. It shows that beneficiaries in the intervention group had mostly 8.4–9.0 office or other outpatient E&M visits per year on average, whereas the comparison group had a slightly lower average range of mostly 6.8–8.0 visits of the same type per year. This is equivalent to a range of 8,400–9,000 visits per 1,000 beneficiaries for the intervention group and a range of 6,800–8,000 visits per 1,000 beneficiaries for the comparison group. Hospital admissions per 1,000 beneficiaries had a generally consistent pattern across most of the intervention group and comparison group groups, mostly ranging from 406 to 461. The 30-day readmission rates ranged from 14 percent to 15 percent. ED visits per 1,000 beneficiaries ranged from 846 to 924 for the intervention group, and were lower for the comparison group groups, where the range was 700 to 773.

Table 3
IHIE MHCQ demonstration beneficiaries by demographics and disease subgroups—combined panels, performance year 3

Measure	Pre-BY IG	Pre-BY CG	BY IG	BY CG	PY3 IG	PY3 CG
Age (%)						
Age < 65	15.8	18.5	17.5	19.2	19.5	21.8
Age 65–75	41.4	39.0	41.6	38.6	40.4	37.7
Age 75–85	32.2	30.6	30.2	29.8	28.8	28.0
Age 85+	10.6	12.0	10.7	12.4	11.3	12.6
Gender (%)						
Male	42.5	40.8	41.9	40.9	42.3	41.3
Female	57.5	59.2	58.1	59.1	57.7	58.7
Medicare eligibility (%)						
Aged[1]	83.6	80.9	81.9	80.2	79.8	77.6
End stage renal disease [ESRD][2]	1.1	1.3	1.1	1.3	1.3	1.3
Disabled	15.3	17.8	17.0	18.5	18.9	21.1
Medicaid (%)	14.0	14.6	16.0	15.7	18.5	17.3
Mean risk score for upper 10% risk score[3]	5.2	5.5	5.2	5.5	5.4	5.7
Mean risk score for upper 25% risk score[3]	3.3	3.5	3.4	3.5	3.5	3.6
Any of 7 diseases below (%)	64.2	56.8	61.8	56.9	63.0	57.4
Diabetes (%)	32.2	27.0	31.4	27.4	32.6	28.2
Chronic obstructive pulmonary disease (%)	18.6	15.2	17.8	15.4	18.7	15.9
Vascular disease (%)	18.1	17.7	17.5	18.1	19.0	18.5
Congestive heart failure (%)	19.9	14.6	17.4	14.6	17.7	14.5
Cancer (%)	14.1	13.6	13.1	13.5	13.9	13.6
Stroke (%)	4.9	4.4	4.7	4.4	4.8	4.4
Acute myocardial infarction (%)	8.5	3.7	7.1	3.5	6.9	3.2

(continued)

Table 3 (continued)
IHIE MHCQ demonstration beneficiaries by demographics and disease subgroups—combined panels, performance year 3

NOTES: IHIE = Indiana Health Information Exchange; MHCQ = Medicare Health Care Quality; PY3 = performance year 3; BY = base year; pre-BY = pre-base year; IG = intervention group; CG = comparison group.

Performance year 3: July 1, 2011–June 30, 2012

[1] Includes beneficiaries aged 65 or older without ESRD.

[2] Includes beneficiaries with ESRD regardless of age.

[3] Risk scores are calculated using hierarchical condition categories (HCCs). Higher risk scores represent sicker beneficiaries.

SOURCE: RTI International analysis of July 2007–June 2012 100% Medicare claims files and enrollment datasets.

Table 4
IHIE MHCQ demonstration assigned beneficiaries by utilization and expenditures, combined panels, performance year 3

Measure	Pre-BY IG	Pre-BY CG	BY IG	BY CG	PY3 IG	PY3 CG
Mean count of qualified office or other outpatient evaluation and management (E&M) visits per beneficiary[1]	8.66	6.84	8.38	7.92	9.03	8.05
Hospital admissions per 1,000 beneficiaries[2]	461	414	426	410	440	406
30-day readmission rate (% of beneficiaries)	15%	15%	15%	15%	14%	15%
Emergency department visits per 1,000 beneficiaries	866	700	846	723	924	773
Mean annualized Medicare expenditures PBPY[3]	$10,216	$9,416	$9,967	$9,821	$11,111	$10,222
Mean annualized Medicare expenditures PBPM	$851	$785	$831	$818	$926	$852
Percent of beneficiaries with some inpatient expenses (%)	26%	23%	24%	23%	25%	23%

NOTES: IHIE = Indiana Health Information Exchange; MHCQ = Medicare Health Care Quality; PY3 = performance year 3; BY = base year; pre-BY = pre-base year; IG = intervention group; CG = comparison group.

Performance year 3: July 1, 2011–June 30, 2012

[1] Qualified E&M visits are defined to be visits with one of the following HCPCS codes: 99201–99205 and 99211–99215. Qualified E&M visits are counted regardless of performing physician

[2] Refers to hospital admissions at any provider.

[3] Annualized Medicare expenditures per beneficiary are calculated by dividing actual expenditures by the fraction of the year the beneficiary is alive and are capped at $100,000 for non-end stage renal disease (ESRD) beneficiaries and $200,000 for ESRD beneficiaries. Expenditures have been rounded to the nearest dollar for presentation purposes.

SOURCE: RTI International analysis of July 2007–June 2012 100% Medicare claims files and enrollment datasets.

Table 4 also presents data on mean annualized Medicare expenditures per beneficiary for PY3. For this IHIE evaluation, Medicare expenditures are expressed as per beneficiary per month (PBPM) or per beneficiary per year (PBPY) expenditures. Medicare expenditures include all Part A and Part B fee-for-service claims components (inpatient, skilled nursing, outpatient, physician/supplier, home health, durable medical equipment, and hospice). Part D expenditures for pharmaceutical expenses are not included because those claims data were not readily accessible for some of the time periods involved in this demonstration.

PBPY expenditures in the baseline and annual performance periods are defined as the sum of Medicare expenditures for the eligible months in that period, and PBPM expenditures are the PBPY amounts divided by the number of eligible months in that period. Intervention and comparison group observations are weighted by the beneficiary's fraction of eligible months in the demonstration period. On average, PY3 assigned beneficiaries had about $9,400–$11,100 in Medicare expenditures per year, consistently across the intervention and comparison groups.

Table 4 also shows the percentage of assigned beneficiaries who had any inpatient Medicare expenses. This is generally consistent across the intervention and comparison groups, at 23–26 percent.

Table 5 and **Table 6** show the same descriptive statistics for PY4 beneficiaries. The patterns and levels found for PY4 beneficiaries for these demographics, utilization, and cost statistics were similar to those found for PY3 beneficiaries.

Table 5
IHIE MHCQ demonstration beneficiaries by demographics and disease subgroups—combined panels, performance year 4

Measure	Pre-BY IG	Pre-BY CG	BY IG	BY CG	PY4 IG[4]	PY4 CG[4]
Age (%)						
Age < 65	14.1	17.8	15.6	18.0	20.1	20.7
Age 65–75	40.7	39.3	41.6	38.9	40.7	38.2
Age 75–85	33.5	30.7	31.4	30.4	28.2	27.3
Age 85+	11.7	12.3	11.4	12.7	11.0	11.9
Gender (%)						
Male	42.2	40.8	41.3	40.7	41.6	41.4
Female	57.8	59.2	58.7	59.3	58.4	58.6
Medicare eligibility (%)						
Aged[1]	85.2	81.6	83.7	81.3	79.2	76.8
End stage renal disease [ESRD][2]	1.1	1.3	1.1	1.3	1.1	1.4
Disabled	13.6	17.1	15.2	17.3	19.6	21.9
Medicaid (%)	13.9	15.1	15.7	16.0	19.1	18.6
Mean risk score for upper 10% risk score[3]	5.4	5.6	5.4	5.6	5.4	5.5
Mean risk score for upper 25% risk score[3]	3.5	3.6	3.5	3.7	3.4	3.4
Any of 7 diseases below (%)	65.9	57.7	63.4	58.9	62.8	57.8
Diabetes (%)	33.1	27.3	32.8	28.5	33.1	28.8
Chronic obstructive pulmonary disease (%)	19.6	15.8	18.5	16.6	18.7	15.9
Vascular disease (%)	19.5	18.5	18.3	19.0	18.6	18.1
Congestive heart failure (%)	21.5	15.1	18.2	15.3	17.0	14.1
Cancer (%)	14.4	14.0	13.2	14.3	13.1	13.7
Stroke (%)	5.2	4.5	4.9	4.5	4.7	4.2
Acute myocardial infarction (%)	8.7	3.8	7.2	3.8	6.7	3.3

(continued)

Table 5 (continued)
IHIE MHCQ demonstration beneficiaries by demographics and disease subgroups—combined panels, performance year 4

NOTES: IHIE = Indiana Health Information Exchange; MHCQ = Medicare Health Care Quality; PY4 = performance year 4; BY = base year; pre-BY = pre-base year; IG = intervention group; CG = comparison group.

Performance year 4: July 1, 2012–January 31st, 2013 (note that IHIE left the MHCQ demonstration at end of January 2013)

[1] Includes beneficiaries aged 65 or older without ESRD.

[2] Includes beneficiaries with ESRD regardless of age.

[3] Risk scores are calculated using hierarchical condition categories (HCCs). Higher risk scores represent sicker beneficiaries.

SOURCE: RTI International analysis of July 2007–January 2013 100% Medicare claims files and enrollment datasets.

Table 6
IHIE MHCQ demonstration assigned beneficiaries by utilization and expenditures, combined panels, performance year 4

Measure	Pre-BY IG	Pre-BY CG	BY IG	BY CG	PY4 IG[4]	PY4 CG[4]
Mean count of qualified office or other outpatient evaluation and management (E&M) visits per beneficiary[1]	9.04	7.28	7.86	7.71	9.11	8.51
Hospital admissions per 1,000 beneficiaries[2]	493	422	447	426	408	396
30-day readmission rate (% of beneficiaries)	15%	15%	14%	15%	14%	15%
Emergency department visits per 1,000 beneficiaries	902	723	868	758	916	802
Mean annualized Medicare expenditures PBPY[3]	$10,459	$9,045	$10,065	$9,822	$10,856	$10,215
Mean annualized Medicare expenditures PBPM	$872	$754	$839	$819	$905	$851
Percent of beneficiaries with some inpatient expenses (%)	27%	24%	25%	24%	24%	22%

NOTES: IHIE = Indiana Health Information Exchange; MHCQ = Medicare Health Care Quality; PY4 = performance year 4; BY = base year; pre-BY = pre-base year; IG = intervention group; CG = comparison group.

Performance year 4: July 1, 2012–January 31st, 2013 (note that IHIE left the MHCQ demonstration at end of January 2013)

[1] Qualified E&M visits are defined to be visits with one of the following HCPCS codes: 99201–99205 and 99211–99215. Qualified E&M visits are counted regardless of performing physician

[2] Refers to hospital admissions at any provider.

[3] Annualized Medicare expenditures per beneficiary are calculated by dividing actual expenditures by the fraction of the year the beneficiary is alive and are capped at $100,000 for non-end stage renal disease (ESRD) beneficiaries and $200,000 for ESRD beneficiaries. Expenditures have been rounded to the nearest dollar for presentation purposes.

[4] Time period used is February 1st 2012–January 31st 2013. Note that IHIE left the MHCQ demonstration in January 2013.

SOURCE: RTI International analysis of July 2007–January 2013 100% Medicare claims files and enrollment datasets.

2.4 Cost and Savings

2.4.1 Savings Calculated for Demonstration Performance Payments

To determine whether the IHIE MHCQ demonstration achieved Medicare savings, CMS contracted with an implementation contractor (independent of the RTI evaluation contract) to calculate savings according to the terms and conditions in the demonstration protocol. The IHIE PY3 financial reconciliation report found that IHIE's Medicare savings did not exceed the minimum savings requirement, so IHIE did not earn a performance payment from Medicare for PY3; this was the same as the results found in the financial reconciliation process for IHIE for PY1 and PY2 (Coomer et al., 2011, 2012, 2013). A financial reconciliation was not conducted for PY4 because IHIE withdrew 7 months into the performance year.

IHIE reported that one of its challenges for achieving cost savings for Medicare was the difference in the population of the Medicare beneficiaries who were actively managed by IHIE providers and the Medicare beneficiaries who were included in the MHCQ demonstration financial reconciliation process. IHIE indicated that this discrepancy resulted from the differences between the MHCQ demonstration one-touch rule for patient assignment to providers and the QHF program plurality rule for patient assignment to QHF providers, and from the retrospective nature of the MHCQ assignment process.

2.4.2 Impact of the Demonstration on Cost Outcomes

The results of the multivariate analysis of the impact of the IHIE MHCQ demonstration intervention on a financial outcome measure are shown in **Table 7** for PY3 and in **Table 8** for PY4 below. These tables present the impact of the IHIE demonstration on annualized Medicare expenditures per beneficiary. These multivariate regression analyses are weighted by propensity scores to balance the intervention and comparison groups. They also control for other variables not shown, including HCC risk score, age, gender, Medicaid eligibility status, Medicare eligibility status, and race. Additional details of the multivariate analysis methodology are available in the MHCQ Demonstration Evaluation Design Report (Trisolini et al., 2013).

Table 7 presents demonstration impact results for PY3 Panel 1, Panel 2, and Panel 3; Panels 1, 2, and 3 combined; and Panels 1, 2, and 3 combined using an alternate beneficiary assignment rule as a sensitivity test. For this analysis, the demonstration impact on per capita expenditures was examined using data from the pre-BY, BY, and PY3. The results show that per capita costs increased significantly compared with the increase in the comparison group during the same time period for the main analysis that includes beneficiaries assigned to Panels 1, 2, and 3 physicians ($264 PBPY). This was an unfavorable impact of the IHIE demonstration on Medicare costs. These results are consistent with the financial reconciliation analysis conducted by the MHCQ demonstration implementation contractor, which also found that costs had increased for IHIE in comparison to the target set for financial reconciliation (Coomer et al., 2013).

The number of participating physicians, and thus the number of base year (BY) assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result of the changing BY population in PY3, it is not appropriate to include performance year 1 (PY1) and performance year 2 (PY2) in the multivariate statistical analysis

models that assess results for PY3. Consequently, the above model is estimated using only PY3 data, and PY1 and PY2 data are left out of the model.

Breakdowns of the main effect using only beneficiaries assigned Panel 1 physicians, Panel 2 physicians, and Panel 3 physicians are shown in the first three columns of **Table 7**. These breakdowns also show similar increases in costs that were statistically significant, ranging from $202 to $252 PBPY. These multivariate statistical analysis results are consistent with the results of the IHIE MHCQ demonstration financial reconciliation. Breakdowns of the financial impact results are included for the different physician panels to test whether the results may vary depending on the length of time physicians participate in the MHCQ demonstration (longer for Panel 1 versus the other panels) and by the varying breakdowns of PCPs and specialist physicians in the different panels. These results showed no differential impact by panel.

To test whether Medicare savings would have occurred if beneficiaries were assigned based on a plurality of touches with an IHIE practice, as opposed to the one-touch rule used for beneficiary assignment for IHIE in the MHCQ demonstration, another analysis was conducted as a sensitivity test with the reassigned beneficiaries. A plurality assignment methodology similar to the methodologies used in the CMS Physician Group Practice demonstration and in the Medicare Shared Savings Program ACO program was used on the combined set of beneficiaries assigned to physicians in Panel 1, Panel 2, and Panel 3. This analysis found a smaller increase in costs, but it was not statistically significant.

Table 8 presents PY4 demonstration impact results for Panel 1, Panel 2, Panel 3, Panel 4; Panels 1, 2, 3, and 4 combined; and Panels 1, 2, 3, and 4 combined using an alternate beneficiary assignment rule as a sensitivity test. For beneficiaries assigned to Panel 1, Panel 2, and Panel 3 providers—that is, Panel 1, 2, and 3 providers who participated in the demonstration in PY4—per capita cost changed by small amounts, but none of the changes were statistically significant for the intervention group between the pre-BY, BY, and PY4 compared with the increase in the comparison group during the same time period. For beneficiaries assigned to Panel 4 providers there was a statistically significant decrease in costs of $391. However, the overall impact when Panels 1, 2, 3, and 4 were combined was a small cost increase of $85 that is statistically significant. This was an unfavorable overall effect of the IHIE demonstration. As noted, breakdowns of the financial impact results are included for the different physician panels to test whether the results may vary depending on the length of time physicians participate in the MHCQ demonstration (longer for Panel 1 versus the other panels) and by the varying breakdowns of PCPs and specialist physicians in the different panels. Results for PY4 should be interpreted with caution as they represent only a seven month time period, during which IHIE was considering withdrawing from the MHCQ demonstration.

For the sensitivity test of beneficiaries assigned based on a plurality of touches with an IHIE practice, as opposed to the one-touch rule used for beneficiary assignment for IHIE in the MHCQ demonstration, results were not statistically significant. In sum, for both PY3 and PY4 there is no evidence that changing the assignment methodology from the one-touch method used in the MHCQ demonstration to the plurality method would have affected the outcomes achieved by the IHIE MHCQ demonstration.

Table 7
Demonstration impact on financial outcomes—multivariate regression results for per capita expenditures[1] for performance year 3

Variable	Panel 1[2,6]	Panel 2[3,6]	Panel 3[4,6]	Panel 1 and Panel 2 and Panel 3 combined[5,6]	Panel 1 and Panel 2 and Panel 3 combined plurality assignment rule sensitivity test[5,6]
N	1,245,334	1,176,323	1,071,042	2,796,279	2,599,932
R^2	0.6386	0.6239	0.634	0.6332	0.6495
Demonstration effect coefficient	202**	248***	252*	264***	48
Coefficient standard error	61	70	108	45	63
Coefficient statistical significance	0.001	0.000	0.020	0.000	0.445

NOTES:

The dependent variable is Medicare annualized expenditures.

N = all beneficiaries included in the regression analysis, including both IG and CG beneficiaries.

[1] The number of participating physicians, and thus the number of base year (BY) assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result of the changing BY population in PY3, it is not appropriate to include performance year 1 (PY1) and performance year 2 (PY2) in a model that contains PY3. Consequently, the above model is estimated using only PY3 data, and PY1 and PY2 data are left out of the model.

[2] The regression is estimated using Panel 1 pre-BY, Panel 1 BY, and PY3 data (i.e., July 1, 2007–June 30, 2009, and July 1, 2011–June 30, 2012, data) for intervention group (IG) and comparison group (CG) beneficiaries. The BY dummy is omitted to avoid collinearity.

[3] The regression is estimated using Panel 2 pre-BY, Panel 2 BY, and PY3 data (i.e., July 1, 2008–June 30, 2010, and July 1, 2011–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[4] The regression is estimated using Panel 3 pre-BY, Panel 3 BY, and PY3 data (i.e., July 1, 2009–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[5] The regression is estimated using the data mentioned in footnotes 2, 3, and 4 above.

[6] The regression is weighted by the Medicare eligibility fraction and by beneficiary propensity scores.

[7] The demonstration impact is estimated by the coefficient of (Post-Demonstration Period)*(Assigned Beneficiary). Negative coefficients indicate savings, and positive coefficients indicate dis-savings or cost increases.

[8] P-values for statistical significance of regression coefficient estimates are as follows: *Statistically significant at the <5% level; **Statistically significant at the <1% level; ***Statistically significant at the <0.1% level. A p-value of 0.000 indicates that the coefficient is significantly different from zero at better than the 0.1% level of significance. A p-value of 0.015 indicates a 1.5% level of significance.

[9] Statistical significance levels and coefficient standard errors are adjusted for beneficiary-level clustering.

SOURCE: RTI International analysis of July 2007–June 2012 100% Medicare claims files and enrollment datasets.

Table 8
Demonstration impact on financial outcomes—multivariate regression results for per capita expenditures,[1] performance year 4

Variable	Panel 1[3,8]	Panel 2[4,8]	Panel 3[5,8]	Panel 4[6,8]	Panel 1 and Panel 2 and Panel 3 and Panel 4 combined[7,8]	Panel 1 and Panel 2 Panel 3 and Panel 4 combined plurality assignment rule sensitivity test[7,8]
N	1,135,175	1,081,350	1,014,655	837,661	3,240,861	3,092,157
R^2	0.4801	0.4747	0.4945	0.4738	0.4728	0.4725
Demonstration effect coefficient	50	−49	−6	−391*	85*	14
Coefficient standard error	54	62	91	169	38	53
Coefficient statistical significance	0.351	0.434	0.946	0.021	0.025	0.790

NOTES:

The dependent variable is Medicare annualized expenditures.

N = all beneficiaries included in the regression analysis, including both IG and CG beneficiaries.

1 The number of participating physicians, and thus the number of base year (BY) assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result, in the changing BY population in PY4, it is not appropriate to include performance year 1 (PY1), performance year 2 (PY2), and PY3 in a model that contains PY4. Consequently, the above model is estimated using only PY4 data, and PY1 and PY2 and PY3 data are left out of the model.

2 IHIE left the demonstration after 7 months into PY4, and as a result PY4 covers the 7-month period from July 2012 to January 2013. To be consistent across years, all years were truncated at the end of January. That is, the pre-BY, BY, and PY4 all use the 7-month period July through January, for purposes of the expenditure analyses in this report.

3 The regression is estimated using Panel 1 pre-BY, Panel 1 BY, and PY4 data (i.e., July 1, 2007–January 31, 2008, July 1, 2008–January 31, 2009, and July 1, 2012–January 31, 2013, data) for intervention group (IG) and comparison group (CG) beneficiaries. The BY dummy is omitted to avoid collinearity.

4 The regression is estimated using Panel 2 (pre-BY, Panel 2 BY, and PY4 data (i.e., July 1, 2008–January 31, 2009, July 1, 2009–January 31, 2010, and July 1, 2012–January 31, 2013, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

5 The regression is estimated using Panel 3 pre-BY, Panel 3 BY, and PY4 data (i.e., July 1, 2009–January 31, 2010, July 1, 2010–January 31, 2011, and July 1, 2012–January 31, 2013, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

6 The regression is estimated using Panel 4 pre-BY, Panel 4 BY and PY4 data (i.e., July 1, 2010–January 31, 2011, July 1, 2011–January 31, 2012, and July 1, 2012–January 31, 2013, data), for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

7 The regression is estimated using the data mentioned in footnotes 3, 4, 5, and 6 above.

8 The regression is weighted by the Medicare eligibility fraction and by beneficiary propensity scores.

9 Negative coefficients indicate savings, and positive coefficients indicate dis-savings or cost increases.

10 Statistical significance levels and coefficient standard errors are adjusted for beneficiary-level clustering.

*Statistically significant at the <5% level; **Statistically significant at the <1% level; ***Statistically significant at the <0.1% level.

SOURCE: RTI International analysis of July 2007–January 2013 100% Medicare claims files and enrollment datasets.

2.4.3 Impact of the Demonstration on Cost Outcomes by Subgroups

Table 9 and **Table 10** present results for the multivariate statistical analysis of the impact of the IHIE demonstration costs by beneficiary subgroups for PY3 and PY4, respectively. The statistical methods are the same as for the overall cost analysis results shown in **Table 7** and **Table 8** previously. When the impact of the demonstration on per capita expenditures was analyzed by subpopulations, a number of statistically significant effects were found in both PY3 and PY4, including some showing cost savings and others showing cost increases.

Of the 60 combinations of subgroups and panels analyzed in **Table 9** for PY3, 26 had statistically significant intervention effects. Increases in per capita spending, which are unfavorable outcomes of the MHCQ demonstration, were found for 25 of these 26 significant effects. Significant savings were found for only 1 of the 26 subgroups—Medicaid enrollees assigned to Panel 1 Physicians. These results are consistent with the overall results for PY3, which showed cost increases for the IHIE MHCQ demonstration, as shown in **Table 7**.

Results for the different panels in **Table 9** showed multiple significant cost increases for Panels 1 and 2, while only one significant subgroup with a cost increase for Panel 3. This is contrary to the expectation that physicians participating for longer periods of time in the IHIE MHCQ demonstration in Panel 1 would show more cost savings, or fewer cost increases in comparison to the other panels. As a result, there was no evidence found to indicate that longer periods of participation by physicians in the IHIE MHCQ demonstration resulted in improved outcomes.

Table 10 shows that for PY4 Panel 1 had statistically significant results for cost savings for patients with acute myocardial infarction, and cost increases for patients with some inpatient expenditures and those in the upper 10 percent risk score distribution and in the upper 25 percent risk score distribution. Panel 2 had statistically significant results for cost savings for patients with congestive heart failure and those with acute myocardial infarction, and those originally eligible for Medicare because of disability. Panel 3 had only one statistically significant result, for cost increases for patients with cancer. Panel 4 had statistically significant results for cost savings for patients also eligible for Medicaid and those eligible for Medicare because of disability, and significant results for cost increases for patients with some inpatient expenditures.

In sum, the results for the different panels in PY4 in **Table 10** showed multiple significant cost increases for subgroups for Panel 1, two significant cost reductions for Panel 2, and only one significant subgroup with a cost increase for Panel 3. As with PY3, this pattern found in PY4 is contrary to the expectation that physicians participating for longer periods of time in the IHIE MHCQ demonstration in Panel 1 would show more cost savings, or fewer cost increases in comparison to the other panels. As a result, there is no evidence that longer periods of participation by physicians in the IHIE MHCQ demonstration resulted in improved outcomes.

The overall results for PY4, for Panels 1, 2, 3, and 4 combined, show statistically significant results for cost savings for patients with acute myocardial infarction, and significant cost increases for patients with diabetes, with some inpatient expenditures and those in the upper 10 percent risk score distribution and in the upper 25 percent risk score distribution.

Table 9
Demonstration impacts on financial outcomes—multivariate regression results for subgroup analyses for per capita expenditures for performance year 3

	Demonstration effect coefficient by subgroup[7,8]	Panel 1[2,6]	Panel 2[3,6]	Panel 3[4,6]	Panel 1, Panel 2 & Panel 3 combined[5,6]
1.	Cancer	529*	598*	627	561**
2.	Congestive heart failure	235	706**	−25	451*
3.	Diabetes	236	359*	25	308**
4.	Chronic obstructive pulmonary disease	364	342	262	424**
5.	Acute myocardial infarction	−545	685	1,085	388
6.	Stroke	760	982	846	855*
7.	Vascular disease	732**	915***	248	782***
8.	Any of seven diseases	292**	412***	292	379***
9.	Medicaid	−343*	−5	264	−26
10.	Originally disabled	338	−163	−475	135
11.	End-stage renal disease	−1,719	1,047	1,631	350
12.	Disabled	−282	−111	642*	−10
13.	Inpatient >$0	758***	637**	344	841***
14.	Upper 10% risk score	1,918***	1,734**	−936	1,548***
15.	Upper 25% risk score	1,202***	878**	321	902***

NOTES:

The dependent variable is Medicare annualized expenditures.

[1] The number of participating physicians, and thus the number of base year (BY) assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result, in the changing BY population in PY3, it is not appropriate to include performance year 1 (PY1) and performance year 2 (PY2) in a model that contains PY3. Consequently, the above model is estimated using only PY3 data, and PY1 and PY2 data are left out of the model.

[2] The regression is estimated using Panel 1 pre-BY, Panel 1 BY, and PY3 data (i.e., July 1, 2007–June 30, 2009, and July 1, 2011–June 30, 2012, data) for intervention group (IG) and comparison group (CG) beneficiaries. The BY dummy is omitted to avoid collinearity.

[3] The regression is estimated using Panel 2 pre-BY, Panel 2 BY, and PY3 data (i.e., July 1, 2008–June 30, 2010, and July 1, 2011–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[4] The regression is estimated using Panel 3 pre-BY, Panel 3 BY, and PY3 data (i.e., July 1, 2009–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[5] The regression is estimated using the data mentioned in footnotes 2, 3, and 4 above.

[6] The regression is weighted by the Medicare eligibility fraction and by beneficiary propensity scores.

[7] Negative coefficients indicate savings, and positive coefficients indicate dis-savings or cost increases.

[8] Statistical significance levels and coefficient standard errors are adjusted for beneficiary-level clustering.

*Statistically significant at the <5% level; **Statistically significant at the <1% level; ***Statistically significant at the <0.1% level.

SOURCE: RTI International analysis of July 2007–June 2012 100% Medicare claims files and enrollment datasets.

Table 10
Demonstration impacts on financial outcomes—multivariate regression results for subgroup analyses for per capita expenditures for performance year 4

Demonstration effect coefficient by subgroup[9,10]	Panel 1[3,8]	Panel 2[4,8]	Panel 3[5,8]	Panel 4[6,8]	Panel 1 and Panel 2 and Panel 3 and Panel 4 combined[7,8]
1. Cancer	113	−166	955**	−482	216
2. Congestive heart failure	6	−512*	24	−24	17
3. Diabetes	201	−52	−65	−16	182*
4. Chronic obstructive pulmonary disease	438*	−274	−181	−604	177
5. Acute myocardial infarction	−1,119**	−1,229**	−1,415	−1,806	−940**
6. Stroke	120	−552	−462	2,188	128
7. Vascular disease	369	52	−199	370	319*
8. Any of seven diseases	89	−80	−18	−416	107
9. Medicaid	−45	−386	−335	−1,029*	−84
10. Originally disabled	−115	−593*	−364	211	−122
11. End-stage renal disease	−411	460	4,179	239	1,337
12. Disabled	−56	−312	−164	−1,049**	−72
13. Inpatient >$0	894***	472	−383	1,299*	932***
14. Upper 10% risk score	1,391**	277	26	222	823**
15. Upper 25% risk score	779**	−119	−18	−49	448**

NOTES:

The dependent variable is Medicare annualized expenditures.

[1] The number of participating physicians, and thus the number of base year (BY) assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result, in the changing BY population in PY4, it is not appropriate to include performance year 1 (PY1), performance year 2 (PY2), and PY3 in a model that contains PY4. Consequently, the above model is estimated using only PY4 data, and PY1 and PY2 and PY3 data are left out of the model.

[2] IHIE left the demonstration after 7 months into PY4, and as a result PY4 covers the 7-month period from July 2012 to January 2013. To be consistent across years, all years were truncated at the end of January. That is, the pre-BY, BY, and PY4 all use the 7-month period July through January, for purposes of the expenditure analyses in this report.

[3] The regression is estimated using Panel 1 pre-BY, Panel 1 BY, and PY4 data (i.e., July 1, 2007–January 31, 2008, July 1, 2008–January 31, 2009, and July 1, 2012–January 31, 2013, data) for intervention group (IG) and comparison group (CG) beneficiaries. The BY dummy is omitted to avoid collinearity.

[4] The regression is estimated using Panel 2 pre-BY, Panel 2 BY, and PY4 data (i.e., July 1, 2008–January 31, 2009, July 1, 2009–January 31, 2010, and July 1, 2012–January 31, 2013, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[5] The regression is estimated using Panel 3 pre-BY, Panel 3 BY, and PY4 data (i.e., July 1, 2009–January 31, 2010, July 1, 2010–January 31, 2011, and July 1, 2012–January 31, 2013, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[6] The regression is estimated using Panel 4 pre-BY, Panel 4 BY, and PY4 data (i.e., July 1, 2010–January 31, 2011, July 1, 2011–January 31, 2012, and July 1, 2012–January 31, 2013, data), for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[7] The regression is estimated using the data mentioned in footnotes 3, 4, 5, and 6 above.

[8] The regression is weighted by the Medicare eligibility fraction and by beneficiary propensity scores.

[9] Negative coefficients indicate savings, and positive coefficients indicate dis-savings or cost increases.

[10] Statistical significance levels and coefficient standard errors are adjusted for beneficiary-level clustering.

*Statistically significant at the <5% level; **Statistically significant at the <1% level; ***Statistically significant at the <0.1% level.

SOURCE: RTI International analysis of July 2007–January 2013 100% Medicare claims files and enrollment datasets.

Table 11 presents multivariate statistical analysis results for the impact of the IHIE demonstration intervention on Medicare expenditure components for PY3. These results indicate that when the impact of the demonstration on per capita expenditures was analyzed by expenditure components, a number of statistically significant effects were found. Of the 40 combinations of expenditure components and panels analyzed for PY3, 22 combinations had statistically significant intervention effects. Of the 22 significant effects, 18 were for increases in costs, representing unfavorable effects, and 4 were for cost decreases, representing favorable effects.

Overall, statistically significant cost increases were much more numerous than statistically significant savings in **Table 11**. This was also reflected in the statistically significant increases in total costs for each panel group, mirroring **Table 7**. As a result, this expenditure component analysis is consistent with the overall results showing consistent cost increases for the IHIE MHCQ demonstration, an unfavorable effect.

Reviewing the results by panels in **Table 11**, there are no clear patterns of differences in results across the different panels. Panel 1 has four significant effects that are cost increasing and two significant effects that are cost decreasing, Panel 2 has five significant effects that are cost increasing and none that are cost decreasing, and Panel 3 has four significant effects that are cost increasing and one that is cost decreasing. As with the subgroup analysis, these expenditure components results are also contrary to the expectation that physicians participating for longer periods of time in the IHIE MHCQ demonstration in Panel 1 would show more cost savings, or fewer cost increases in comparison to the other panels. As a result, there is no evidence that longer periods of participation by physicians in the IHIE MHCQ demonstration result in improved outcomes.

Table 12 presents multivariate statistical analysis results for the impact of the IHIE demonstration intervention on Medicare expenditure components. These results indicate that when the impact of the demonstration on per capita expenditures was analyzed by expenditure components, a number of statistically significant effects were found. Of the 40 combinations of expenditure components and panels analyzed, 33 combinations had significant intervention effects, including 16 showing cost increases and 17 showing cost decreases. Mirroring **Table 8**, the Total Effects were not statistically significant for Panels 1, 2, and 3, but there was a significant cost saving for Panel 4. This savings was not enough to achieve overall savings as there was a significant cost increase for the overall PY4 demonstration effect for Panels 1, 2, 3, and 4 combined. For the overall effect, statistically significant cost increases were found for the inpatient total, inpatient hospital, and inpatient skilled nursing facility components, while statistically significant savings were found for the outpatient total, outpatient Part B physician/supplier, outpatient home health, outpatient durable medical equipment, and hospice components. Here again, there is no clear evidence of better performance for Panel 1 versus the other panels with less time participating in the MHCQ demonstration.

Table 11
Demonstration impacts on financial outcomes—multivariate regression results for expenditure components for per capita expenditures for performance year 3

Demonstration effect coefficient by expenditure component[7,8]	Panel 1[2,6]	Panel 2[3,6]	Panel 3[4]	Panel 1 and Panel 2 and Panel 3 combined[5,6]
Total	202**	248***	252*	264***
Inpatient total	319***	156*	259*	230***
Inpatient hospital	143**	47	243**	99**
Inpatient skilled nursing facility	176***	109***	16	132***
Outpatient total	−71	92*	53	58
Outpatient institutional (hospital)	20	121***	216***	106***
Outpatient Part B physician/supplier	−23	−17	−56	−4
Outpatient home health	−37***	13	−27	−8
Outpatient durable medical equipment	−4	−14	−24	−10
Hospice	−27**	−11	−56**	−26***

NOTES:

The dependent variable is Medicare annualized expenditures.

[1] The number of participating physicians, and thus the number of base year (BY) assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result, in the changing BY population in PY3, it is not appropriate to include performance year 1 (PY1) and performance year 2 (PY2) in a model that contains PY3. Consequently, the above model is estimated using only PY3 data, and PY1 and PY2 data are left out of the model.

[2] The regression is estimated using Panel 1 pre-BY, Panel 1 BY, and PY3 data (i.e., July 1, 2007–June 30, 2009, and July 1, 2011–June 30, 2012, data) for intervention group (IG) and comparison group (CG) beneficiaries. The BY dummy is omitted to avoid collinearity.

[3] The regression is estimated using Panel 2 pre-BY, Panel 2 BY, and PY3 data (i.e., July 1, 2008–June 30, 2010, and July 1, 2011–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[4] The regression is estimated using Panel 3 pre-BY, Panel 3 BY, and PY3 data (i.e., July 1, 2009–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[5] The regression is estimated using the data mentioned in footnotes 2, 3, and 4 above.

[6] The regression is weighted by the Medicare eligibility fraction and by beneficiary propensity scores.

[7] Negative coefficients indicate savings, and positive coefficients indicate dis-savings or cost increases.

[8] Statistical significance levels and coefficient standard errors are adjusted for beneficiary-level clustering.

* Statistically significant at the <5% level; **Statistically significant at the <1% level; ***Statistically significant at the <0.1% level.

SOURCE: RTI International analysis of July 2007–June 2012 100% Medicare claims files and enrollment datasets.

Table 12
Demonstration impacts on financial outcomes—multivariate regression results for expenditure components for per capita expenditures for performance year 4

Demonstration effect coefficient by expenditure component[9,10]	Panel 1[3,8]	Panel 2[4,8]	Panel 3[5,8]	Panel 4[6,8]	Panel 1 and Panel 2 and Panel 3 and Panel 4 combined[7,8]
Total	50	−49	−6	−391*	85*
Inpatient total	285***	211**	220*	196	250***
Inpatient hospital	132**	96	176*	108	117***
Inpatient skilled nursing facility	152***	114***	44	88	133***
Outpatient total	−192***	−210***	−164**	−394***	−94***
Outpatient institutional (hospital)	−62**	5	23	−147*	26
Outpatient Part B physician/supplier	−63***	−83**	−16	−241***	−34*
Outpatient home health	−21**	−11	−37*	−37	−12*
Outpatient durable medical equipment	−21**	−112***	−139***	66***	−64***
Hospice	−26***	−9	5	−36	−11*

NOTES:

The dependent variable is Medicare annualized expenditures.

[1] The number of participating physicians, and thus the number of base year (BY) assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result, in the changing BY population in PY4, it is not appropriate to include performance year 1 (PY1), performance year 2 (PY2), and PY3 in a model that contains PY4. Consequently, the above model is estimated using only PY4 data, and PY1, PY2, and PY3 data are left out of the model.

[2] IHIE left the demonstration after 7 months into PY4, and as a result PY4 covers the 7-month period from July 2012 to January 2013. To be consistent across years, all years were truncated at the end of January. That is, the pre-BY, BY, and PY4 all use the 7-month period July through January, for purposes of the expenditure analyses in this report.

[3] The regression is estimated using Panel 1 pre-BY, Panel 1 BY, and PY4 data (i.e., July 1, 2007–January 31, 2008, July 1, 2008–January 31, 2009, and July 1, 2012–January 31, 2013, data) for intervention group (IG) and comparison group (CG) beneficiaries. The BY dummy is omitted to avoid collinearity.

[4] The regression is estimated using Panel 2 pre-BY, Panel 2 BY, and PY4 data (i.e., July 1, 2008–January 31, 2009, July 1, 2009–January 31, 2010, and July 1, 2012–January 31, 2013, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[5] The regression is estimated using Panel 3 pre-BY, Panel 3 BY, and PY4 data (i.e., July 1, 2009–January 31, 2010, July 1, 2010–January 31, 2011, and July 1, 2012–January 31, 2013, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[6] The regression is estimated using Panel 4 pre-BY, Panel 4 BY and PY4 data (i.e., July 1, 2010–January 31, 2011, July 1, 2011–January 31, 2012, and July 1, 2012–January 31, 2013, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[7] The regression is estimated using the data mentioned in footnotes 3, 4, 5, and 6 above.

[8] The regression is weighted by the Medicare eligibility fraction and by beneficiary propensity scores.

[9] Negative coefficients indicate savings, and positive coefficients indicate dis-savings or cost increases.

[10] Statistical significance levels and coefficient standard errors are adjusted for beneficiary-level clustering.

*Statistically significant at the <5% level; **Statistically significant at the <1% level; ***Statistically significant at the <0.1% level.

SOURCE: RTI International analysis of July 2007–January 2013 100% Medicare claims files and enrollment datasets.

2.5 Quality

2.5.1 Quality Measures Reported by IHIE for the Demonstration

QHF reports provide physicians with feedback on their performance on a number of quality measures. IHIE revises these reports, as needed, to reflect changes suggested by physicians or the addition of new quality measures. In PY3, the QHF reports included 21 quality measures. Of these, 12 were included in the IHIE MHCQ demonstration. In PY4, which was originally slated to cover the period July 2012 through June 2013, IHIE withdrew from the demonstration after 7 months. As a result, there was not enough data available to report on the quality measures for the MHCQ demonstration for PY4.

Table 13 shows IHIE's performance on the quality measures for the MHCQ demonstration that IHIE calculated and reported to CMS. In PY1 and PY2, IHIE was able to report on 10 MHCQ demonstration quality measures. For PY3, IHIE implemented two additional measures, including diabetes care (HbA1c $\leq$ 8 percent) and heart health (lipid profile for patients with chronic stable coronary artery disease).

IHIE reported meeting quality targets for 7 of the 12 measures in PY3, as shown by the positive performance numbers relative to target for 7 measures in the last column of **Table 13**. For comparison, targets were met for 6 of the 10 eligible measures in PY1 and for 5 of the 10 eligible measures for PY2. These targets were 2 percentage points' improvement over prior year values for all of the measures, except for 3 measures in PY3 whose targets ranged from 0.9 to 1.5 percentage points' improvement.

IHIE indicated that several factors could explain these results for quality measure performance. First, it had a slow start to the MHCQ demonstration. IHIE did not receive Medicare claims and eligibility data until the 6th month of PY1. It took time to be able to use this information in QHF quality reports, so that the first quality report issued that included Medicare patients was in the 11th month of PY1.

Second, there was some interruption in claims data received from Medicare. During PY2, the flow of claims was stopped for 4 months. When claims resumed, IHIE discovered that the format had changed. As a result, IHIE had no new claims information incorporated into its quality reports for a 6-month period. So, for the first 24 months of the demonstration, IHIE provided quality reports with timely Medicare claims data for a total of about 8 months.

Third, two quality measures had coding changes in their specifications in PY3. In addition, the new measures introduced in PY3 could take some more time to show improvement.

Nonetheless, by PY3 IHIE was meeting quality targets for only 58 percent of eligible quality measures. Moreover, IHIE had agreed in the original MHCQ demonstration protocol to implement 14 quality measures in PY1, 14 measures in PY2, and 20 measures in PY3. Thus by PY3, IHIE had still not implemented the number of quality measures originally required for the MHCQ demonstration for PY1, and was well below implementing the number of quality measures originally required for PY3.

Table 13
MHCQ demonstration quality measures and IHIE quality performance in PY1, PY2, and PY3 reported by IHIE, relative to target

Quality measures (Percentage of IHIE-assigned Medicare beneficiaries meeting numerator criteria)	PY1 performance relative to target (percentage points)	PY2 performance relative to target (percentage points)	PY3 performance relative to target (percentage points)
Diabetes care: HbA1c testing	17	−0.8	1
Diabetes care: HbA1c ≤ 9%	−6	12	−0.7
Diabetes care: LDL-C screening	19	−0.2	3
Diabetes care: LDL-C controlled at < 100 mg/dl	−2	10	−9
Diabetes care: kidney disease monitored	17	−14	−8
Diabetes care: retinal exam	11	−0.6	7
Diabetes care: HbA1c ≤ 8%	NA	NA	−4
Heart health: LDL-C screening for patients with cardiovascular conditions	19	−2	1
Heart health: LDL-C controlled at < 100mg/dl for patients with cardiovascular conditions	−2	5	6
Heart health: lipid profile for patients with chronic stable coronary artery disease	NA	NA	1
Breast cancer screening	−3	0.3	−3
Colorectal cancer screening	4	2	2

NOTE: HbA1c = glycated hemoglobin; IHIE = Indiana Health Information Exchange; LDL-C = low-density lipoprotein cholesterol; MHCQ = Medicare Health Care Quality; NA = not applicable; PY = performance year.

SOURCE: RTI calculations from IHIE quality measure reports for the MHCQ demonstration.

2.5.2 Multivariate Statistical Analysis of IHIE's Quality Performance

The IHIE MHCQ evaluation included multivariate statistical analysis of the impact of the IHIE demonstration on five claims-based quality measures for PY3. A similar analysis was not conducted for PY4 because IHIE did not remain in the demonstration for the entirety of that performance year. The quality measures used for this multivariate statistical analysis are based on clinical guidelines specifying care to be provided over a 1-year time period, so IHIE's partial year participation in the MHCQ demonstration in PY4 would not allow this type of analysis to be conducted.

Unlike the quality measures reported by IHIE, these claims-based measures enable the evaluation to assess IHIE's quality performance in relation to the comparison group. These regression analyses use a logistic regression model because they have dependent variables that are binary (coded as 1 or 0, representing either testing done in the past year or not done in the past year). These regression analyses include control variables for HCC risk scores, age, gender,

Medicaid status, Medicare eligibility status, and race. Further details on the statistical methods are included in the MHCQ Demonstration Evaluation Design Report (Trisolini et al., 2013).

The results in **Table 14** indicate that 7 of the 20 quality measure and panel group combinations showed effects that were statistically significant. Five of these significant results have an odds ratio of less than 1.0, indicating that the IHIE demonstration was associated with a lower probability of receiving the indicated care, in comparison to the comparison group. These measures included the low-density lipoprotein (LDL) testing (DM-4) measure for Panel 1 and for Panel 2; for the urine protein testing (DM-6) measure for Panel 1; and for the lipid profile testing (CAD-5) measure for Panel 1 and for Panel 2. Two of the 7 significant results have an odds ratio of greater than 1.0, indicating that the IHIE demonstration was associated with a higher probability of receiving the indicated care, in comparison to the comparison group, for the HbA1C testing (DM-1) measure for Panel 1 and for the urine protein testing (DM-6) measure for Panel 3.

The overall results in the last column of **Table 14**, including the combined group of beneficiaries assigned to physicians in Panel 1, Panel 2, and Panel 3, showed no statistically significant effects for any of these five quality measures. This indicates that the IHIE demonstration had no overall impact on quality of care for these measures for PY3.

Results by panel in **Table 14** indicate that Panel 1 and Panel 2 provided lower quality care than Panel 3. Panel 1 had three quality measure showing lower probability of receiving the indicated care and one quality measure showing higher probability of receiving the indicated care, Panel 2 had two quality measures showing lower probability of receiving the indicated care and none showing higher probability of receiving the indicated care, and Panel 3 had no quality measures showing lower probability of receiving the indicated care and one showing higher probability of receiving the indicated care. This is contrary to the expectation that physicians participating longer in the IHIE MHCQ demonstration, those in Panel 1, would show better quality results.

Measures assessing utilization indicators are included in the next section. Some of these, such as readmissions, are sometimes also viewed as quality measures because they reflect the impact of quality of care on utilization.

Table 14
Demonstration impact on quality outcomes—multivariate regression results for five claims-based quality measures for performance year 3

Demonstration effect by quality measure[7,8]	Panel 1[2,6]	Panel 2[3,6]	Panel 3[4]	Panel 1, Panel 2 & Panel 3 combined[5,6]
HbA1c testing for beneficiaries with diabetes (DM-1)	1.16***	0.99	1.01	1.11
LDL testing (DM-4)	0.88***	0.80***	0.99	0.89
Urine protein testing for beneficiaries with diabetes (DM-6)	0.89***	1.05	1.28***	1.00
Lipid profile testing for beneficiaries with coronary artery disease (CAD-5)	0.87***	0.89***	0.94	0.89
LVEF testing for hospitalized heart failure patients (HF-2)	0.78	0.94	1.02	0.88

NOTES:

The dependent variable for each logistic regression is a binary indicator for achieving a quality measure. DM-1 is a quality measure for glycated hemoglobin (HbA1c) testing once per year for beneficiaries with diabetes. DM-4 is a quality measure for low-density lipoprotein (LDL) testing once per year for beneficiaries with diabetes. DM-6 is a quality measure for urine protein testing once per year or for evidence of medical attention for nephropathy for beneficiaries with diabetes. CAD-5 is a quality measure for lipid profile testing once per year for beneficiaries with coronary artery disease. HF-2 is a quality measure for beneficiaries hospitalized with a principal diagnosis of heart failure during the current year who also had left ventricular ejection fraction (LVEF) testing during the current year.

[1] The number of participating physicians, and thus the number of base year (BY) assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result, in the changing BY population in PY3, it is not appropriate to include performance year 1 (PY1) and performance year 2 (PY2) in a model that contains PY3. Consequently, the above model is estimated using only PY3 data, and PY1 and PY2 data are left out of the model.

[2] The regression is estimated using Panel 1 pre-BY, Panel 1 BY, and PY3 data (i.e., July 1, 2007–June 30, 2009, and July 1, 2011–June 30, 2012 data) for intervention group (IG) and comparison group (CG) beneficiaries. The BY dummy is omitted to avoid collinearity.

[3] The regression is estimated using Panel 2 pre-BY, Panel 2 BY, and PY3 data (i.e., July 1, 2008–June 30, 2010, and July 1, 2011–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[4] The regression is estimated using Panel 3 pre-BY, Panel 3 BY, and PY3 data (i.e., July 1, 2009–June 30, 2012, data), for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[5] The regression is estimated using the data mentioned in footnotes 2, 3, and 4 above.

[6] The regression is weighted by the Medicare eligibility fraction and by beneficiary propensity scores.

[7] Odds ratios > 1.0 indicate higher quality of care, and odds ratios < 1.0 indicate lower quality of care.

[8] Statistical significance levels and odds ratio standard errors are adjusted for beneficiary-level clustering.

*Statistically significant at the <5% level; **Statistically significant at the <1% level; ***Statistically significant at the <0.1% level.

SOURCE: RTI International analysis of July 2007–June 2012 100% Medicare claims files and enrollment datasets.

2.6 Utilization

IHIE's original goals for the MHCQ demonstration included decreasing hospitalizations and ED visits and increasing preventive care by providing comprehensive quality feedback reports to PCPs. IHIE staff indicated to the evaluation team that they believed that the QHF program affected physician behavior by causing physicians to focus more intensive care management on selected chronic conditions and cancer screening for the Medicare population. They believed that this level of care management could affect utilization of services.

Tables 15a, 15b, and 15c present the results of the multivariate regression analysis conducted by the evaluation team for IHIE's MHCQ demonstration utilization outcomes for PY3 in terms of hospital admissions, ED visits, and 30-day readmissions. A similar analysis was not conducted for PY4 since IHIE did not participate in the demonstration for the entirety of the fourth performance year.

Table 15a shows that the demonstration effects were overall significant, in the last column, for hospital admissions for the predicted number of utilization events and the overall effect of the demonstration on admissions. These effects were negative, which means hospital admissions were reduced in comparison to the comparison group over the same time period, and thus they represent a favorable impact of the demonstration for this utilization outcome. Individual panel results in **Table 15a** were somewhat mixed, with an increase in the predicted probability of a utilization event occurring in Panel 1, decreases in the predicted number of utilization events across all three panels, and a decrease in the overall demonstration effect for Panel 2 only. These differences in results between panels were small, however.

The percentage changes in **Table 15a**, which are associated with the effect coefficients, translate the coefficients from the nonlinear statistical models into estimated percentage effect sizes. The estimated percentage effects on the number of hospitalizations for IHIE beneficiaries who had at least one hospitalization showed reductions across all three of the panels ranging from 1.4 percent to 1.8 percent. The overall reduction in utilization was 1.3 percent for the combined group of beneficiaries assigned to physicians in Panels 1, 2, or 3. These results can be compared to **Table 11**, where some cost increases were estimated for the demonstration impact on the inpatient expenditures component. As a result, it seems that the utilization results presented in **Table 15a** were favorable in terms of a small reduction in hospital admissions, but the reduction was not large enough to offset other types of cost increases for inpatient expenditures.

Table 15b shows statistically significant reductions, compared to the comparison group, in overall ED visit utilization for Panel 1 and Panel 2, and for beneficiaries assigned to physicians in any of the three panels combined. These were favorable effects of the demonstration. The estimated overall percentage reduction was 2.3 percent.

Table 15c shows statistically significant reductions, compared to the comparison group, in 30-day readmissions, for the predicted number of utilization events for all three panels, and for the overall effect on beneficiaries assigned to physicians in any of the three panels combined. These were also favorable effects of the demonstration. The estimated overall percentage reduction in utilization was 7.4 percent.

Table 15a
Demonstration impacts on utilization outcomes—summary of effects for hospitals admissions for performance year 3

Type of Analysis	Panel 1[5]	Panel 2[6]	Panel 3[7]	Panel 1, Panel 2, & Panel 3 combined[8]
Predicted probability of a utilization event occurring[1]	0.007446*	0.000537	0.011952	0.003681
Predicted number of utilization events[2]	−0.01991**	−0.02677***	−0.02127**	−0.0227***
Overall demonstration effect on utilization[3]	0.000704	−0.01281**	0.006571	−0.00616*
Percent change in predicted probability of utilization event occurring	3.15%	0.22%	5.29%	1.56%
Percent change in predicted number of utilization events	−1.37%	−1.83%	−1.47%	−1.55%
Percent change from overall demonstration effect on utilization	0.16%	−2.70%	1.50%	−1.33%

NOTES:

*Statistically significant at the <5% level; **Statistically significant at the <1% level; ***Statistically significant at the <0.1% level.

[1] Logit regression models were used to calculate the predicted probability of utilization binary events (yes/no event) occurring, such as whether a beneficiary had at least one hospital admission per year.

[2] Negative binomial regression models were used to predict the number of times a utilization event occurs. These models, which were estimated on beneficiaries who had at least one occurrence of the utilization event (such as beneficiaries with at least one hospital admission), predict the number of admissions among beneficiaries who had at least one admission.

[3] Combined hurdle regression models were used to analyze the joint effects of two separate processes generating the utilization outcomes. These include one process generating whether a beneficiary experienced an event, whereas the other process generates the number of events the beneficiary experiences given that the beneficiary had at least one event. The combined hurdle models combine the information from the logit models and from the negative binomial models and calculate the overall effect of the demonstration on the utilization outcomes.

[4] The number of participating physicians, and thus the number of base year (BY)] assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result, in the changing BY population in PY3, it is not appropriate to include performance year 1 (PY1) and performance year 2 (PY2) in a model that contains PY3. Consequently, the above model is estimated using only PY3 data, and PY1 and PY2 data are left out of the model.

[5] The regression is estimated using Panel 1 pre-BY, Panel 1 BY, and PY3 data (i.e., July 1, 2007–June 30, 2009 and July 1, 2011–June 30, 2012, data) for intervention group (IG) and comparison group (CG) beneficiaries. The BY dummy is omitted to avoid collinearity.

[6] The regression is estimated using Panel 2 pre-BY, Panel 2 BY, and PY3 data (i.e., July 1, 2008–June 30, 2010, and July 1, 2011–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[7] The regression is estimated using Panel 3 pre-BY, Panel 3 BY, and PY3 data (i.e., July 1, 2009–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[8] The regression is estimated using the data mentioned in footnotes 5, 6, and 7 above.

SOURCE: RTI International analysis of July 2007–June 2012 100% Medicare claims files and enrollment datasets

Table 15b
Demonstration impacts on utilization outcomes—summary of effects for emergency department visits for performance year 3

Type of Analysis	Panel 1[5]	Panel 2[6]	Panel 3[7]	Panel 1, Panel 2, & Panel 3 combined[8]
Predicted probability of a utilization event occurring[1]	−0.00841	−0.00272	0.002629	−0.00483
Predicted number of utilization events[2]	−0.02566**	−0.03658**	−0.00937	−0.02289***
Overall demonstration effect on utilization[3]	−0.02792**	−0.02593*	−0.00054	−0.02083**
Percent change in predicted probability of utilization event occurring	−2.21%	−0.69%	0.70%	−1.25%
Percent change in predicted number of utilization events	−1.36%	−1.89%	−0.50%	−1.20%
Percent change from overall demonstration effect on utilization	−3.09%	−2.69%	−0.06%	−2.25%

NOTES:

*Statistically significant at the <5% level; **Statistically significant at the <1% level; ***Statistically significant at the <0.1% level.

[1] Logit regression models were used to calculate the predicted probability of utilization binary events (yes/no event) occurring, such as whether a beneficiary had at least one hospital admission per year.

[2] Negative binomial regression models were used to predict the number of times a utilization event occurs. These models, which were estimated on beneficiaries who had at least one occurrence of the utilization event (such as beneficiaries with at least one hospital admission), predict the number of admissions among beneficiaries who had at least one admission.

[3] Combined hurdle regression models were used to analyze the joint effects of two separate processes generating the utilization outcomes. These include one process generating whether a beneficiary experienced an event, whereas the other process generates the number of events the beneficiary experiences given that the beneficiary had at least one event. The combined hurdle models combine the information from the logit models and from the negative binomial models and calculate the overall effect of the demonstration on the utilization outcomes.

[4] The number of participating physicians, and thus the number of base year (BY) assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result, in the changing BY population in PY3, it is not appropriate to include performance year 1 (PY1) and performance year 2 (PY2) in a model that contains PY3. Consequently, the above model is estimated using only PY3 data, and PY1 and PY2 data are left out of the model.

[5] The regression is estimated using Panel 1 pre-BY, Panel 1 BY, and PY3 data (i.e., July 1, 2007–June 30, 2009, and July 1, 2011–June 30, 2012, data) for intervention group (IG) and comparison group (CG) beneficiaries. The BY dummy is omitted to avoid collinearity.

[6] The regression is estimated using Panel 2 pre-BY, Panel 2 BY, and PY3 data (i.e., July 1, 2008–June 30, 2010, and July 1, 2011–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[7] The regression is estimated using Panel 3 pre-BY, Panel 3 BY, and PY3 data (i.e., July 1, 2009–June 30, 2012, data), for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[8] The regression is estimated using the data mentioned in footnotes 5, 6, and 7 above.

SOURCE: RTI International analysis of July 2007–June 2012 100% Medicare claims files and enrollment datasets.

Table 15c
Demonstration impacts on utilization outcomes—summary of effects for 30-day readmissions for performance year 3

Type of Analysis	Panel 1[5]	Panel 2[6]	Panel 3[7]	Panel 1, Panel 2, & Panel 3 combined[8]
Predicted probability of a utilization event occurring[1]	−0.00451	−0.00352	−0.00094	−0.00374
Predicted number of utilization events[2]	−0.05419***	−0.05951***	−0.03283*	−0.04784***
Overall demonstration effect on utilization[3]	−0.02034**	−0.01983*	−0.00997	−0.01761**
Percent change in predicted probability of utilization event occurring	−2.83%	−2.34%	−0.64%	−2.44%
Percent change in predicted number of utilization events	−4.13%	−4.62%	−2.60%	−3.69%
Percent change from overall demonstration effect on utilization	−8.13%	−8.60%	−4.54%	−7.39%

NOTES:

*Statistically significant at the <5% level; **Statistically significant at the <1% level; ***Statistically significant at the <0.1% level.

[1] Logit regression models were used to calculate the predicted probability of utilization binary events (yes/no event) occurring, such as whether a beneficiary had at least one hospital admission per year.

[2] Negative binomial regression models were used to predict the number of times a utilization event occurs. These models, which were estimated on beneficiaries who had at least one occurrence of the utilization event (such as beneficiaries with at least one hospital admission), predict the number of admissions among beneficiaries who had at least one admission.

[3] Combined hurdle regression models were used to analyze the joint effects of two separate processes generating the utilization outcomes. These include one process generating whether a beneficiary experienced an event, whereas the other process generates the number of events the beneficiary experiences given that the beneficiary had at least one event. The combined hurdle models combine the information from the logit models and from the negative binomial models and calculate the overall effect of the demonstration on the utilization outcomes.

[4] The number of participating physicians, and thus the number of base year (BY) assigned beneficiaries, changed substantially in performance year 3 (PY3), and again in performance year 4 (PY4). As a result, in the changing BY population in PY3, it is not appropriate to include performance year 1 (PY1) and performance year 2 (PY2) in a model that contains PY3. Consequently, the above model is estimated using only PY3 data, and PY1 and PY2 data are left out of the model.

[5] The regression is estimated using Panel 1 pre-BY, Panel 1 BY, and PY3 data (i.e., July 1, 2007–June 30, 2009, and July 1, 2011–June 30, 2012, data) for intervention group (IG) and comparison group (CG) beneficiaries. The BY dummy is omitted to avoid collinearity.

[6] The regression is estimated using Panel 2 pre-BY, Panel 2 BY, and PY3 data (i.e., July 1, 2008–June 30, 2010, and July 1, 2011–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[7] The regression is estimated using Panel 3 pre-BY, Panel 3 BY, and PY3 data (i.e., July 1, 2009–June 30, 2012, data) for IG and CG beneficiaries. The BY dummy is omitted to avoid collinearity.

[8] The regression is estimated using the data mentioned in footnotes 5, 6, and 7 above.

SOURCE: RTI International analysis of July 2007–June 2012 100% Medicare claims files and enrollment datasets.

SECTION 3
LESSONS LEARNED AND IMPLICATIONS FOR FUTURE PROGRAMS

A variety of lessons learned and implications for Medicare can be gleaned from the results of the IHIE MHCQ demonstration. These lessons are drawn from the results of the multivariate statistical analyses of the IHIE demonstration's impact on cost, quality, and utilization outcomes and the results of qualitative assessments and descriptive statistics regarding the structure and processes of IHIE's interventions.

The multivariate analyses conducted in comparison to performance by the comparison group on the same outcomes and controlling statistically for other factors that could affect the outcomes found that the cost impacts of the demonstration were mostly increases in costs to Medicare or were not statistically significant. The overall effects of the IHIE demonstration in the later performance years, PY3 and PY4, both showed increases in costs that were statistically significant. These represent unfavorable effects of the IHIE demonstration on cost outcomes.

IHIE reported that one of its challenges for achieving cost savings for this demonstration was the difference in the population of the Medicare beneficiaries who were actively managed by IHIE providers and the Medicare beneficiaries who were included in the MHCQ demonstration financial reconciliation process. IHIE indicated that this discrepancy resulted from the differences between the MHCQ demonstration one-touch rule for patient assignment to providers and the QHF program plurality rule for patient assignment to QHF providers, and from the retrospective nature of the MHCQ assignment process. To test whether Medicare savings would have occurred if beneficiaries were assigned based on a plurality of touches with an IHIE practice, the evaluation conducted another analysis as a sensitivity test that reassigned beneficiaries using a plurality assignment methodology similar to that used in the CMS Physician Group Practice demonstration and in the Medicare Shared Savings Program ACO program. This analysis found a smaller increase in costs than the analysis using a one-touch assignment, but it was not statistically significant.

The quality results are mixed even though quality feedback reports were the centerpiece of the IHIE MHCQ demonstration intervention. IHIE's internal quality measures for the MHCQ demonstration, which were assessed against targets agreed upon with CMS and not against a comparison group, showed limited improvement, and the multivariate analysis using a comparison group found no significant impacts on five claims-based quality measures. IHIE was not able to meet the modest targets for many of its internal measures and was not able to implement all of the quality measures originally planned. IHIE reported meeting quality targets for 6 of the 10 eligible quality measures in PY1, for 5 of the 10 eligible measures for PY2, and for 7 of the 12 eligible measures in PY3. By PY3, IHIE was meeting quality targets for only 58 percent of eligible quality measures and they had not implemented the number of quality measures originally planned for PY1 and was well below implementing the number of quality measures originally planned for PY3. The multivariate analysis of five Medicare claims-based quality measures in PY3 found no statistically significant overall impacts indicating that the IHIE demonstration had no overall impact on these quality outcomes.

In sum, these quality results indicate that this type of health information exchange (HIE) intervention, attempting to bring together multiple payers and providers who are otherwise fierce

competitors, may not be effective (or not effective by itself) for producing improved quality performance for Medicare beneficiaries.

The multivariate analysis of utilization impacts of the IHIE demonstration, found some statistically significant overall impacts for three utilization measures in the latest performance year with utilization analysis available, PY3. Hospital admissions, ED visits, and 30-day readmissions all had lower utilization. However, the magnitude of the reductions was not sufficient to offset cost increases in other areas for the IHIE demonstration, as noted.

Qualitative analysis for the MHCQ demonstration also provided a number of lessons learned and implications for future programs. A major issue was the exit of many physicians from the MHCQ demonstration in PY3 to join ACOs. Because CMS required that physician groups not be in two different Medicare shared savings programs at the same time (e.g., in both the MHCQ demonstration and in an ACO), the groups had to choose one or the other. The lack of financial incentive payments in the MHCQ demonstration was one factor in this decision, but physician groups also viewed the demonstration as too limited in focusing only on the nine-county Indianapolis region. ACOs were able to define larger and more flexible service areas. Notably, those physician groups remained in IHIE's QHF program, even while leaving the MHCQ demonstration, because of QHF's continuing involvement with private payers that did not include geographic restrictions.

In addition, large physician groups and independent practice associations (IPAs) found the QHF quality reports less useful and less timely than the internal reports they developed using their in-house EHRs. Their internal data systems enabled more rapid access to data for clinical interventions that required day-to-day decision making by providers. As more providers join ACOs, the prevalence of stronger internal data systems is likely to increase, and the future role of external data systems such as QHF may become less important.

On the positive side, providers indicated that they viewed the QHF quality reports as a fair and honest reflection of the care they provided. IHIE worked to ensure that they provided doctors with timely, accurate data; opportunities to correct data errors through the reconciliation process; and data reports that covered all of a doctor's patients, not just patients from one payer. Both providers and IHIE staff indicated that the ability to add Medicare claims data to the QHF reports was a benefit for the development of IHIE and QHF because Medicare patients are a large part of most physicians' practices. Without Medicare data, the QHF reports would have been unable to provide comprehensive quality information covering the complete range of a provider's patients.

These results from the MHCQ demonstration indicate that HIEs that bring multiple and competing providers and payers together may not be effective for pay-for-performance programs such as MHCQ. However, HIEs may continue to be useful for public reporting. The internal IHIE processes took a long time to develop consensus among stakeholders and to develop data systems for implementing new quality measures. It may be that multiprovider and multipayer HIEs are better suited for public reporting and public accountability programs, as IHIE has implemented with state-wide, regional, and practice site-specific quality data publicly reported on the IHIE Web site. These public reporting systems provide community accountability for providers without requiring the rapid data feedback to providers across multiple quality measures

for clinical interventions as was provided for the large physician groups by their internal EHR data systems. The broad range of trust among stakeholders IHIE built up enabled their reports to be the focal point for public reporting of quality results that merge data from competing payers and providers. CMS should continue to participate in these public reporting efforts by HIEs; the public reports should include data from all payers and all providers serving patients in a community to provide comprehensive public reports on the quality of care for a community and for practice sites.

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