

**The New York City Department of Health & Mental
Hygiene**

Primary Care Information Project

**2011 HIMSS DAVIES APPLICATION
PUBLIC HEALTH AWARD OF EXCELLENCE**

Submitted April 15th, 2011

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NYCDOHMH's PCIP HIMSS DAVIES AWARD APPLICATION

Organization

The Primary Care Information Project (PCIP) is a Bureau of the New York City Department of Health and Mental Hygiene (NYC DOHMH) that seeks to improve the quality of care in underserved communities through health information technology (HIT). With a staff of 95, PCIP has extended prevention-oriented EHRs to over 2,500 NYC primary care providers working in underserved settings. This virtually integrated healthcare system includes 471 independent small practices, 34 Community Health Centers (CHC) and 4 Hospitals. Collectively, these practices serve nearly 2 million patients in NYC; about one quarter of the total NYC population. These practices, selected for their high volumes of Medicaid and uninsured patients, all have access to shared resources such as clinical quality and technical staff, a unified public health hub, quality dashboards and group trainings. By leveraging data derived from this EHR network, PCIP allows the NYC DOHMH to conduct programs in a more strategic, data-driven manner.

Management

1. Objectives: While EHRs deployed in isolation have not been shown to have significant public health impact, PCIP has demonstrated that community EHR programs, when deployed as part of a networked effort, with public health oriented tools and data capabilities, create dramatic improvements in quality of care, patient-centric workflows and data-driven decision making (see Appendix A). This network has been structured to provide both routine and ad hoc data from the EHRs, improving both population health as well individual patient care.

- 1) Design and deploy prevention-oriented public health functionality in the EHRs across a 2500+ user community, including:
 - a. Point-of-care clinical decision support system (CDSS) focused on critical public health areas: hypertension, diabetes and smoking

- b. Quality measurement dashboards that give providers real-time access to their performance on 34 clinical quality measures. Providers can see the performance of all providers at their practice, and drill down to the patient level to identify which patients make up each measure (See Appendix B)
- 2) Design a public health database, Healthcare Quality Information Network (HQIN), that receives both routine data (automatic, aggregate monthly transmissions on 34 prevention-oriented clinical process and outcomes measures, syndromic surveillance data and EHR utilization measures that provide information about how the providers are using the EHR). HQIN also allows for ad hoc queries, CDSS and real-time messaging to providers. Using this functionality, PCIP can:
- Make determinations about which practices are succeeding or struggling, thereby allocating field staff resources more appropriately
 - Support multiple pay-for-prevention programs, relying on EHR instead of claims data
 - Study the impact of various novel interventions, such as shared outreach resources that call patients back in for care, and assess their impact on quality of care
 - Send ad hoc queries, CDSS and messages to providers and their EHRs, providing a real time “action” arm of the NYC DOHMH
 - Target communications to those practices and providers that need it the most
 - Detect variations in disease prevalence and treatment to inform broader NYC DOHMH initiatives looking to target specific issues, like practices with low screening rates

2. Project Organization: The following PCIP teams have specific responsibilities relevant to the system described in this application.

Team	Team Lead	Function
Implementation, Systems Integration and Large Practice Quality improvement	Mytri Singh (Executive Director of Implementation)	<ul style="list-style-type: none"> Ensuring practices have bidirectional reference lab and immunization registry interfaces, ensuring that lab and immunization data is incorporated in structured fields. This process is vital to ensuring that the quality measures reported to HQIN are accurate and reflective of the providers’ actual workflow.
Small Practice Quality	Dr. Daniel Halevy (Executive)	<ul style="list-style-type: none"> Ensuring practices understand documentation workflows needed to

Improvement, Billing Consulting, Workforce Development and Panel Management	Director of Clinical Quality)	<p>populate the EHR correctly, ensuring that comprehensive and accurate data is transmitted to HQIN</p> <ul style="list-style-type: none"> Overseeing partnerships with institutes of higher learning to contribute to HIT curriculum design and delivery, as well as training and hiring a new workforce to assist with public health oriented HIT projects
Development, EHR consulting, Public Health Informatics, Public Health Reporting	Dr. Jesse Singer (Executive Director of Development)	<ul style="list-style-type: none"> Ensuring EHRs have built-in prevention oriented functionality like Clinical Decision Support, Syndromic Surveillance transmissions, and Quality reporting Designing and deploying monthly quality dashboard reports to providers (using HQIN data) Leveraging EHR-derived syndromic surveillance data to track and monitor disease outbreaks (e.g., H1N1) to help inform the overall Health Department strategy Developing and managing the public health alert and query network that allows PCIP to send out specific queries to provider's EHRs, alerting them about critical health issues (e.g., medication recall, disease outbreak) to generate public health queries and get real time data back from the EHR network (e.g. what is the percentage of blood pressure control by NYC zip code).
Evaluation, HQIN and Pay-for-Performance	Sarah Shih (Executive Director of HQIN/Evaluation)	<ul style="list-style-type: none"> Using HQIN data to evaluate the success of our programs, and to provide feedback loops to various teams about issues and trends Using HQIN data, occasionally in partnership with other datasets like Medicaid claims, to assess the public health, quality and costs of various aspects of the PCIP program, helping to create knowledge and data for policy design

These teams report to Dr. Amanda Parsons (Assistant Commissioner, PCIP), who reports to Louise Cohen (Deputy Commissioner, Health Care Access & Improvement), who reports to Dr. Thomas Farley (Health Commissioner, NYC DOHMH).

Prior to the deployment of the EHR network, public health functionality and HQIN, the NYC DOHMH relied on large statewide datasets to assess trends in clinical preventive services. Timely and costly initiatives, like the Community Health Survey, were used to assess the quality of care delivered in NYC. NYC DOHMH had no way to provide quality improvement to the vast array of practice settings in NYC. In addition, NYC DOHMH did not have access to real-time data to inform strategic programmatic decisions. After the deployment of the technologies described above, PCIP was able leverage a powerful network of EHR-enabled providers to give NYC DOHMH critical data it needs to deploy programs in the most strategic manner.

Implementation

1. Public Health Organization – Segments Involved:

- 1) NYC Community Physicians within all 5 boroughs (n=2,500)
 - a. Receive real time queries, clinical decision support alerts, and messages, (n = 142 providers at 66 practices serving over 150,000 patients) on an ad hoc basis. For example, in response to the Food and Drug Administration (FDA) Metronidazole recall on January 6th, and the January 12th Health Alert Network announcement (HAN), PCIP used the Public Health Query, Alert and Messaging module to query practices (on January 12th) to determine the volume of patients recently prescribed Metronidazole and distributed a real time CDSS alert to physicians a few days later that displayed the names of patients who were recently prescribed or currently taking this medication. Additionally, we distributed a message to provider's secure EHR inbox (on January 14th) notifying them of this recall and linking to additional information on the FDA website.
 - b. Our 2,500 + physicians make use of pre-programmed quality measures and CDSS on a daily basis. Each patient is evaluated against 34 quality measures targeted towards prevention and displays appropriate patient-specific, actionable decision support in real time, focusing on health priorities for New York City. Additionally, on a monthly basis, providers receive dashboards displaying their quality measure, EHR utilization and syndromic surveillance data across their entire patient population, utilizing a population/public health view. The dashboard also provides recommendations for improvement. Many of these measures are aligned with Meaningful Use (MU) measures, and the dashboards provide specific feedback to practices on progress towards MU.
- 2) NYC Department of Health and Mental Hygiene
 - a. Bureau of the Primary Care Information Project (Number of Staff: 95)
 - i. Analysis of quality measurement, EHR utilization, and syndromic surveillance data occurs daily. This data drive decisions regarding health department messaging to the public as well as its allocation of

health department resources. This data is analyzed and used to deploy PCIP's 25 field staff to educate providers and troubleshoot their systems. Additionally, as EHR-derived ambulatory care measures are new and innovative, we have analysts that review the data, and compare/contrast it to more traditional methods of data collection. In our paper "A Comparison of Emergency Department and Ambulatory Care Syndromic Surveillance in New York City During 2009 Pandemic H1N1" (in press), we compare emergency department and EHR-derived ambulatory care syndromic surveillance systems during the 2009 H1N1 outbreak in NYC, demonstrating that emergency departments experienced increases in influenza-like-illness significantly earlier than ambulatory care facilities. Based on this analysis, DOHMH encourages the public to seek care with their primary care physicians before making use of emergency department services.

- ii. Use of the public health query, alert and messaging module of the system. This is used to drive health department decisions by distributing ad hoc queries, CDSS and messages as needed for specific health department campaigns, to alert physicians, and to improve epidemiologic awareness in real time. For example we are able to alert providers of drug recalls, disease outbreaks and health department initiatives in real time, on an as-needed basis using this system. Currently this system is in the midst of its rollout and is in use at this time by 66 practices and 142 providers.
 - iii. Analysis of key Meaningful Use indicators occurs regularly. For example, based on trends in the monthly rates of e-prescribing, field staff have been instructed to deploy an e-prescribing toolkit to certain practices, as well as troubleshoot and reorient workflows to assure providers are meeting this measure. Communications staff also developed an e-prescribing campaign including providing information about additional incentives available through NYS Medicaid as well as developing patient-facing education materials for practices.
- b. Bureau of Communicable Disease (Number of Staff : 80)

- i. Uses PCIP's system at over 30 practice sites to generate custom clinical decision support and order sets to educate and encourage proper treatment of upper respiratory infections.
 - ii. Currently working with PCIP to utilize our EHR derived syndromic (influenza) surveillance for use in ILI NET, part of the CDC's influenza surveillance program.
- c. Bureau of Immunization (Number of Staff: 145)
- iii. This bureau uses PCIP EHR-derived data to create immunization dashboards and uses them to perform outreach to practices and give scorecards and feedback on immunization rates.

2. Scope

1) Quality Measures and CDSS

- a. These hard-coded quality measures were designed to be captured through the provider's routine workflow and use of the EHR and reflective of overall performance. In the co-development of the prevention-oriented EHR, PCIP worked with the vendor to program a set of 34 clinical process and outcome measures (See Appendix C). These measures were chosen as part of an overall strategy within NYC DOHMH's health policy agenda, known as "Take Care New York."¹ This agenda reflects a set of ten priority areas that present the greatest disease burden to New Yorkers and are amenable to evidence-based intervention and improvement. All providers who join PCIP agree to share their quality and utilization measurement data. These measures are calculated using a combination of SQL and Java code and run directly on the EHR production database. These calculations are automatically executed using a scheduled job within the individual EHRs and are transmitted on a monthly basis to the NYC DOHMH/PCIP using secure file transfer protocol (SFTP) and Public Health Information Network Messaging System (PHIN-MS). Once received by PCIP, the data is extracted, transferred and loaded into a Microsoft SQL database (HQIN).
- b. The clinical decision support as a complement to quality measurement, identifies opportunities for clinical preventive services in real time at the point of care. As clinical data is entered into the EHR during the

¹ <http://www.nyc.gov/html/doh/html/tcny/index.shtml>

patient visit, CDSS evaluates the data and determines whether patients are eligible for specific preventive services. If the patient is eligible for a service, determined by age, diagnosis, or other health issue, but has not yet met recommended goal or received the service, a clinical decision support alert is displayed in a non-intrusive fashion, consonant with the provider's workflow. Importantly, the alerts are "actionable" at the point of care. When the alert is displayed, the provider is shown a number of options to meet the recommended goals of the quality measure and order or conduct the recommended service, causing the alert to disappear.

2) Syndromic Surveillance

- a. PCIP has built disease reporting capability within the EHR for outbreak detection, in contrast to other traditional data collection methods, such as analysis of emergency room data. PCIP's syndromic surveillance queries, created using a combination of Java and SQL code, are focused on gastrointestinal illness and influenza like illness across multiple age stratifications. These queries run daily on the production database within each EHR as a scheduled job, and are transmitted to NYC DOHMH/PCIP using SFTP and PHIN-MS, then loaded into HQIN.

3) EHR Utilization

- a. PCIP monitors how providers use the EHR in order to accurately interpret quality and syndromic measurement. For this reason, PCIP has incorporated a number of EHR utilization measures into the EHRs, such as the frequency and extent of e-prescribing, number of office visits, use of clinical decision support and population registry functions, referral frequency, patient insurance distribution, etc. These are transmitted on a monthly basis using the same transmission protocols described above.

4) Public Health Query, Alert and Messaging System

- a. In addition to getting monthly data sets, PCIP also generates ad hoc queries, CDSS and messages to community providers in "real-time" at the point of care. This aspect of the system permits the creation and distribution of queries for summarized population data, clinical decision support alerts at the point-of-care

for patients who meet specified conditions, and email messages directly to provider EHR inboxes. Each EHR connects to a central server in a hub and spoke model. On this central hub is the Population Health module. Queries, alerts and messages are entered into the central hub using a graphical user interface and transmitted down the spokes to the practices over HTTPS using SOAP protocols.

3. System Implementation

1) Quality/Utilization/Syndromic/CDSS:

- a. Timeline: The development of this functionality occurred over an approximate 1 year period beginning in 2007 in co-development with an EHR vendor. Although development is officially complete, quality assurance testing and modifications are always ongoing in an effort to continuously improve the quality of our data, as measure calculation within EHRs is complex and highly dependent on provider workflow. The implementation of this functionality was originally to allow providers to go live on their EHR and then, 6 months later to enable clinical decision support, as that was provider facing and required training. The quality, utilization and syndromic surveillance metrics could all be activated when the functionality had completed development by our vendor, as this was transparent to providers. The early adopters of the EHR did not have any of this functionality in place, and required upgrades to enable this after go live. Please see Appendix D for the historical timeline of deployment.

2) Process redesign: CDSS was new functionality as were the quality measures, EHR utilization and syndromic surveillance reporting. Measure capture is dependent on correct provider workflows to ensure data elements are captured appropriately for use in measure calculation. As a result we redesigned our vendors training materials, created our own CDSS and measure curricula, and “trained the trainers”, so that providers were taught how to adjust their workflows to facilitate the accurate capture of our public health measures. Public Health Query, Alert and Messaging System

- a. Timeline: The development of this module occurred over an approximate 2 year period beginning in 2009. Quality assurance is ongoing and additional (phase 2) development will continue throughout 2011. This

module went live on production early this year. Initial rollout was to two small practices, and once piloted successfully began rolling out to all practices on the current version. This current version is required for meaningful use certification, and this public health query, alert, and messaging functionality was built into this version. Please see Appendix D for the historical timeline as well as future planned rollout.

4. Current State

1) Quality Measures/Utilization and Syndromic Surveillance Data/CDSS:

- a. PCIP currently has over 2,500 NYC community physicians at over 500 practices using the system; representing over 350,000 encounters per month. These physicians and practices are reporting varying elements of quality measures, EHR utilization syndromic surveillance data, and using the real time clinical decision support. PCIP's community physicians use the system daily during patient encounters; utilizing the real time clinical decision support to improve delivery of clinical preventive services and to also examine trends across their patient panels.
- b. According to the data PCIP has received, the system currently covers over 1.9 million NYC patients.
- c. This system is currently in use by multiple bureaus and divisions within the NYC DOHMH and is used at the highest level for strategic decision making. The ability to determine health care outcomes, monitor citywide syndromic surveillance and the provision of clinical preventive services in the ambulatory setting using EHR-derived data for over 1.9 million patients on a monthly basis has been extremely valuable for determining NYC public health strategies and resource allocation.
- d. Analyzing EHR utilization data combined with quality measurement data is a critical process in determining the factors that ensure successful adoption and "meaningful use" of an EHR. The EHR utilization data reported to PCIP from the system was the prototype for the federal meaningful use criteria. The data PCIP received and analyzed has been critical to the additional responsibilities and duties as a Regional Extension Center. PCIP is able to detect trends in use and target struggling providers. Using this EHR-derived data PCIP deploys staff to educate providers on meaningful use workflows and troubleshoot their systems, then follow that providers' performance longitudinally post-intervention.

2) Public Health Querying, Alerting and Messaging System:

- a. PCIP has over 140 NYC community physicians at 66 practices on this system, covering over 150,000 patients. Currently, PCIP is rolling out the public health query, alert, and messaging module and plans for 100% coverage of all PCIP physicians by the end of 2011 (500 practices and 2500+ physicians)
- b. This system is currently in use as needed by multiple bureaus as a means to message providers and collect data that is often otherwise unobtainable. At this time, this system is used to determine patient demographics for those being seen by a PCIP provider as compared to the known population demographics of NYC. Additionally, the system is used to determine prevalence, incidence, and level of control of a number of disease conditions, stratified by race/ethnicity and geographic location at the zip code and borough level, to better direct the Health Department's public health activities. For example, the real-time prevalence of obesity in all patients seen in one geographic neighborhood in NYC was recently conducted by zip code. As a result, the health department can better target anti-obesity campaigns to improve health care outcomes.

5. Exchange and Interoperability Levels: In order to increase the quality and quantity of measurement data in the network of providers it was essential to establish working relationships with the New York City regional health information organizations (RHIOs). In collaboration, PCIP and the RHIOs co-developed a live bidirectional interface using the NHIN Connect standards to share Continuity of Care Documents (CCDs) between clinical practices. This work has been leveraged across New York State through our participation in statewide collaborative communities to ensure broad interoperability across the state and alignment with federal initiatives. This interface is currently in pilot with complete rollout to all PCIP practices expected by the end of 2011.

PCIP has received regular quality measurement data feeds for the last four years from our clinical practices through a combination of SFTP and PHIN-MS. This data includes metrics based upon NCQA quality standards. Through an EHR vendor collaboration, NextGen, shared their quality data using the Quality Reporting Document Architecture (QRDA) standard. Flat-file syndromic surveillance data has been received by PCIP since November

2008, which will be updated in accordance with developing national standards and in accordance with Meaningful Use.

In meeting a critical gap in lab coding standards, PCIP partnered with all major New York City lab companies to develop a master lab compendium. Regular flat file feeds of the individual lab company compendiums are received over SFTP. These codes are processed by PCIP experts through a master lab compendium mapping tool in order to assign a universal LOINC for common lab company orders/results. This master compendium is incorporated by PCIP's EHR partners within their systems, thus enabling a common standard by which to conduct lab reporting and clinical decision support.

PCIP is developing a bi-directional exchange of immunization data between practices and the Citywide Immunization Registry. The exchange is based on national standards, such as the CDC's Implementation Guide for Immunization Data Transactions using version 2.3.1 of the Health Level Seven (HL7) Standard Protocol, AHIC immunization & Response Management Detailed Use Case, and HITSP Immunizations and Response Management Interoperability Specification. This interface is currently in testing with our first pilot practice and a complete rollout to all PCIP practices expected by the end of 2011.

6. Privacy Protection This system was designed specifically for public/population health use and as such, transmits only aggregate, summarized counts of data at the provider level. (i.e. what is the number of Dr. X's patients who have a diagnosis of diabetes and a HgbA1c < 8%?). The functional requirements for the design of this system specified that PCIP should not be able to access patient level data, and that no patient level data should be transmitted. That is the current state of the system today.

1) Quality/Utilization/Syndromic Surveillance:

- a. These queries are hard-coded within each providers EHR system and on a scheduled basis, each EHR generates the counts of data for each measure. These aggregate summarized counts are transmitted via SFTP to a vendor-hosted server. From there, using PHIN-MS, this data is transported within the NYC DOHMH firewall and extracted, transferred and loaded into an MS-SQL database (HQIN).

2) Public Health Queries, Alerts and Messaging System:

- a. The hub of this hub-and-spoke model is accessed via HTTPS, where user identification and password authentication occurs. The design of the system prevents access to any patient identifiable data elements at the database table level. Database access rights are used to prevent any modification to existing practice data tables. Queries, alerts and messages are entered into the central hub using a graphical user interface and transmitted down the spokes to the practices using HTTPS. On a scheduled basis, these queries are executed, and the resultant aggregate counts of data are transmitted up the spokes to the central hub using HTTPS, where it is again extracted, transferred and loaded into an MS-SQL database (HQIN).

PCIP adheres to all applicable federal and state laws, including the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and the Health Information Technology for Economic and Clinical Health Act (Title XIII of the American Recovery and Reinvestment Act of 2009).

7. Data Quality: To assess the reliability of automated quality reporting using the standard reporting tool available in the EHR, reviews of the electronic records were conducted for over 4,000 patients across 57 practices, abstracting data elements and their location in the EHR for constructing quality measures. The purpose for this review is as follows: 1) Identify provider documentation patterns for reliable quality measurement reporting; 2) Select measures for monitoring and improving EHR use and delivery of clinical preventives services; 3) Recognize the limitations and benefits of EHR derived data for pay-for-performance programs. Practice level quality measures were calculated based on the location of the data elements for nine quality measures. Across the elements abstracted; vitals, medications, and disease diagnoses were consistently recorded in over 90% of the patients. Measures that required the use of data elements from laboratory results, diagnostic imaging orders and results, and smart form for smoking status or cessation intervention had the highest variability for capture in quality reporting. In many cases, the high variability of the location of the laboratory results was due to a system issue where the interface was missing or LOINC codes were not mapped correctly. Additional training or redesign of the EHR interface for imaging results, such as mammograms, or use of smart forms for assessing smoking status

of patients is needed as the current data entry process is cumbersome or non-intuitive for the practices' existing workflow.

In addition, a provider dashboard was created to elicit provider feedback on their performance relative to the community wide results. The dashboards also allow for quality assurance of the data received and are used to initiate a dialogue with providers, effectively creating a feedback loop that allows PCIP to improve the quality of the data as an iterative process. After distribution of these provider dashboards, providers are encouraged to contact the development team if they note any discrepancies between the data they are presented and what they feel their actual performance may be. Two factors are the main causes for discrepancies: 1) Providers are complying with the measures and recommended preventive services, however their particular workflows do not ensure data are captured and represented by the measure results, 2) There is a configuration problem with their EHR such as missing LOINC codes (used for lab measurement), missing EHR configuration elements or other EHR application issues. These types of issues can be ameliorated via deployment of PCIP's EHR field teams. Once field teams are able to correct these issues via a remote or on-site visit, this ensures future quality measurement data generated by the EHR is more accurate and representative of the provider's performance, and not a problem with workflow or EHR configuration.

Value

1. *Impact on Population Health and Public Health Practice:* Our goals of data driven improvements in population health include:

- 1) Increasing the delivery of recommended clinical preventive services – this has been demonstrated by two different methods. First, manual reviews of the electronic records across 56 independent small practices showed significant increases of five percentage points or more for six quality of care measures: A1c screening for patients with diabetes, antithrombotic therapy for patients with diabetes or ischemic vascular disease, blood pressure control for patients with hypertension, breast cancer screening for women ages 40 years or older, body mass index recorded in patients ages 18 years and older, and smoking status recorded for all patients 18 years

or older (manuscript submitted for review) (See Appendix E). We have also confirmed similar trends showing increases in the same measures through the automated quality reporting. Additionally, delivery of smoking cessation interventions for current smokers has increased at a rate of 0.86 percent change per month (manuscript under revision).

- 2) Reduction in adverse drug events through increasing electronic prescriptions – rates of electronic prescribing have increased from 10.08% (January 2009) to 41.95% (March 2011) in 26 months
 - 3) Monitoring of syndromic surveillance data in care settings other than emergency departments – reporting by 49 practices during the initial 2010 H1N1 outbreak in NYC enabled DOHMH to examine for differences in health-seeking behavior across these different settings.
 - 4) To date, the PCIP data warehouse has data that tracks approximately a) 350,000 patient encounters per month; b) over 500,000 prescriptions per month; c) 400 independent primary care practices representing 1,500 primary care providers. Using reports from the literature, PCIP estimates the system potentially averts ~30 lives per year for every 10% increase in delivery of clinical preventive services across eight quality measure indicators. Full compliance (100%) across eight quality measures will avert approximately 300 lives. PCIP anticipates the impact to increase as additional primary care providers are incorporated into the virtual network.
2. Costs and Benefits Offsetting Costs: A formal return on investment analysis has not been conducted for PCIP. Over 85 million dollars has been invested into the PCIP program from local, state, and federal government sources, as well as grants from private foundations. PCIP has conducted early estimates of the cost benefits of investing in data systems for improving population health. These include:
- 1) Reduction in costs of prescriptions through electronic prescribing: for every patient seen by a provider using electronic prescribing, a net savings of \$39 per patient per year is achieved by using a formulary decision support system that is more likely to help providers prescribe an equivalent generic drug

- 2) Reduction of adverse drug events through electronic prescribing: for every patient seen by a provider using electronic prescribing, a net savings of \$6.62 per patient per year is achieved by avoiding adverse drug events (one event is avoided for every 150 patients receiving electronic prescriptions per year)
- 3) Reduction in duplicate lab tests through electronic interfaces for ordering and receiving laboratory results. An estimated savings of \$2.43 per patient per year.
- 4) Reduction in costs from averting heart attack or stroke in patients with hypertension through better blood pressure control: implementation of clinical decision support could reduce costs by \$17.16 per patient per year by increasing the number of patients with hypertension with controlled blood pressure through pharmacotherapy, lowered to recommended goals.

Additional gains due to avoidable hospitalizations or health care utilization due to untreated or avoidable disease complications have yet to be determined and are underway. PCIP has engaged with academic researchers to estimate the long term shift in costs, health care utilization and ambulatory care sensitive hospitalizations based on interventions deployed by PCIP.

3. Lessons Learned/Critical Success Factors: Establishing a useful data system that spans hundreds of independent primary care organizations is very challenging and requires a great deal of tenacity and resourcefulness. The success of PCIP can be attributed to several factors:

- 1) Visionary leadership that established an organizational culture of ‘can-do’ attitude, where all challenges are met with ‘group think’ and persistence to identify a feasible and lasting solution
- 2) Highly dedicated staff; people are hired based on their aptitude to ‘roll with the punches’
- 3) Support from the New York City mayor, health department commissioner, and high level policy makers
- 4) Substantial financial backing that allowed for some flexible spending; this includes adjusting the skill set of the work force and development of the data systems infrastructure
- 5) Commitment to data driven decision making, this includes introspection of day-to-day processes to identify successes that should be sustained and avoid repeating mistakes

- 6) Constant gauging of whether program goals are in alignment to address critical gaps or needs identified by stakeholders and PCIP's constituents of community health care providers.

In recognition of the above success factors, the following factors would likely have yielded even greater success if we had known them at the time of the system development and implementation:

- 1) The need to have architecture that allowed for 'live', adjustable queries; hence the invention of the hub model
- 2) The need for expandable resources for maintaining data transmissions/collection; this was not as seamless or 'easy' as originally envisioned
- 3) The need for a universal identifier in use across the health care system for both providers and their practice affiliations The lack of a universal identifier by provider and practice hinders the ability to provide timely information back to providers as the process of verification can be time consuming. This verification process is a very important process and necessary to maintain trust with providers. Accurate and reliable data, reflective of the provider's work and/or use of system can impact PCIP's credibility as a trusted resource.
4. Dissemination: In 2010 alone, PCIP staff have been invited to speak at over 35 conferences and participate in ,multiple workgroups or advisory panels. (See Appendix F for a list of presentations, work group/advisory panel participation and manuscripts).
5. Transportability: As part of a health department, PCIP has made every effort to share the architectural design and layouts of the data systems. All components have been funded by public sources and can potentially be replicated if desired. Staff has fielded questions from various organizations (e.g. regional extension centers, quality improvement organizations outside of the city) and individuals interested in developing similar capabilities or working with PCIP to leverage the existing systems within the city to meet mutual interests in improving public health.



NEW YORK CITY DEPARTMENT OF
HEALTH AND MENTAL HYGIENE
Thomas Farley, MD, MPH
Commissioner

April 13, 2011

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+ 1 347 396 4100 tel

Mr. David A. Collins
4300 Wilson Boulevard, Suite 250
Arlington, VA 22203-4168

Dear Mr. Collins,

I am writing to support the application of the Primary Care Information Project (PCIP) for the 2011 Healthcare Information and Management Systems Society Davies Award for Public Health.

Since PCIP was established at the New York City Department of Health and Mental Hygiene in 2005, the program has successfully connected more than 2,500 providers, serving Medicaid and uninsured patients, to prevention-oriented electronic health records. The patient level data collected by PCIP is vital to the Health Department's ability to measure, monitor, and improve the health of New Yorkers.

PCIP provides the Health Department with valuable information about chronic disease incidence and prevalence, syndromic surveillance and rates of provider delivery of clinical preventive services. Data from PCIP's integrated system promotes the efficient identification of emerging public health issues and enables the Department to track the progress of priority initiatives including the prevention of noncommunicable diseases through tobacco cessation, increased physical activity, and the provision of nutrition information. Over time, as more providers adopt electronic health records and more patients visit a provider who uses one, these data will become increasingly representative of New York City primary care practices.

PCIP continues to innovate in the field of health information technology with the specific aim of improving the health of all New Yorkers. A recent innovation allows PCIP to send critical messages to providers notifying them of important issues, including medication recalls, in real-time.

Thank you for considering the Primary Care Information Project for the Davies Award for Public Health.

Sincerely,

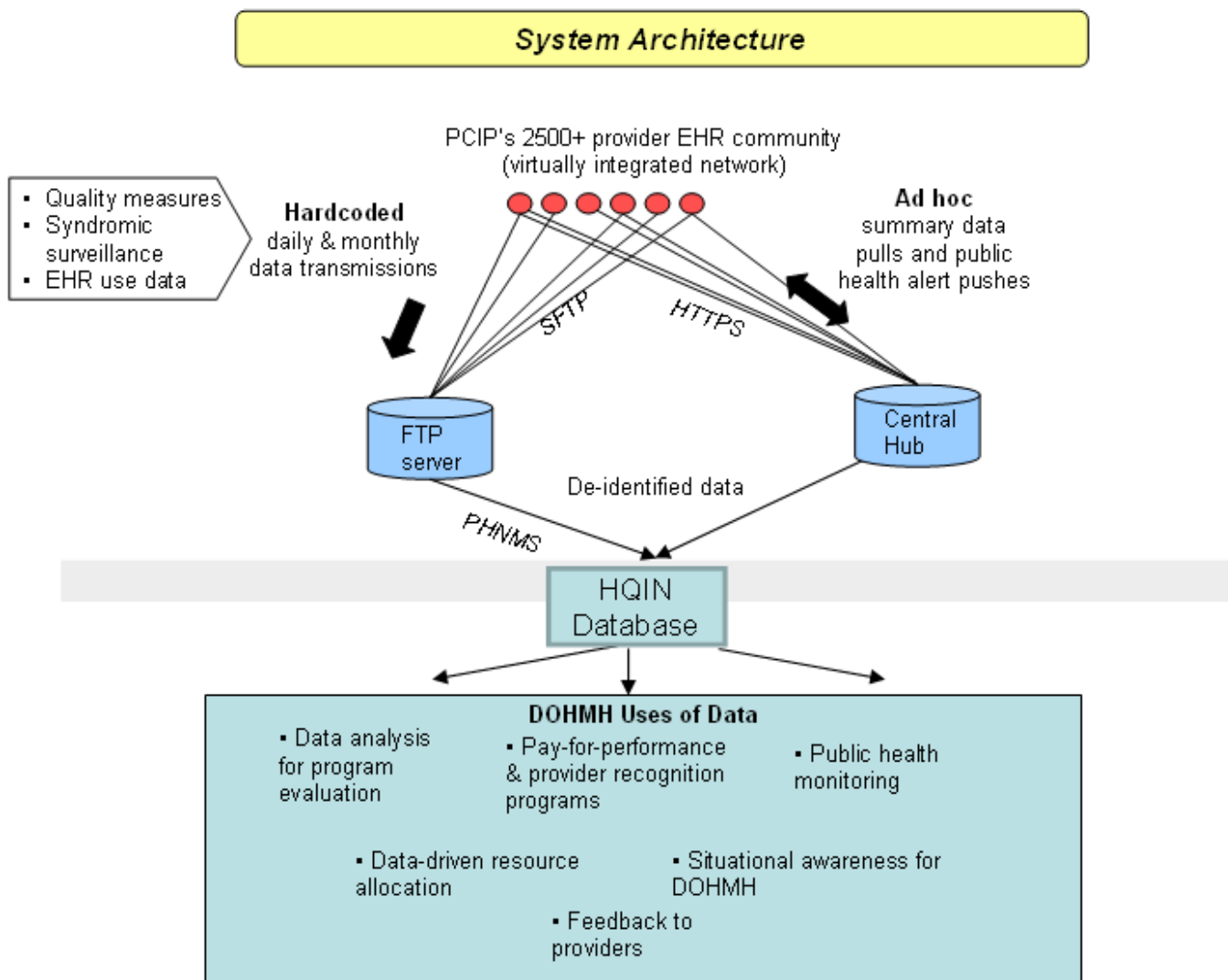


Thomas A. Farley, MD, MPH
Commissioner

Appendices

- A.** System Architecture
- B.** Sample Provider Dashboard
- C.** Quality and EHR Utilization Measures
- D.** Implementation Timeline
- E.** Increases in Clinical Preventive Services
- F.** Dissemination Activities

Appendix A. System Architecture



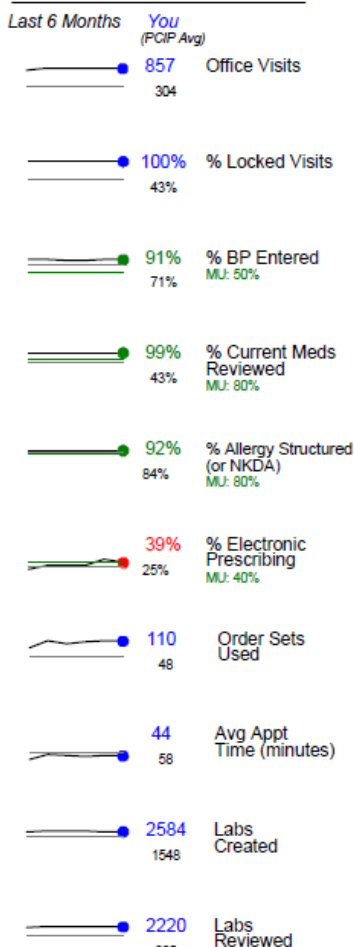
Appendix B. Sample Provider Dashboard

Provider Report for February - July 2010
Provider: &FirstName &LastName Practice: &Name (APUID: &apu)
Practice Go Live: &golive

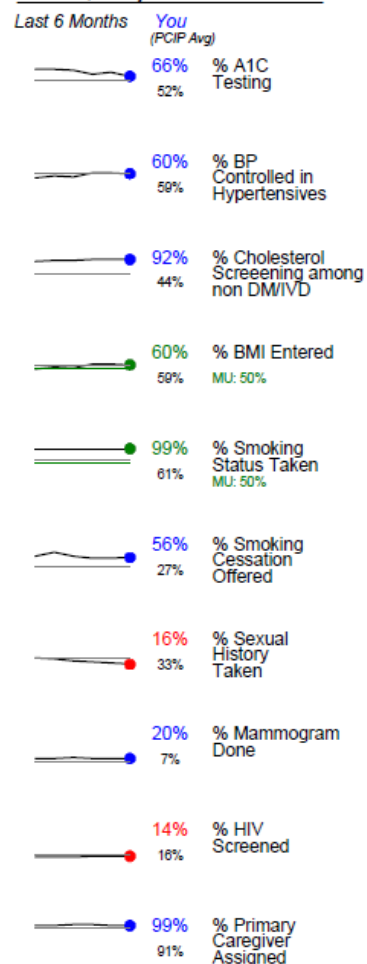
Legend (Sample Graph)



eHR Use Measures



Quality Measures

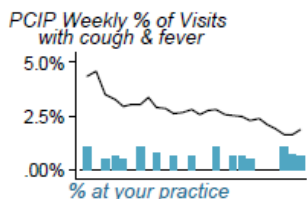
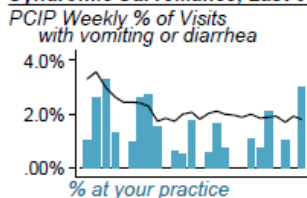


Recommendations:

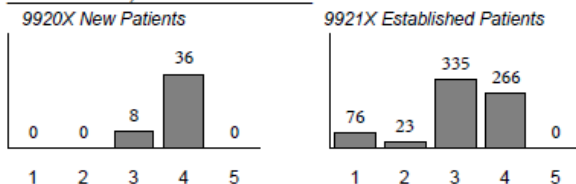
Based on this report and the impact of each measure on patient health, two measures to target for improvement in the future are

- Meaningful Use:
 % electronic prescribing
- Quality Measures:
 % HIV Screening

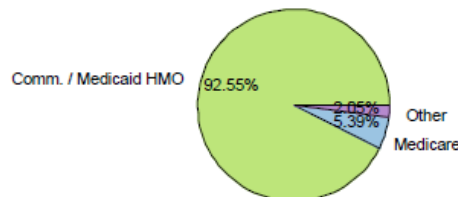
Syndromic Surveillance, Last 6 Months



CPT Codes, Last Month



Payment Type, Last Month



For questions regarding these measures, contact your QI specialist:
 &QI_FirstName &QI_LastName at &email



Appendix C. Quality and EHR Utilization Measures

“Take Care New York” Adult Quality Indicators (Core measures in bold)

TCNY Alert	TCNY Measure	(Patient Population)	In the last...
1. Regular Doctor			
Patients see assigned PCG	Seen by assigned Primary Care Giver	(all adults)	12 months
2. Tobacco			
Smoking status	Smoking status updated	(All adults)	12 months
Smoking cessation intervention	Received counseling, meds or Fax2Quit	(Smokers)	12 months
3. Cardiovascular Health			
Body Mass Index	BMI measured	(all adults)	2 years
Cholesterol screen (genl pop)	HDL & Total Chol measured	(M35+F45+, no DM/IVD)	5 years
Cholesterol control (genl pop)	Chol <240 (no LDL) or LDL <160	(M35+ F45+ no DM/IVD)	
LDL testing (high risk)	LDL screened	(Patients with DM or IVD, 18-75)	12 months
LDL control (high risk)	LDL <100	(Patients with DM or IVD, 18-75)	
BP Control in HTN (140/90)	Last BP<140/90	(18-75, with HTN but not IVD/DM)	
BP Control in IVD (140/90)	Last BP<140/90	(18-75, with IVD but not DM)	
BP Control in DM (130/80)	Last BP<130/80	(18-75, with DM)	
A1C testing	A1C test	(Patients with DM)	6 months
A1C control (<7%)	Last A1C<7.0%	(Patients with DM)	
Antithrombotic tx (IVD or DM)	Currently on aspirin or other antithrombotic	(DM or IVD)	
4. HIV			
HIV screening	HIV test	(18-64)	
HIV viral load and CD4 testing	Viral load or CD4 test	(HIV+)	3 months
5. Depression			
Depression screening	Negative PHQ2 or any PHQ9	(All adults)	12 months
Depression follow-up	Reassessed	(PHQ9 10+)	w/in 3 months
Depression control	New score <10	(PHQ9 10+)	
6. Substance Abuse			
Alcohol use screening	Alcohol use screened – AUDIT-C	(All adults)	12 months
7. Cancer Screening			
Colorectal cancer screening	Colonoscopy (procedure)	(50-80)	10 years
Breast cancer screening	Mammogram (procedure)	(F40+)	2 years
Cervical cancer screening	Pap smear (lab)	(F18 – 64)	3 years
8. Immunizations			
Influenza vaccine (high risk)	Flu shot Sept-March	(18-49, high risk)	Since last Sept.
Influenza vaccine (over 50)	Flu shot Sept-March	(50+)	Since last Sept.
Pneumococcal vaccine	Pneumococcal shot	(65+ or high risk)	5 years (Once after 65)
9. Environmental Health			
Asthma symptom assessment	Evaluated for symptom freq	(18-56 with asthma)	12 months
Asthma control (18-56 yrs)	Prescribed either the preferred long-term control medication or an acceptable alternative treatment	(18-56 with asthma)	

10. Reproductive Health		
Sexual history taken	Sexual history taken	(All adults) 12 months
Chlamydia screening	Chlamydia test	(F18-25 sexually active) 12 months

EHR Utilization Measures

(Sample presented below)

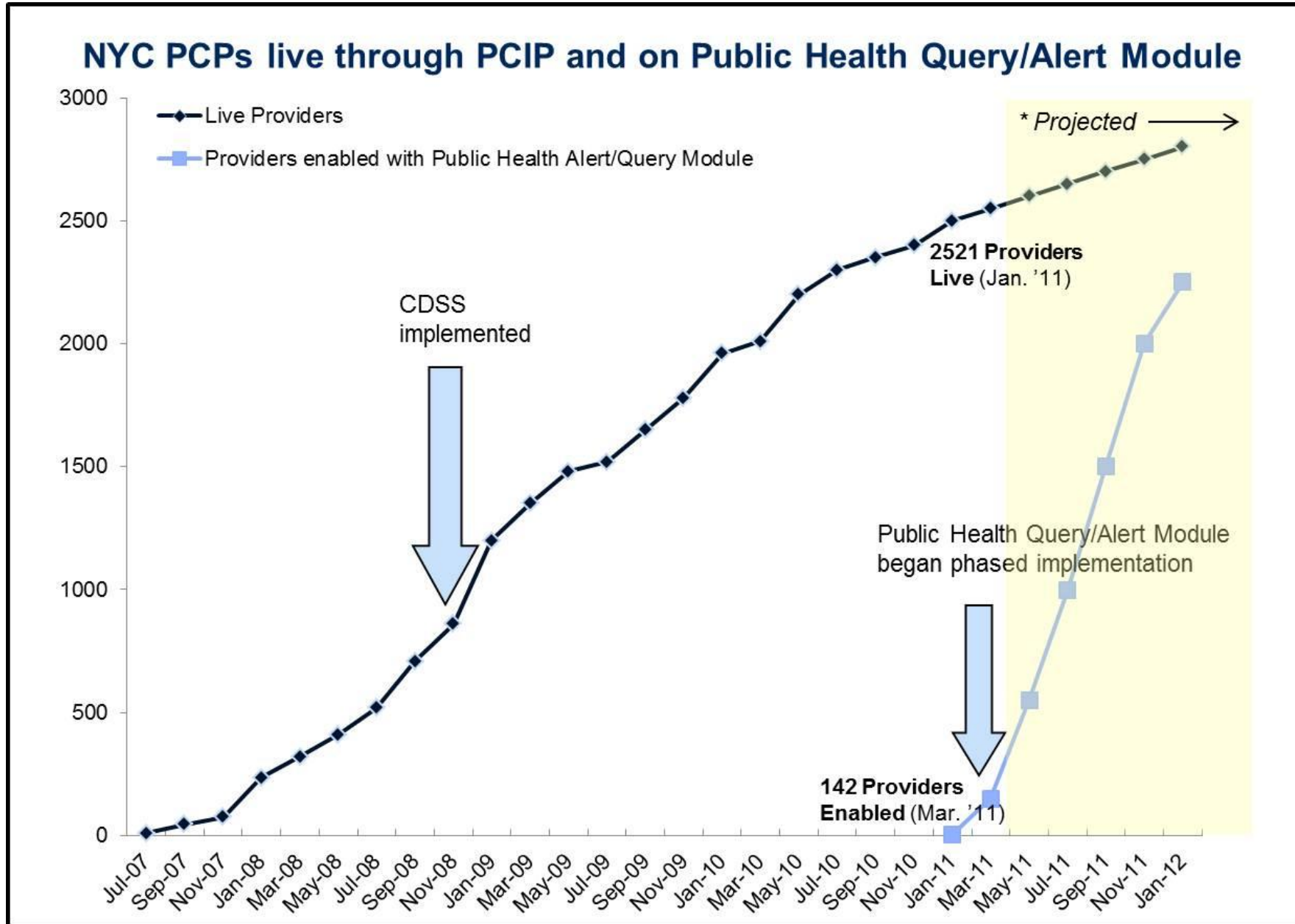
Data Element	Description
ActivePatients	Number of patients that are not inactive or deceased
BPEntered	Number of true visits where Blood Pressure was entered
CommercialInsurance	Number of true visits where the patient has a Commercial Insurance
EDIRX	Number of times the ePrescription function was used
EstPtEnc	Number of established patient visits
LabsCreated	Number of labs that were ordered for true visits
LabsResultsElec	Number of lab results that were received from the Lab Interface
LabsTransmittedElec	Number of Labs that were transmitted electronically through an Interface
Medicaid	Number of office visit encounters where Insurance indicates Medicaid
Medicaid	Number of true visits where the patient was a Medicaid patient
MedsPrescribed	Number of medications prescribed for true visits
NewPatientEncounter	Number of new patient appointments
OfficeVisit	Number of appointments for that provider in that facility where the patient was actually seen in the office. Also termed as 'true visits'
PatientsWithCPTLastMonth	Number of patients in the reporting month with at least one billable visit
PatientsWithPCG	Number of patients who have Primary Care Giver noted
PrintSummaryVisit	Number of true visits where the Visit Summary was printed
RXGenerated	Number of true visits where medications were entered
TeleEncounter	Number of Telephone Encounters that were open or addressed under the corresponding Provider and Facility names
Vaccinesless19	Number of patients that are less than 19 years old and have been given vaccines

Syndromic Measures

(Sample presented below)

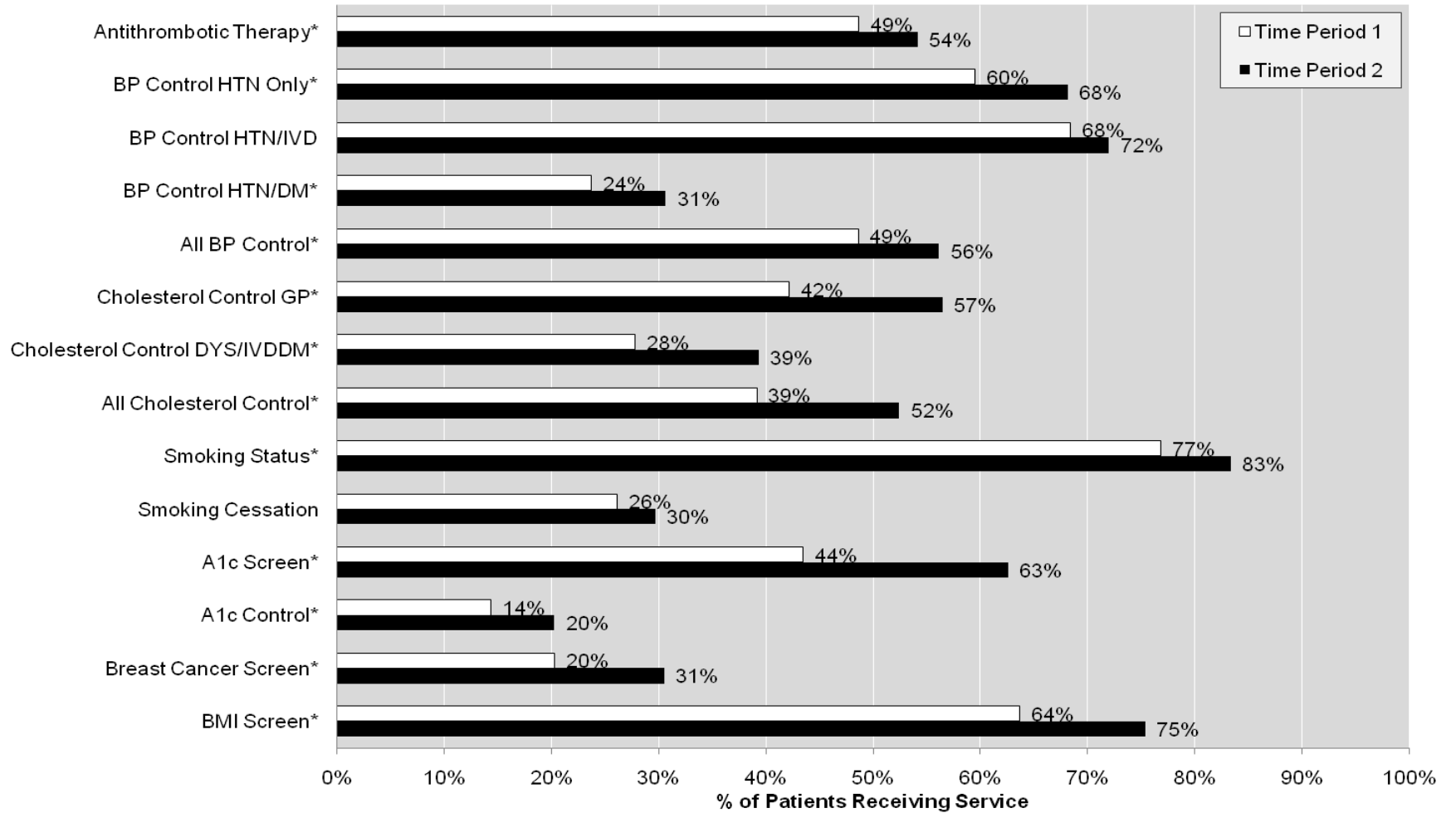
Measure Name	Description
ILI	Number of patients who had an ICD-9 code of ILI OR text string of "cough" or "flu" or "sore throat" in chief complaint) AND (measured temperature > 99.9 OR text string of "fever" in chief complaint)
GI	Number of patients who had an ICD-9 code of GI OR text string of "DIARRHEA" in chief complaint OR text string of "VOMITING" in chief complaint
Fever	Number of patients who had a measured temperature > 99.9 OR text string of "fever" in chief complaint OR ICD-9 code of 780.6
Flu_ICD9_Only	Number of patients in denominator who had ICD-9 code of Flu

Appendix D. Implementation Timeline



Appendix E. Increases in Clinical Preventive Services

(Source: Based on Manual Chart Reviews of 51 small practices, sample of over 6,000 patients)



Appendix F: Dissemination Activities

Presentations:

- SShih, Feb 9, Academy Health National Health Policy Conference "From HIT to Actionable Knowledge: Building the Research Bridge"
- DHalevy, Feb 26, Agency for Healthcare Research and Quality Advisory Meeting Primary Care Extension Program
- MBuck, WWu W, MPlagianos, NSoulakis, JSinger, Feb 28, Healthcare Information and Management Systems Society (HIMSS) Academic Forum, (oral presentation)
- AParsons, Mar 10, HIT Policy Committee Hearing - Implementation Panel Testimony
- AParsons, Apr 6, National Health Policy Forum
- TCannell, May 12, The Challenge and Promise of Electronic Medical Records at "A Time for Change: Restructuring America's Health Care Delivery System"
- WWu, June 2, Agency for Healthcare Research and Quality Grantee Conference (poster presentation)
- CMcCullough, June 2, Agency for Healthcare Research and Quality Grantee Conference (poster presentation)
- CDuncan, June 3, C5 Summit, (oral presentation)
- CPulgarin, June 8, Council of State and Territorial Epidemiologists Conference (oral presentation)
- AParsons, Jun 9, Keynote Address: National Network of Public Health Institutes annual conference
- MSingh, June 9, HIMSS Virtual Conference & Expo (oral presentation)
- SDeLeon, Jun 27 Academy Health Annual Research Meeting (oral presentation)
- SShih, Jun 27 Academy Health Annual Research Meeting (panel presentation)
- MSmithRyan, Jun 28 Academy Health Annual Research Meeting (poster presentation)
- CDuncan, Jun 28 Academy Health Annual Research Meeting (poster presentation)
- KColon, Jul 15, State Quality Improvement Institute Massachusetts Technical Assistance Meeting
- AParsons, July 29, HIT Policy Committee, Meaningful Use Workgroup Hearing, Population Session (oral presentation)
- DStephenson, Jul 29, Patient-Centered Primary Care Collaborative (oral presentation)
- DStephenson, Aug 19, HIMSS – NYS Meeting, (oral presentation)
- NNikas, Aug 19, HIMSS – NYS Meeting (oral presentation)
- DHalevy, Aug 31, Elderplan – “Remain Competitive in a Digital Age,” (panel presentation)
- NNikas, Oct 5, NYS HEAL V/X Advisory Meeting, (oral presentation)
- AParsons, Oct 14, NYC Business Health Leaders, (panel presentation)
- AParsons, Oct 15, HIMSS-NY, (oral presentation)
- LBrosen, Oct 26, Office of National Coordinator of Health IT, Workflow Community of Practice (web presentation)
- AParsons, Oct 28, National Healthcare IT Connect Summit, (panel presentation)
- SShih, Oct 28, MultiState Collaborative for Health Systems Change: Supporting Health Care to Reduce Tobacco Use, (panel presentation)
- MBuck, CPulgarin, JSinger, Nov 4, Robert Wood Johnson Foundation, Finding Answers: Disparities Research for Change Grantee Conference, (poster presentation)
- NNikas, Nov 9, NYS HEAL V/X, RHIO Grantee Meeting, (oral presentation)
- DGottlieb, Nov 10, American Public Health Association Annual Meeting, (oral presentation)
- MBuck, WWu, Nov 16, AMIA 2010 Annual Symposia, (panel presentation)
- SShih, Nov 16, AMIA 2010 Symposia, (panel presentation)
- DHalevy, Nov 19, NYS HIMSS Student Informatics Conference, (panel presentation)
- CMcCullough, Dec 2, International Society for Disease Surveillance Annual Conference: Enhancing the Synergy between Research, Informatics, and Practice in Public Health, (oral presentation)
- SShih, Dec 7, AHRQ Grantee Meeting, (oral presentation)
- AParsons, Dec 7, NYC City Council Hearing, (testimony)

- AParsons, Dec 9, New York Health Plan Association, (oral presentation)
- AParsons, Dec 14, ONC Grantee Meeting (panel presentation)

Workgroup/Committee Participation:

- Health Information Technology Policy Committee’s Quality Measure Workgroup; led the “Population Health” sub-workgroup (J. Singer)
- National Committee for Quality Assurance: Patient Centered Medical Home Advisory Group (A. Parsons)
- Markle Foundation (A. Parsons)
- Academy Health: Health IT for Actionable Information (S. Shih)

Manuscripts:

- Plagianos M, Wu W, McCullough C, Paladini M, Lurio J, Buck M, Calman N, Soulakis N. (2011). A Comparison of Emergency Department and Ambulatory Care Syndromic Surveillance in New York City During 2009 Pandemic H1N1. *Emerging Infectious Disease*, (In Press)
- S. Amirfar, S. Anane, M. Buck, R. Cohen, S. DiLonardo, P. Maa, C. McCullough, M. Plagianos, C. Pulgarin, J. Taverna, J. Singer Study of Electronic Prescribing Rates and Barriers Identified Among Providers Using Electronic Health Records in New York City Informatics in Primary Care. *JAMIA* (Submitted)
- M. Buck, S. Anane, J. Taverna, S. Amirfar, and J. Singer. The Hub Population Health System: Distributed Ad-Hoc Queries and Alerts (In Progress)
- R. Samantaray, J. Brunner, V. Njoku, V. Raghavan, M. Kendall, and S. Shih. Promoting EHR Adoption Among Small Independent Primary Care Practices. *AJMC* (Accepted)
- S. Deleon and S. Shih. Tracking clinical preventive services among primary care providers that have adopted electronic health records. *JAMIA* (reviewed and under revision)
- S. Shih, C. McCullough, J. Wang, J. Singer, and A Parsons. Health Information Systems in Small Practices: Improving the Delivery of Clinical Preventive Services. *AJPM* (under review)