

**HIMSS Davies Public Health Award of Excellence
The Institute for Family Health**

SECTION A: PROJECT IDENTIFIERS

- 1. Name and Title of Submitter:**
Neil S. Calman, President and CEO
- 2. Public Health Organization Name:**
Institute for Family Health
- 3. Public Health Information System Name:**
Epic Systems (Verona, Wisconsin)
- 4. Address:**
16 East 16th Street
- 5. City:** New York **State:** NY **Zip Code:** 10003
- 6. Telephone:** 212.633.0800 ext.1255 **Fax:** 212.691.4610
- 7. E-mail:** ncalman@institute2000.org **Website:** www.institute2000.org
- 8. Description of community served:** The Institute for Family Health operates 15 community health centers, three school health programs, a counseling center, and eight part-time clinics that serve the homeless, providing services to minority, uninsured, and disadvantaged communities throughout the Bronx, and Manhattan in New York City, and Ulster and Dutchess counties in upstate New York. All of these practices are federally qualified health centers with New York State Article 28 or Article 31 licenses. The Institute also operates two family practice residency programs: an urban program in collaboration with Beth Israel Medical Center in Manhattan and a rural program in affiliation with Kingston Hospital in Kingston, New York. The Institute serves as the Metropolitan Regional Office of the New York State Area Health Education Center System, and engages in community-based participatory research related to racial and ethnic disparities in health outcomes with support from the Centers for Disease Control, the National Institutes of Health, and the New York State Department of Health.
- 9. Number of FTEs:** The Institute for Family Health employs an FTE staff of 615, which includes over 300 clinical staff, and 14 information systems staff. The Institute's public health initiatives were developed by three Institute clinical/administrative staff and five information systems staff, representing a total of four FTE and involve all of our New York City sites and programs.

10. Description of Public Health Program(s) directly affected by submission:

- The New York City Department of Health and Mental Hygiene (DOHMH) Syndromic Surveillance System – the integration of the Institute’s ambulatory clinical data into the system to enable early detection of disease outbreaks in its service areas.
- *Take Care New York*, DOHMH’s initiative to improve health in ten key areas which cause significant illness and death in the community but are amenable to intervention – the development and implementation of primary care clinical decision supports within the Institute’s EHR that advance this public health agenda in the ambulatory setting and allow the automated reporting of clinical performance across a broad range of ambulatory care measures.
- Public Health Disease Registries - pilot-testing the automated transfer of information to and from the citywide public health registries into an EHR-based clinical decision support system to improve therapeutic and diagnostic decision-making by ambulatory providers.
- Racial and Ethnic Health Disparities Initiative – an independent Institute effort to use the EHR to identify, examine, and eliminate disparities in health processes and outcomes.

11. Members of the Electronic Public Health Information Project:

Name	Title
Neil Calman, MD	President and CEO
Kwame Kitson, MD	VP for Quality Improvement
Joseph Lurio MD	Chief Medical Information Officer
Weston Willet	Chief Information Officer
Jonah Piascik	Senior Applications Engineer
Alison Meyers	Integration Manager
Stephnie Cargill-Skeeling	Systems Analyst
Michelle Pichardo	Program Associate

SECTION B: PROJECT DESCRIPTION

1. Description of Organization

The Institute for Family Health is a federally qualified health center (FQHC) network operating primary care practices in the Bronx, Manhattan and, recently in the Mid-Hudson Valley as well. Founded in 1983, the Institute is dedicated to developing innovative ways to provide primary health services to underserved urban populations based on the family practice model of care. The Institute operates 15 full-time practices, and eight part-time practices that provide care for the

homeless. Several additional clinical programs serve special populations, such as four Ryan White HIV/AIDS programs and two free clinics that provide comprehensive primary care to the uninsured. Of the 34,000 patients served at the Institute's New York City sites, 75% are Black or Hispanic; 15% are uninsured; 40% receive Medicaid; 80% are below 200% of the federal poverty level; and 25% are estimated to require services in a language other than English. In 2006, over 1,000 patients served were homeless and more than 600 had HIV/AIDS. Patients served by these centers suffer disproportionately from an array of health problems prevalent in low income urban areas, including high rates of asthma, diabetes, hypertension, obesity, depression, mental illness, and substance abuse.

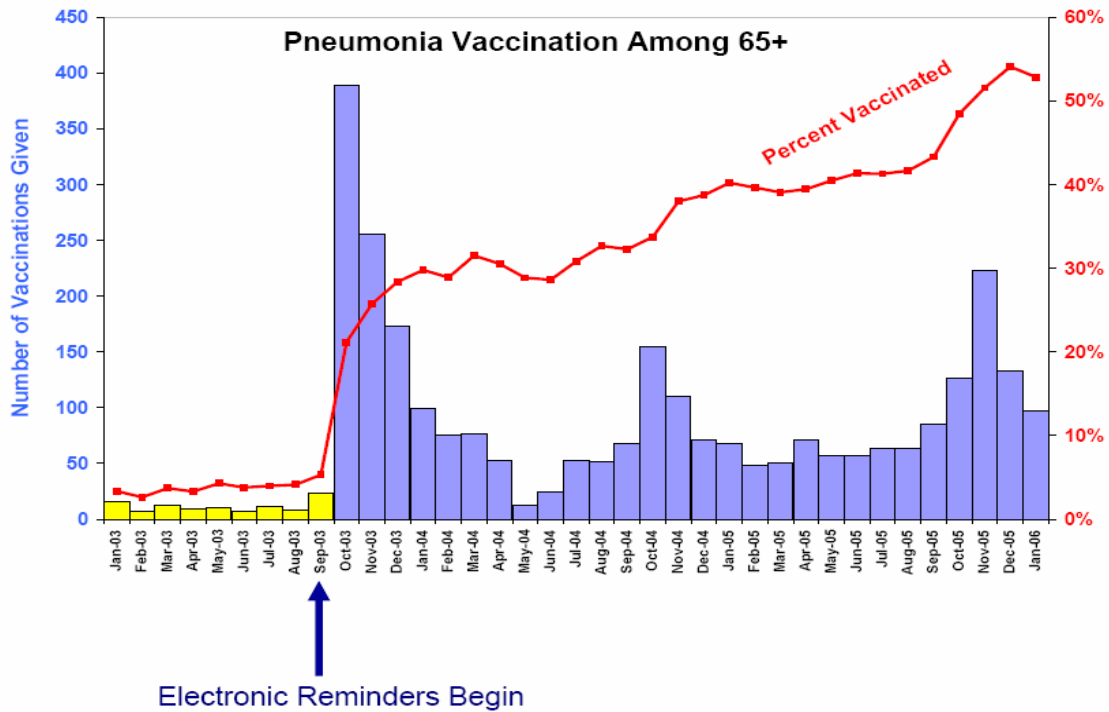
In 2002, the Institute became one of the first community health center networks in the nation to implement a fully-integrated electronic medical record and practice management system, Epic Systems (Verona, Wisconsin), throughout its network of ambulatory clinical sites. The Epic EHR has allowed the Institute to enhance its system of services and significantly improve patient care through tracking systems, best practice alerts, and printable "visit summaries."

The motivation to develop this system was due, in part, to work developed by Bronx Health REACH, a CDC-funded project for which the Institute's Dr. Calman serves as principal investigator. Bronx Health REACH involves more than 40 diverse organizations committed to eliminating racial disparities in diabetes and cardiovascular disease. Through its preliminary research and the implementation of a community action plan, the Coalition has identified and highlighted vulnerabilities to disparate care faced by people of color, and the importance of consistent, preventive care. The Institute's leadership recognized that, when placed in the service of underserved communities, EHRs offer tremendous potential to improve health outcomes and to aid in the reduction of racially and ethnically based disparities.

The EHR system has enhanced the quality of patient care provided at the Institute's sites, demonstrably increasing compliance with preventive care guidelines. Much of this improvement is due to the implementation of clinical decision supports, also known as "best practice alerts" or BPAs, triggered by evidence-based practice guidelines such as annual pap smears, obtaining mammograms at the recommended intervals, flu vaccines, and blood sugar testing for diabetics. Several clear examples of performance improvements in the chronic care of patients can be reported in the period following the implementation of BPAs. The implementation of a BPA alerting physicians that pneumococcal vaccination is recommended for their patients resulted in an 18-fold increase in the rate of pneumococcal vaccines, as shown below. Similarly, a BPA for at-risk diabetic patients resulted in a 55% increase in the rates of referrals for ophthalmology appointments. The Institute's success in implementing clinical decision supports and using EHR data to improve quality have laid the groundwork for creating a premier laboratory for testing broader public health initiatives to improve community health through primary care interventions.

The Institute has devoted significant resources and time in workflow redesign to advance communitywide health improvements through its collaborative efforts with the New York City Department of Health and Mental Hygiene, one of the world's largest public health agencies. With approximately 6,000 employees and an annual budget of more than \$1.5 billion, the Department's programs encompass areas of disease control, environmental health, epidemiology,

health care access and improvement, health promotion and disease prevention, and mental hygiene, serving the more than 8 million New York City residents as well as more than 3 million others who work or visit the City each day.



2. Project Objectives

The Institute’s goal in establishing an EHR system was not only to improve the quality of patient care at its own practices, but to improve the health of the communities it serves. Federally qualified health centers have an important role to play in, and an obligation to advance, the harnessing of information technology for coordinated, communitywide efforts to improve health. The Institute has partnered in three initiatives spearheaded by DOHMH to use EHR data interchange to improve the quality of on-site care and to advance broader public health goals. A fourth initiative is targeted at addressing racial and ethnic disparities in health.

Syndromic Surveillance System. The Institute is one of the first ambulatory care networks to integrate clinical EHR data with a syndromic surveillance system. DOHMH’s syndromic surveillance system, established in 2002, monitors emergency department visits to detect disease outbreaks early. Routinely collected chief complaint information is transmitted electronically to the health department daily, where it is analyzed for temporal and spatial aberrations. Respiratory illness, fever, diarrhea, and vomiting are the key syndromes analyzed. Statistically significant aberrations are investigated to determine their public health importance. However, most bioterrorism agents and infectious disease epidemics of concern have a non-specific *prodrome* – a period when mild symptoms occur before the time when patients with more serious symptoms appear in ERs and hospitals. Detection of patients during this prodrome would provide health departments with an early warning that may enable them to identify

individuals who have been exposed and institute control measures to limit morbidity and mortality.

To enable this type of detection, the Institute has linked ambulatory EHR data from its practice sites to DOHMH's syndromic surveillance system. The Institute implemented the Public Health Information Networking Messaging System (PHIN-MS) – a secure encrypted data transfer mechanism by which daily data abstracts are transmitted to the health department. Every night, data on roughly 600 patient visits are downloaded to DOHMH. The data are compared to data from prior periods in previous years, and geospatially analyzed to detect any “outbreaks” of new symptoms or diseases. Early identification of illness in our practices can help the entire community.

Public Health Priorities – *Take Care New York*

The greatest challenges facing public health and primary care providers today include chronic disease “epidemics” such as diabetes, heart disease, and HIV, for which traditional public health approaches may have reached their limits of effectiveness and delivery of high-quality, evidence-based care is sporadic. Computerized clinical decision supports within an EHR system can improve providers' adherence to practice guidelines to address these conditions. Through the collaboration with DOHMH, the Institute has developed and implemented a model clinical decision support system at its practice sites that is organized around New York City's public health priorities outlined in the *Take Care New York (TCNY)* initiative.

Launched in March 2004, *TCNY* set an ambitious agenda to prioritize coordinated actions that can help New York City improve health in ten key areas, each of which causes significant illness and death but is amenable to intervention. DOHMH has estimated the health care burden and amenability to intervention, and established population-level targets for each of these priority intervention areas. The ten *TCNY* goals for patients are:

1. Have a regular doctor or other health care provider.
2. Be tobacco-free.
3. Keep your heart healthy
4. Know your HIV status.
5. Get help for depression.
6. Live free of alcohol and drugs.
7. Get checked for cancer.
8. Get the immunizations that you need.
9. Make your home safe and healthy
10. Have a healthy baby.

The Institute's *TCNY* project is the development of a model EHR-based clinical decision support system, built around public health priorities, that produces, transfers, and applies locally relevant knowledge, applicable to both the target population and the New York City community.

Through the development of this model, the identification of functional requirements for such a system, and an evaluation of its effectiveness, both the personal health care and public health benefit of such a system, can be established.

Public Health Registries. The potential for EHRs to improve health is linked to the exchange of timely and accurate health information. With its ability to acquire, store, and deliver data to

multiple users, the EHR is a promising informatics tool for both primary care and public health interventions. As part of this series of initiatives, the Institute and DOHMH are pilot-testing the automated transfer of information to and from the citywide public health registries (e.g., immunization, lead registry) and epidemiologic data (e.g. antibiotic resistance patterns, illness trends) into an EHR-based clinical decision support system to improve therapeutic and diagnostic decision-making by ambulatory providers. The bidirectional transfer of information through an electronic interface has many challenges and we expect to have this fully functional by Spring of 2008.

Racial and Ethnic Disparities in Health. While quality improvement efforts in health care have led to substantial improvement in health across racial and ethnic groups, these improvements have not succeeded in closing the gap in health outcomes between certain minority populations and those of white America. Racial and ethnic disparities in health have been widely documented in our community and across the country. While minority communities have typically been the last to benefit from advances in medical technology, EHRs hold much potential for improving health care in these communities.

The Institute has launched an independent initiative, based on its organizational experience and interest in eliminating racial and ethnic disparities in health outcomes. The goal of this initiative is to demonstrate the use of an EHR system to identify disparities in health processes and outcomes among its own patients, to explore the root of these disparities, and to implement interventions to address them. This initiative grew out of earlier work to identify the community's perspective on health disparities, and findings that included widespread distrust and fear of the health care system, feeling undervalued and disrespected, difficulty communicating with doctors, concerns about the competency of community doctors, and the importance of self-advocacy.¹ The Institute's EHR implementation and workflow redesign was conducted with these findings in mind, resulting in features such as flat panel monitors that enable patients to view the EHR screen, and printed visit summaries that highlight key information for patients.²

The Institute is furthering this agenda by exploring specific care processes that may contribute to health disparities. We will identify the specific elements in care among practice sites and practitioners that contribute to the highest quality of care and optimal health outcomes for patients at the Institute's health centers, and to determine whether these elements can be replicated at additional practice sites to improve patient outcomes. The Institute's initial efforts in this area focus on disparities among patients with diabetes, one of the most prevalent conditions affecting our patients and the communities we serve.

¹ Kaplan SA, Calman NS, Golub M, Davis JH, Ruddock C, Billings J. Racial and ethnic disparities in health: a view from the South Bronx. *Journal of Health Care for the Poor and Underserved*. 2006 Feb;17(1):116-27.

² Calman, NS, Golub M, Kitson K, Ruddock C. Electronic Health Records: The Use of Technology to Eliminate Racial Disparities in Health Outcomes. In: *Medical Informatics: An Executive Primer*. Health Information and Management Systems Society, Chicago, IL. Kenneth Ong, MD, Editor. January 2007.

3. Project Organization

Roles and Responsibilities

The components of the first three initiatives are managed by project teams at the Institute and the DOHMH. Project managers for each organization have created a shared vision for the project, while Institute quality improvement and information technology staff has undertaken specific tasks around EHR programming and report development. DOHMH has provided continuous guidance to the Institute throughout the project. The health disparities project is led by an Institute project team, with assistance from New York University's Center for Health and Public Service Research and a project advisory board which is comprised of experts in quality improvement, health disparities, diabetes, and information technology.

Program Component	Institute Role	DOHMH Role
Integrate ambulatory EHR data with the DOHMH's syndromic surveillance system	<ul style="list-style-type: none"> ● Purchase, install, and program software necessary to provide DOHMH with outpatient syndromic surveillance data, via PHIN-MS. ● Program EHR system to respond to community-wide illness trends identified through DOHMH's surveillance system. ● Respond to syndrome detection and document response. 	<ul style="list-style-type: none"> ● Integrate IUFH data into system algorithms. ● Contact IUFH if syndrome is identified
Implement a model clinical decision support system in the Institute's practice sites that is organized around New York City's <i>Take Care New York</i> public health priorities	<ul style="list-style-type: none"> ● Jointly identify health indicators and create workflow changes related to 10 <i>TCNY</i> objectives that can be reported by an EHR system. ● Develop systems that can use the Institute's data warehouse to generate reports on each indicator. ● Generate baseline scores for indicators that can be used to measure effectiveness of clinical decision support tools ● Implement at least two clinical decision support tools for each <i>TCNY</i> objective and evaluate their success 	<ul style="list-style-type: none"> ● Jointly identify health indicators and create workflow changes related to 10 <i>TCNY</i> objectives that can be reported by an EHR system. ● Provide public health standard measures for all indicators. ● Provide feedback on findings related reports based on fully implemented clinical decision supports ● Provide epidemiologic data to guide the development of decision supports
Integrate EHR data with public health registries	<ul style="list-style-type: none"> ● Implement and evaluate secure, standards-based methods for real-time public health data exchange between an EHR and DOHMH's 	<ul style="list-style-type: none"> ● Integrate IUFH data into registries. ● Provide ongoing live registry updates through the

	citywide immunization and lead registries	EHR
Use EHR system to reduce racial and ethnic disparities in health.	<ul style="list-style-type: none"> ● Collect and maintain data on race and ethnicity of IUFH patients. ● Analyze EHR data to identify disparities in health processes and outcomes. ● Identify and implement interventions. ● Disseminate findings related to this initiative. 	<ul style="list-style-type: none"> ● Partners for this initiative include New York University's Center for Health and Public Service Research and The Commonwealth Fund.

Project Timeline

DOHMH Collaborative Projects. The Institute's collaborative projects with DOHMH were initiated in May 2004, and included planning and pre-implementation of activities. The syndromic surveillance bilateral communication system, the first project to be realized, was selected and programmed over the next three quarters. This system continues to operate successfully with minor maintenance as needed.

Phase I of the TCNY clinical decision support system began in September of 2004. The development of each clinical decision support tool has involved several steps, including planning, development of unique specifications, assessment, system level programming, tool production, pilot testing, and full implementation. By June 2007, twenty decision support tools were fully implemented.

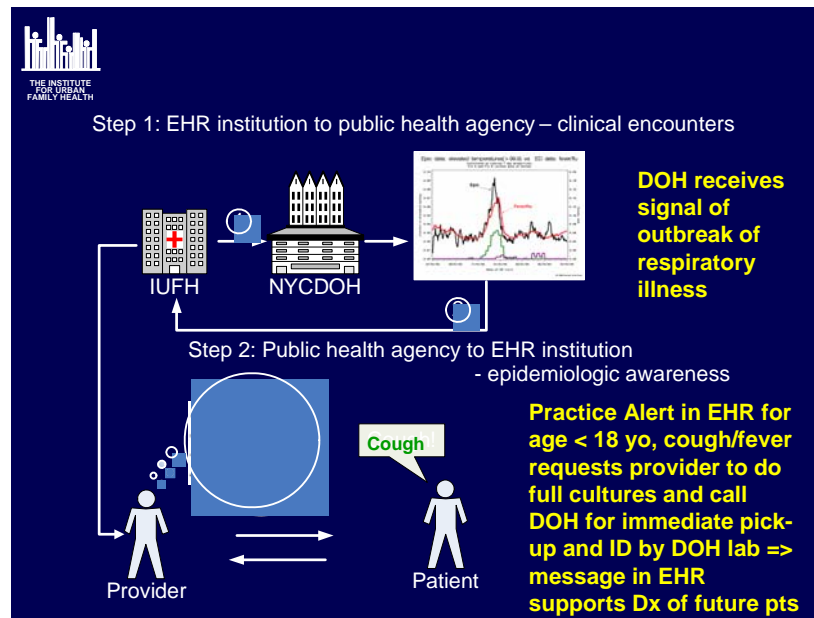
The EHR disease registry integration planning was initiated in May of 2006. As a first step, the Institute purchased an immunization interface license in HL7 format from Epic and installed it into the system environment. An interface engine was then configured by the Institute programmer. Most recently, the Institute extracted historical immunization batch data that has been sent to the DOHMH, and the batch upload process is now being tested. The next step for the registry will be the completion of the DOHMH's building of the HL7 interface.

Racial and Ethnic Health Disparities: The Institute began electronic collection of patient race and ethnicity data when the EHR was implemented in the fall of 2002. In 2005, the Institute began to run a variety of reports on patient outcomes by race and ethnicity that indicated the existence of disparities. In June 2006, we secured funding from the Commonwealth Fund to systematically study clinical factors that may contribute to disparities. Data analyses are concluding, and the implementation of a clinical intervention will be conducted in fall of 2007.

4. Project Implementation

System Use and Scope

Syndromic Surveillance System: The syndromic surveillance system involves continuous analysis of data abstracts provided by the Institute to DOHMH. While invisible to the clinical providers, the data integration allows for the identification of disease outbreaks which are communicated to Institute clinical leadership by staff at DOHMH. The information is then communicated to providers through EHR alerts or other means, depending on the information to be conveyed. The Institute documents its response to the DOHMH notification and provides this to the appropriate DOHMH staff.



EHR-based clinical decision support system: The Institute’s EHR-based clinical decision support is a knowledge management system that assists clinicians in problem solving (e.g. diagnosis) and decision making (e.g. treatment planning) in health care settings. Through this initiative, clinical decision supports have been built around New York City’s *Take Care New York* initiative to address ten specific health objectives. The Institute’s efforts focus on preventive care decision supports which can be accessed and used at the point of care by a clinician interfacing with the EHR. These supports are largely in the form of automated clinical reminders or “best-practice alerts” (BPAs) which can provide patient-specific advice at the time of a patient encounter. The most recently implemented BPA is based on the *TCNY* priority “be tobacco free.”

The EHR-based clinical decision support system is used by the Institute’s clinical services staff, including all providers, nurses, residents and the quality improvement and practice management teams. There are several levels of utilization within each clinical department which are defined by the role of the staff member. Members of the practice management team have the greatest involvement in the development and implementation of the clinical decision support system. All

other members are end users of the system and have an interactive relationship with the system. The Institute provides quarterly reports on the use of *TCNY*-related clinical decision supports to DOHMH, which, in turn, provides feedback to the Institute.

Public Health Registries: The Institute is the beta testing site for the initiative to link clinical EHR data with DOHMH's citywide immunization and lead registries, having provided historical batch data for this purpose. The linkage between the two organizations allows for continuous updates to the City's registries, enabling DOHMH to maintain current data in the registry. It also allows the Institute's providers to make online submissions to the registries directly from the patient's EHR, eliminating the need for separate documentation and submission of required registry data.

Racial and Ethnic Health Disparities Initiative: This effort is managed by the Institute's Continuous Quality Improvement (CQI) staff, which reviews data system-wide to identify health disparities and best practices, and communicates them to Institute providers. As best practices for reducing racial and ethnic health disparities are identified, they will be integrated into the EHR's clinical decision support system. End users of the system will be prompted to follow the recommended guidelines. The impact of alerts and other practices resulting from this effort are monitored by the CQI staff.

Integration Level: The integration with the syndromic surveillance system required specific programming of the EHR to enable its communication with the Public Health Information Network Messaging System, developed by the CDC for local, State, and Federal organizations to rapidly and securely send sensitive health information over the Internet. The Institute's EHR successfully sends the following information on a daily basis to the DOHMH:

- Diagnosis data using ICDM Codes;
- Procedure data using CPT Codes; and
- Reason for visit data which includes a uniquely designed pick list generated by the Institute.

The EHR immunization registry integration is the process of completing a batch load using the DOHMH's web file repository upload software to be transferred into the Universal Provider Interface format.

Privacy Protection: All data provided for the syndromic surveillance system, EHR-based clinical decision support system, and the city-wide immunization registry are de-identified. The de-identification process includes stripping all identifying information from the feed. An automatically generated internal database identifier is used to link all necessary health information, which is passed through a secure encrypted data transfer mechanism to the DOHMH.

The Institute maintains the privacy and security of data entered into the Epic system through a series of system features, such as password protection, strict control of access to system modules based on users' assigned roles, further restrictions for records containing sensitive information, such as employees who are patients, "break the glass" features requiring justification for record access, and an audit trail tracking user access to records. System access from remote locations is secured through a private frame relay network. There is an industry standard (Watchguard)

firewall in place to prevent access to the Institute's network from external sources. Access from external locations, such as providers accessing the system from home, is done via encrypted Virtual Private Network connections.

System Implementation:

Syndromic surveillance system: The implementation of the EHR data into the syndromic surveillance system required the Institute team to develop specifically programmed data extracts to run de-identified encounter information from Epic to be sent daily to the DOHMH via the PHIN-MS software provided by the CDC. Once the data is obtained by the DOHMH team, various analyses are completed to detect significant changes. If significant changes are found, the Institute team is alerted and given a detailed description of the findings

EHR-based clinical decision support system: The development of each clinical decision support required needs analysis and design, logic/tool building, validating, implementation, training, and go live production. In addition there are several post-implementation activities that require ongoing support and maintenance, including data analysis and function evaluation. In order to remain current with all public health standards and policies, the Institute, with guidance and support from the DOHMH, reassessed all clinical decision supports and re-programmed necessary adjustments to the developed software lifecycle and performed many rounds of fine-tuning.

The diagram below displays the process the EHR uses to generate and complete a single clinical decision support, in this case, for tobacco use. Starting with the patient visit, the system then completes a series of algorithms to determine whether or not to trigger an alert to the provider based on a diagnoses, health maintenance topics, sex, or age. The alert received by the provider will prompt him/her to review medications, order procedures, and click a link to obtain current guidelines or other patient education material. In the tobacco use example, patients can be linked directly to a separate New York State health initiative, the New York State Quitline, to obtain assistance and support to stop smoking,

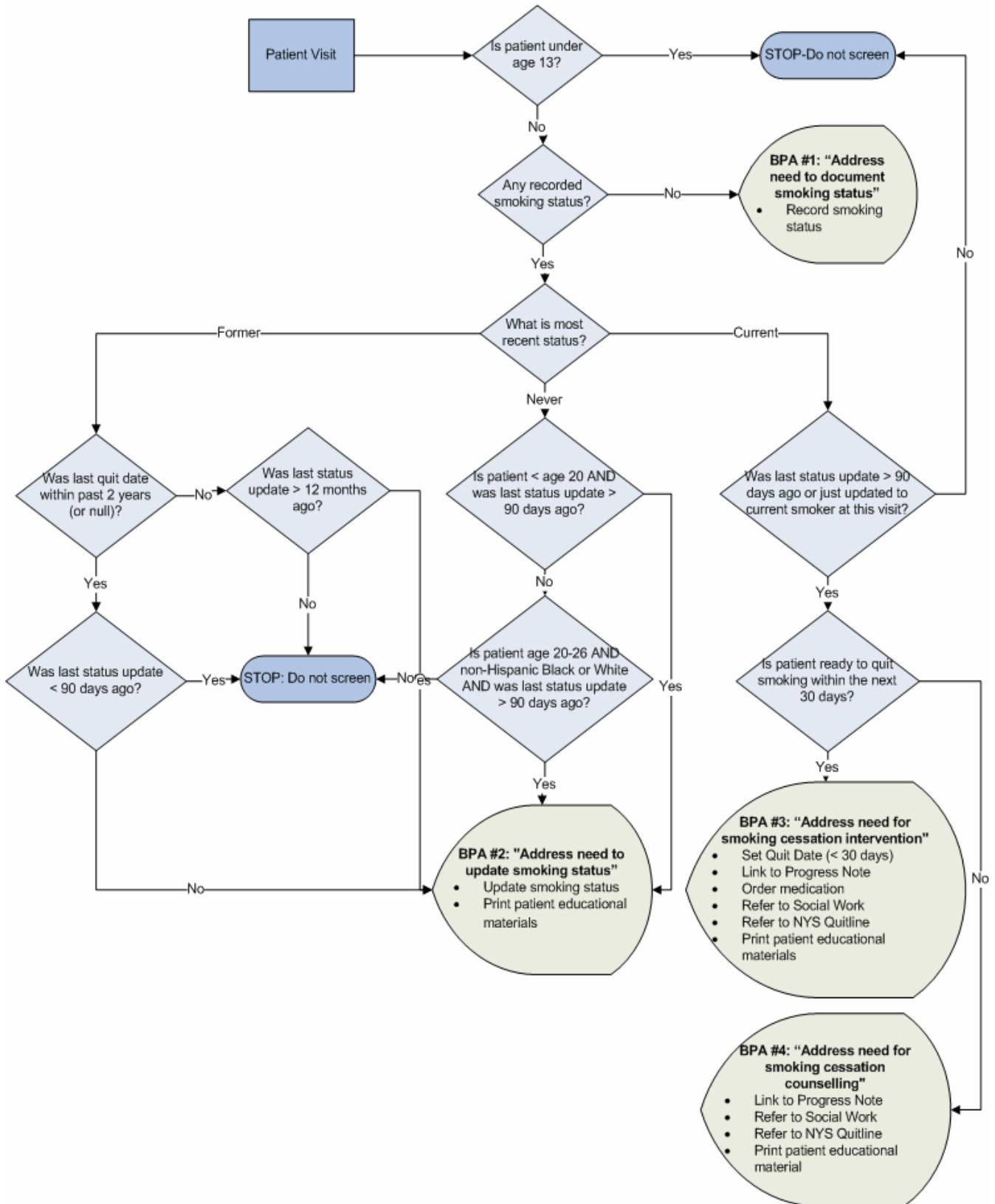
The decision support system has allowed the Institute to enhance data collection by providing a more defined level of data extraction and analysis, and provided enhanced ability to disseminate important health information quickly and effectively. Since all activities of the decision support system are built into the EHR, all data is recorded and accessible.

Public Health Registries: In order to create the real-time exchange of public health data through the Citywide Immunization Registry, the Institute purchased and programmed an immunization interface license with Epic in HL7 format allowing the exchange of outgoing immunization information to be received by the registry. This initiative is currently being implemented and is in the technical testing stage.

Racial and Ethnic Health Disparities Initiative: Together with a project advisory committee, the Institute is establishing measures of optimal health outcomes for diabetic patients and identifying areas of potential intervention that are likely to be sources of variation in diabetes outcomes, and that are actionable in the context of our healthcare system. We are conducting case-control analyses of our data in order to identify areas in which well-controlled and poorly-controlled

diabetes patients differ in their interactions with our healthcare system, and analyzing the extent to which these differences correlate with race.

Tobacco Control TCNY CDSS Logic Model



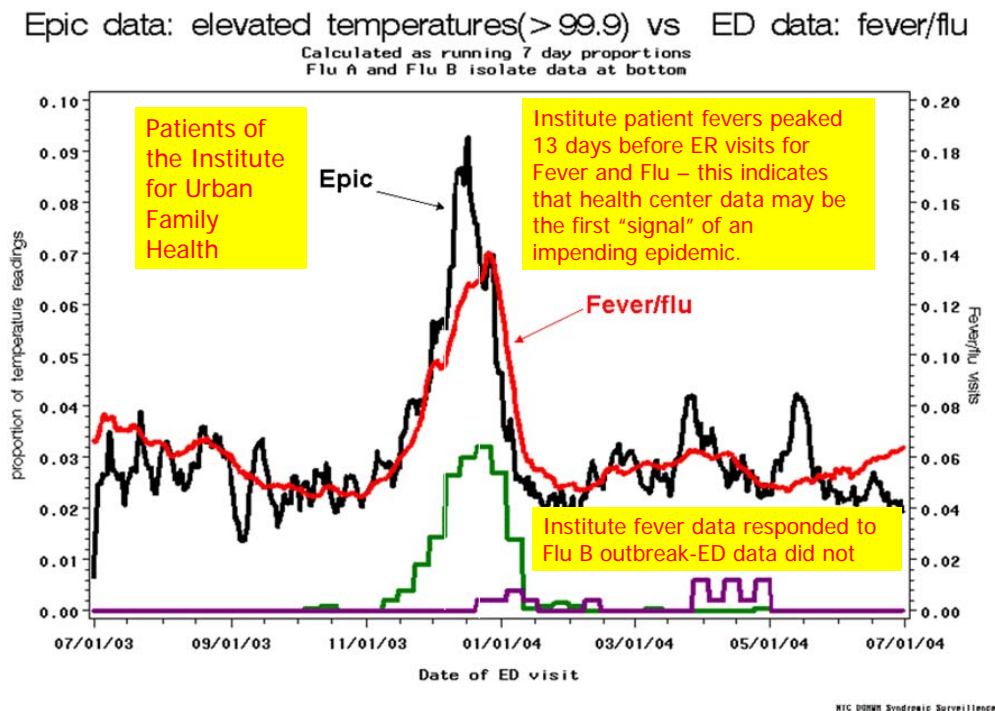
Upon identification of clinical practices or provider or patient differences that mediate the relationship between race and diabetes outcomes, the Institute and advisory board will select best practices to be replicated. Implementation of the best practices involves EHR programming, staff training, and data monitoring and analyses to ensure appropriate application of the intervention and to measure its impact.

5. Value of the Initiative

Success in Meeting Objectives

The initiatives described aim to achieve ongoing, effective communication of timely health information between a primary care ambulatory network and a public health department. Each initiative is designed to systematically provide health information at the point of care in order to improve the health of the community. Several enhancements have been achieved.

The Syndromic surveillance system integration provides the Institute and DOHMH with the ability to identify and act on new diseases and problems in our communities during a period when mild symptoms occur and before the time when patients with more serious symptoms appear in ERs and hospitals. Working with DOHMH, the Institute analyzed the EHR data to determine what clinical factors could predict both the rise and peak of a potential epidemic before it had surfaced in emergency room data. Ultimately, it was determined that gauging measured temperature $>100^{\circ}$ could enable us to predict the peak flu epidemic almost 10 days before the ER data, and days more before isolates were available to confirm the diagnosis. For example, during the period of March to May 2004, an outbreak of Flu B circulating in NYC was identified in the Institute's EHR temperature data days earlier than in the ER data, indicating how community health centers are sentinels which, with the appropriate technology, can aid in detecting and reporting, and ultimately, preventing the spread of new diseases and problems in our communities.



In the summer of 2007, the Institute engaged in two separate cases where epidemiologic alerts were transmitted from the health department. Decision supports were built into the Institute's EHR and were linked to documentation and order sets to enable providers to rapidly consider the new information provided by the department.

In the first case, a snack product called Veggie-Booty caused national concern when packages were found to be contaminated with Salmonella and a number of clinical cases were confirmed. As soon as this bulletin was received by the Institute, an alert was introduced into the system that was triggered by a chief complaint of diarrhea. This alert prompted the provider to ask about possible consumption of Veggie-Booty, and recommended appropriate diagnostic and therapeutic interventions if the history was confirmed.

A month or so later, there was an outbreak of Legionella pneumonia in the Parkchester area of the Bronx. An alert was introduced only for patients in our Parkchester center which prompted action by the provider in the event a patient in that area presented with respiratory symptoms. Thus the rapid integration of health department information into alerts at the point of care was accomplished successfully. We are now looking at generating reports as to the number of times these alerts were triggered and the actions taken by our providers.

The EHR-based clinical decision support system built around public health priorities has improved adherence to clinical guidelines among Institute providers, including depression and cancer screening. This effort has resulted in the development of a model decision support system, which includes over 40 expert-reviewed clinical measures and provides a foundation for implementing EHR-based, public health-oriented, quality improvement tools throughout New York City. Having recently acquired its own EHR licenses, the DOHMH plans to roll out the model decision support system developed with the Institute at public health clinics and other ambulatory settings across the City. This expansion will enable DOHMH to enhance its ability to measure progress on its TCNY objectives, and, with the introduction of related clinical decision supports, to enhance its progress.

The creation of linkages between ambulatory care providers and public health registries creates value in several ways. Health care providers experience greater efficiencies in documenting and submitting reportable data, leading to improved reporting and more complete public health data. Two-way integration with EHRs, once fully operational, will enable authorized providers to access immunization and lead test histories from the registry and can be linked to clinical decision supports. The outcome of this endeavor will allow the Institute and the DOHMH to generate registry information updates and evaluation regularly and with limited errors.

By building best practices for addressing racial and ethnic health disparities into its EHR, the Institute is able to implement quality improvement efforts that have an impact not just on overall health care quality, but have the potential to break through the "parallel improvements" to truly reduce gaps in disparate health outcomes. This model can be replicated by other FQHC and health care providers to address health disparities in their communities.

Costs and Benefits Offsetting Costs

The Institute’s work on the initiatives implemented in collaboration with DOHMH has been supported with grant funds provided through DOHMH’s Primary Care Information Project. The racial and ethnic health disparities initiative is supported by the Commonwealth Fund and builds on years of support by the CDC for this work. Additional staff costs have been covered by the Institute, as addressing community needs is an integral part of its mission.

Because the value of an EHR system is driven by its functionality, these initiatives increase the value of our system by enhancing its ability to serve as a tool for improving the health care we deliver to the community, particularly with regard to chronic care, preventive care, and the elimination of health disparities. Once the models have been developed and implemented for incorporating public health data and health priorities, and for addressing health disparities, they can be modified to address changing needs. These models are replicable applications that can be translated across EHR products and across communities.

Is there a return on our investment in the EPIC EHR and the public health functionality we have built into it ?

Improved Provider Productivity?	Probably – depending on decision supports keeps providers from reviewing flow charts for all chronic diseases. If no alerts appear, all required health maintenance and secondary preventive procedures are done and up to date.
Improved Efficiency of Support Staff ?	Yes, improved messaging, faster communication
Reduction in Support Staff ?	NO – Increase in staff needed to follow-up on new information on patient panels
Improved Outcomes for Patients in Pay-for-performance Plans ?	Yes – proven interventions work to improve compliance with preventive measures–
Improved staff retention?	Unknown at present – needs to be studied
Improved patient satisfaction?	Definitely
Increased physician work in patient follow-up and outreach	Definitely and this is a negative return – more information means more follow-up
Need for new staff for software, hardware, network support	Yes
Need to develop outreach staff for report follow-ups	Yes – and staff needs to be bilingual in our population. These are new job functions

What did the system cost?

In an implementation like this it is almost impossible to identify the costs in a way that would be meaningful for those who would want to engage in such an effort. The actual costs of purchasing the software from EPIC, configuring it and developing its functionality in our health center network is approximately \$50,000 per provider. The ongoing costs run approximately \$9 per patient visit but about half of that amount is development work that is supported by research and HIT implementation funding in our system.

Beyond the finance however, lies the most important aspect of these projects. They demonstrate the important role that community health care providers can play, both as leaders and participants, in health information technology projects aimed at improving community health.

Due to the important roles that patients play on both the Institute's Board of Directors and Project Advisory Committees, the Institute ensures that its patients are represented in the development and assessment of HIT systems and standards. We believe that participation by those at all levels of the health care system is required for an optimal, truly integrated health information system to become a reality.

Dissemination of Knowledge

Institute leadership, most notably Neil Calman, MD, President and CEO, participates actively in local, state, and national forums on the adoption and assessment of electronic health records. Dr. Calman serves on the Executive Committee of New York City's Primary Care Health Information Consortium, a group formed by the NYC DOHMH, the Primary Care Development Corporation, the Community Health Care Association of New York State, and more than 30 community health centers. In addition, Dr. Neil Calman serves on the New York State e-Health Consortium, a statewide group that examines policy regarding the use of HIT. On the national level, Dr. Calman participates on the National Quality Forum Ambulatory Care Measures Disparities Subcommittee.

Dr. Calman has presented the Institute's work on using electronic health records to improve public health and reduce health disparities to the National Association of Community Health Centers, the Agency for Healthcare Research and Quality, and the Health Resources and Services Administration. In March he will present this work to the Congressional Black and Latino Caucus on behalf of the Healthcare Information and Management Systems Society, which awarded him its Physician's Information Technology Leadership Award in 2006.

Finally, the New York City Department of Health and Mental Hygiene, in partnership with the Institute and Columbia University's Department of Biomedical Informatics, has received designation as a National Center of Excellence in Public Health Informatics, and Dr. Calman serves as the principal investigator of one of the Center's two major initiatives.

The Institute is committed to the use of health information technology to improve the health of our patients, the communities we serve, and the public, and to insuring that the advances in health care made possible by HIT benefit all members of the community – especially those living in low income, minority, and underserved communities. We are further committed to making the lessons we learn widely available through presentations and publications and ongoing collaborations with our colleagues.