# ASTHO Million Hearts State Learning Collaborative: Using Health Information Exchange (HIE) Data to Evaluate Hypertension in Albany County, New York

**Feng Qian, et al**

## Abstract

**Objective:** To evaluate whether health information available through a health information exchange (HIE) can be used for community health planning, public health surveillance, and to support population health initiatives aimed at improving the identification and control of hypertension for a county-wide area.

**Methods:** Health records for patients residing in Albany County (2013) were aggregated and extracted from the Hixny HIE and loaded into an informatics platform for data management and analysis. Three population level hypertension measures (diagnosed hypertension, hypertension control, and undiagnosed hypertension) were developed and calculated for Albany County. Stratification analyses for hypertension measures were planned for patients' important demographic factors, health plan and type, and source. Practical difficulties and challenges of using information available through Hixny HIE were examined.

**Results:** We found that these three population level hypertension measures could be calculated with adaptations using the information available through Hixny HIE system for Albany County, New York. However, our estimated values were much lower than the national or state performance on these measures. There were also remarkable variations in these measures across different subgroups. Our investigation revealed multiple practical difficulties and challenges of using information through a HIE system to estimate county-wide surveillance rates. However, when the hypertension rates were calculated for 3 Federally Qualified Health Centers (FQHCs) contributing relatively reliable and attributable BP readings, we found that the hypertension control rates were closer to the national and statewide rates.

**Conclusions:** This pilot study demonstrates possibility for using HIE data to evaluate population level public health indicators more efficiently. However, the participating data sources connected to contemporary HIE systems need to improve so that they can make significant contributions to public health surveillance. In the meantime, it is worth testing whether information from relatively reliable sources can be used to support local near real-time population health improvement initiatives.

## Background

High blood pressure (HBP) or hypertension is a major risk factor for cardiovascular disease and remains a significant national public health concern. Hypertension is defined as: (1) systolic blood pressure (SBP) ≥ 140 mmHg or diastolic blood pressure (DBP) ≥ 90 mmHg or taking antihypertensive medicine, or (2) having been told at least twice by a healthcare provider that one has HBP. Currently, there are about 78 million adults with hypertension giving the prevalence rate of 29% in the United States.[1] It is projected that approximately 42% of U.S. adults will develop hypertension by 2030.[1] Furthermore, the estimated direct and indirect cost of hypertension for 2010 is $46.4 billion and the total cost of hypertension will reach $274 billion by 2030.[1] Moreover, hypertension has been consistently reported to be disproportionately present in non-Hispanic blacks and people with lower socioeconomic status. Also, literature suggests that 48% of patients with hypertension don't have their conditions under control and 6% of US adults have undiagnosed hypertension.[1]

In New York State, there are approximately 4.5 million adults with hypertension giving the prevalence rate of 32%. More importantly, New York State has the second highest mortality rate in the country from cardiovascular disease. Consistent with the national pattern, hypertension rate is higher among non-Hispanic blacks (36%) and low-income adults (36%). For the statewide hypertension control rates, they vary from 59% in blacks to 74% in Asian Americans.

As cardiovascular disease cause one in every three deaths and is the leading cause of preventable death in America for both women and men, the Million Hearts initiative was launched in January, 2012 by the federal government (led jointly by the Centers for Medicare and Medicaid Services <CMS> and the Centers for Disease Control and Prevention <CDC>) with the goal of preventing one million heart attacks and strokes by 2017.[2]

Blood pressure control was one of the four focused tasks of the Million Hearts initiative. Currently, 14 million Americans are unaware of that they have hypertension, 6

million are aware but not treated, and 17 million are treated but do not have their hypertension control.[3] The Million Hearts clinical quality measures on blood pressure control have been endorsed by the National Quality Forum (NQF): controlling hypertension is measured by the percentage of patients aged 18 through 85 years who had a diagnosis of hypertension in the first six months of the measurement period and whose blood pressure was adequately controlled (<140/90 mmHg) during the measurement year (NQF 0018/<Physician Quality Reporting System <PQRS> 236).[3] One of the Million Hearts goals is to achieve ≥ 70% control among adults with diagnosed hypertension by 2017.[4] It is projected that when Million Hearts achieve its goals, 10 million more patients with hypertension will have it under control. However, a recent study reveals that in the first year of Million Hearts initiative (2012), only 64% of insured people had their blood pressure under control suggesting that further work is needed to effectively identify and monitor patients with hypertension.[4]

The Million Hearts initiative has received strong support from many public and private sector organizations. One of them is the Association of State and Territorial Health Officials (ASTHO), a national association representing public health agencies in the United States. ASTHO has been supporting state and local health agencies in integrating efforts to better identify patients with hypertension and to improve blood pressure control. In particular, ASTHO encourage the use of aggregated data to improve population health outcomes by providing actionable information to providers and communities. Moreover, ASTHO is committed to promote health information technology to identify undiagnosed hypertension and uncontrolled hypertension.

In New York State, clinical information available through Health Information Exchange (HIE) operated by regional health information organizations (RHIOs) is considered to have great potential in estimating real-time population health indicators for hypertension. Lack of small geographic area hypertension information and using retrospective datasets limited the local health departments to target monitoring and interventions to high-needs communities and population in a timely manner. Currently,

NYSDOH provides county-level prevalence rate of hypertension every 5 years based on patients' self-reported Behavioral Risk Factor Surveillance System (BRFSS) survey. Since aggregate health records contain patient's diagnosis information in the standard International Classification of Disease (ICD) format or captured in problem lists maintained in the outpatient setting, the HIE data has great potential to calculate population level diagnosed hypertension rate at any point in time. As New York State is developing a statewide health information network for NY (SHIN-NY) which will connect the 10 regional networks throughout the state, it is important to know whether and how HIE data can be used for real-time statewide hypertension surveillance and control and to support population health initiatives. In addition, HIE data might be helpful to test and validate the population level indicator for undiagnosed hypertension because there is no consensus about this measure in the real world setting.

**Introduction**

The New York State Department of Health (NYSDOH) and the Health Center Network of NY (HCNNY) have recently engaged three Federally Qualified Health Centers (FQHCs) (note: Whitney Young Health Center in Albany County is one of them; the other two are Hudson River Health Care–Beacon and Finger Lakes Community Health–Penn Yan) and their respective local health departments in a learning collaborative aiming to improve the detection and the control of hypertension. One of the proposed projects of this collaborative is to explore the feasibility and potential of using population level data from an HIE operated by Hixny, a local RHIO, to generate the county level hypertension information for Albany County in New York. The availability of population data on hypertension indicators can assist local health departments, hospitals, health care providers, health plans, FQHCs, and other partners in identifying priority patient groups, developing a community-wide plan to reduce the burden of hypertension, and connecting the priority patients with community and medical resources.

Albany County is in the east central part of New York State with population of 304,204. (see Figure 1) The intermediate goal of this project is to implement interventions to improve hypertension control at the population level in Albany County. According to 2008-2009 survey data, the age-adjusted hypertension rate among adults in Albany County was higher than the rate for NYS (31% vs. 26%). The long-term goal is to examine whether the medical information within a robust HIE can help monitor the three key measures of hypertension (i.e., prevalence of diagnosed hypertension, hypertension control rates, and prevalence of undiagnosed hypertension) more quickly and efficiently in Albany County. If this proves to be successful, the NYSDOH intends to disseminate the data analysis methods developed by Hixny to other RHIOs in New York State.

As a national leader in HIE adoption, Hixny is a RHIO that serves about 1.6 million people, a population larger than 12 states, and a region that spans the greater Capital District and Northern New York and covers more than 25% of the land mass of New York State. As a not-for-profit, Hixny connects providers, patients, and organizations with the goals of better coordinating care and reducing health care costs by offering patients and clinicians real-time electronic access to patients' comprehensive medical history for making timely and informed care decisions. Hixny serves 719 participating entities (e.g., 28 hospitals, 25 long-term care facilities, 7 home care agencies, 6 health homes, 6 behavioral health organizations, 21 radiology sites, 5 standalone imaging centers, etc). Currently, 2,108 physicians are connected through Hixny's HIE encompassing 61% of the region's providers. Each month on average, over 30,000 clinical summaries are accessed in clinical settings, more than 100,000 lab results and image reports are delivered to providers, and more than 10,000 transcribed documents and event notifications are delivered. In addition, 62% of patients in the region have consented to have their medical records shared with their providers through Hixny. In March 2013, 2% of physician practices nationwide were connected to a public HIE for query-based exchange, in NY the percentage was 10%, and Hixny had connected 62% of the practices in its service area. Put another way, 10% of the connected practices in the nation were connected to the Hixny HIE in Q1 2013. (see Figures 2A and 2B)

The objective of this initial phase of the pilot study using Hixny HIE data is threefold: first, to develop population level key hypertension measures (i.e., diagnosed hypertension rate, hypertension control rate, and undiagnosed hypertension rate) with consistent specifications and to program them using Hixny HIE data for Albany County; second, to evaluate the quality and completeness of the Hixny HIE data and to report challenges in calculating each hypertension measure; third, to explore the feasibility of conducting stratified analyses to identify high risk population or patients/communities in urgent need of services.

## Methods

### Data Source and Study Population

The medical information available through the Hixny HIE system in the calendar year of 2013 was the primary data source for this study. Most physician practices, hospitals, specialists, pharmacies and insurance companies keep patient health information in some type of secure electronic record. The HIE allows healthcare providers to share patient information. The HIE can be thought as an electronic filing system using source data from various electronic formats including Health Level 7 (HL7) messages as well as a wide variety of document types emitted by provider electronic medical record (EMR) and hospital information systems. The most common type is the continuity of care document (CCD). The HIE system aggregates data from each participating provider source to create a single, longitudinal, composite health record for each patient in the exchange upon demand by an authorized user. This consolidated health history was aggregated and extracted for all eligible patients in Albany County and imported into the analytics platform for analysis. (see Figure 3)

The following inclusion and exclusion criteria were applied to generate the final study sample and were based on the July 2010 version of the National Quality Foundation (NQF) 0018 measure for controlling High Blood Pressure. The inclusion criteria were

patients whose age was from 18 through 85 in 2013; whose residence zip code fell into the area of the Albany County (see Figure 4 and Table 1); and who were alive at the start of the measurement period. Due to the nature of collecting data from many different sources, many patients have multiple addresses. Therefore any patient whose current address (as determined by the HIE) fell within Albany County was considered eligible for the study. The exclusion criteria were patients who were pregnant; diagnosed with end-stage renal disease, or received treatment for end-stage renal disease in 2013; or who did not have at least one encounter in 2013. (see Figure 5)

**Hypertension Measures and Analysis**

Diagnosed hypertension was specified as the percentage of eligible patients who had a diagnosis of hypertension during the first six months of the study period (consistent with the NQF0018 definition for hypertension control). The operational formula for diagnosed hypertension rate was the total number of patients with ICD-9 diagnosis codes or problem lists containing hypertension (e.g., 401.0, 401.1, and 401.9) divided by the total number of eligible patients during 2013 in Albany County. (see Table 2)

Hypertension control was defined as the percentage of eligible patients who had a diagnosis of hypertension and whose most recent blood pressure was adequately controlled. In operation, the rate of hypertension control was calculated by the number of patients whose most recent blood pressure reading was under 140/90 mmHg (specifically the systolic blood pressure was below 140 mmHg and the diastolic blood pressure was below 90 mmHg) divided by the number of patients with ICD-9 diagnosis for hypertension. (see Table 3)

Undiagnosed hypertension was defined as the percentage of patients who had not been diagnosed with hypertension previously but who had two or more blood pressure readings indicating hypertension. The working formula for calculating the undiagnosed hypertension rate was to use the total number of patients who had never been

diagnosed with hypertension but with 2 or more abnormal blood pressure readings (i.e., either a systolic BP > 140 mmHg or a diastolic BP > 90 mmHg) in 2013 divided by the total number of patients who did not have ICD-9 diagnosis for hypertension. (see Table 4)

As these three hypertension measures might vary by patient's demographics (age, gender, and race), health plan and type, and source (location), we originally planned to calculate all three hypertension measures for different subgroups aiming to better identifying priority subgroups and informing actions for local health department. (see Table 5) Also, we intended to investigate whether patients' demographic and socioeconomic status information in the Hixny HIE system had been reported consistently so that our proposed stratification analysis for hypertension surveillance was feasible.

Finally, we reported our findings with respect to the data completeness and accuracy of the Hixny HIE system and other challenges in terms of using HIE data to study population level hypertension. We compared our findings with both national and statewide rates which had been reported previously. If our results were quite different from those known rates, we would like to discuss the possible reasons for our findings as this study was a pilot study to explore the value of using HIE data for public health research and surveillance, and to support population health initiatives.

**Data Extract, Transfer and Load**

Complete longitudinal patient records from the Hixny HIE system were first aggregated from each of the sources contributing data to the HIE for patients residing in Albany County during the study period. It then took seven days to extract the data. To facilitate the data extraction work, we limited the patients to the preset inclusion and exclusion criteria. The complete composite health record for each patient served as the source data for the analytics platform. It then took seven more days to import the data,

parse it into source tables in the analytics platform. During the extract and load process, the analytical cubes were built.

**Results**

There were 40,879 patients included in the final sample after applying the predefined inclusion and exclusion criteria. (see Figure 5) For diagnosed hypertension, the rate among all patients was 17.1% (6,981 as numerator and 40,879 as denominator) for those patients with a problem list entry in 2013. The hypertension control rate among all patients with a problem list entry was 31.5% (2,199 as numerator and 6,981 as denominator). For undiagnosed hypertension, the rate among all patients with a problem list entry was extremely low (i.e., 0.00%; 1 as numerator and 22,787 as denominator) (see Table 7)

Our findings of these three hypertension measures were much lower than the values for both national and statewide hypertension indicators, which prompted a more detailed investigation into the possible causes. This led to an examination of the origin of the hypertension diagnosis and blood pressure readings. In reality, practices, hospitals and facilities can send vital signs (including blood pressure readings) into the HIE in several ways. They typically enter the exchange via HL7 messaging, which is the standard protocol for exchanging information from inpatient settings, or by Continuity of Care Documents (CCDs) from outpatient physician practices. CCDs are exchanged in the HIE from participating provider practices' electronic medical record (EMR) systems and may contain a summary of the most recent patient visit or even the entire clinical summary of the patient.

An examination of the blood pressure readings' source indicated that only those readings transmitted from via CCDs in the HIE were able to be processed and attributed to an encounter by the analytics platform. Furthermore, out of all the blood pressure readings available, only a very small percentage (13%, 18,447 attributable BP readings out of a total of 141,477) were actually attributed to a particular visit/encounter number

by the source EMR system. This attribution was critical for inclusion in these measures, particularly since the analytics platform used only the aggregated data for each patient.

To ensure a self-consistent dataset, we attempted to limit the study population to those patients with outpatient visits in 2013 to providers who contributed data to the HIE via CCDs. Patients in this group had the possibility of having both a hypertension diagnosis as well as blood pressure readings in the HIE. Without this restriction, there might be patients included in the study who had a diagnosis of hypertension from an HL7 message source, but since no blood pressure readings were available from HL7 sources, this could skew the data so that control rates and hypertension prevalence were artificially low. In fact, three large outpatient facilities contributed data to Hixny via HL7 messages, so this concern was very real. In our analyses, we were using the existence of a problem list entry as a proxy for an outpatient encounter to a provider that sent CCD documents to the HIE. Because problem lists only came from CCD documents (not HL7 messages), we believed that this was a reasonable proxy to use.

For stratification analysis, we were only able to conduct subgroup analysis according to patients' residence zip code and demographics (age, gender, and race).(see Tables 8-10) However, we encountered coding issues such as lack of uniform standard and missing values to code the race variable in the system. The main reason why we were unable to run stratification analyses for patients' health plan and type was that such patient level information was not supported by the analytics platform. We were also unable to stratify patients according to their source of care mainly because the analytics platform could not assign the majority of BP readings to an encounter and therefore unable to link them to a specific facility.

One of our hypotheses was that none of the hospitals and practices exchanging information via HL7 in the Hixny HIE was submitting BP readings. Furthermore, 82% of connected practices sending CCDs did not contribute BP readings in a way that allowed them to be readily attributed to an encounter for analysis. (see Figures 6 and Table 11 ) Realizing that the current Hixny HIE data (2013) were very heterogeneous in terms of

data availability and format, we selected patients who were from 3 homogeneous FQHCs (Hudson Headwaters Health Center, Whitney Young Health Center, and Hometown Health Center) and then calculated the 3 hypertension measures for the FQHC patient population. (see Table 12) We found that the hypertension control rate using the FQHC patients were closer to the national and statewide rates.

**Discussions and Conclusions**

In this pilot study, we found that the three population level hypertension measures could be calculated with adaptations using the Hixny HIE data for Albany County, New York. However, compared with the national or state performance on these hypertension measures, our estimates for Albany County were overall much lower. Furthermore, remarkable variations in these hypertension measures across different subgroups were observed.

Our results suggest that out of 498 practices contributing records for outpatient encounters, only a very small proportion of BP readings could be assigned to a specific encounter. As the hypertension measures specified BP readings taken during encounters, this excluded the vast majority of patient population and also invalidated several proposed stratification analysis. We also found that all of the PCP practices sending usable BP readings were using either athenahealth or eClinicalWorks EHRs. Given the fact that the three FQHCs in Albany County each adopted one these EHR systems and their medical data were relatively reliable, it seems that they might be in a very advantageous position to use the Hixny HIE system to monitor population level hypertension and to leverage this information to support ground-breaking population health initiatives in a real-time manner.

More importantly, we identified several challenges and barriers in analyzing the current medical information exchanged by providers and facilities via the Hixny HIE. First and foremost, the three population level hypertension quality measures are initially designed for use by skilled health information manager or trained nursing professionals

who typically abstract data from patient's medical records manually. However, when the federal EHR incentive program offers impetus for transforming quality measurement from the traditional labor intensive medical chart review process to a modern automatic retrieval using the EHR system, only a very small proportion of the existing quality metrics can be re-engineered for eMeasurement. Even if the re-engineering is successful, the validity of using them in the context of an HIE for public health surveillance remains unknown. In addition, there is a lack of benchmark information to compare with our estimates in the present study. Secondly, analyses suggest that data from hospitals and some large practices were sent using legacy HL7 formats without BP readings, however this needs to be validated. Although the vast majority of practices have adopted CCD format in data transferring, it was often not possible to attribute the BP reading to an encounter and thus link them to a facility. Furthermore, patients' demographics information was provided from source systems using proprietary values which did not align well with standards. This led to difficulty in calculating hypertension measures and conducting stratification analysis. Last but not least, we used analytics functionality that had not yet been formally adopted by Hixny and installed in parallel to the production HIE. This necessitated extracting data from the HIE, loading it into a separate instance of the analytics platform, and performing the analyses in that environment. The time and effort involved with this additional step demonstrates the value of implementing this functionality as part of the core HIE. This strongly suggests the possibility of making population level data available in near real-time for future disease surveillance and intervention evaluation.

Although HIE has been widely perceived as useful in fostering care coordination, reducing healthcare expenditure and improving quality, evidence of using HIE on outcomes and patient experience is lacking.[5] A prior study found that HIE adoption led to better care coordination and reduce time searching for patient information.[6] However, recent studies revealed that there were technical, organizational, cultural, and legal challenges in using and accessing the HIE data.[7-11] As contemporary HIE systems in the country are at different development stages, the Hixny HIE system in our study has

been regarded as one of the most advanced HIE systems that has overcome many of these challenges to become a nationwide leader in provider adoption.

Based on our findings of quality measures and data quality using Hixny HIE to evaluate population level hypertension, we have the following recommendations for future work: (1) continue to advocate for movement toward the adoption of interoperability standards in HIE; (2) identify appropriate incentives for providers to share data in the HIE via CCD as opposed to HL7; this should become more viable with greater adoption of EHRs certified to 2014 Stage II Meaningful Use (MU) standards as practices continue to focus on MU; (3) install data semantics/terminology solution to address basic values that are not standardized in the current HIE data sources such as gender, race, etc; (4) include HIE stakeholders in quality measure development and validation; (5) investigate the factors contributing to gaps in data, mapping issues, transmission errors, data extract and load, and data entry as part of clinical work flow; (6) couple the analytics platform and the HIE in the production environment so that the analytics platform can leverage real-time data; (7) deploy a pilot of real-time hypertension registries, dashboards and alerts at the point of care to practices contributing usable data to demonstrate how this information can be used to support community population health programs; and (8) consider the deployment of an HIE-based patient portal to deliver messages and reminders to improve patient engagement and enhance patient-centered outcomes.

**Acknowledgement**

We thank Mark McKinney (CEO of Hixny), Joel Ryba (COO of Hixny), Dr. Manjunath (CMO of Whitney M Young Health Center) for their support.

**Disclosure**

None

**Figure 1. Albany County in the New York State (Albany County's Population size <Year 2010>: 304,204)**

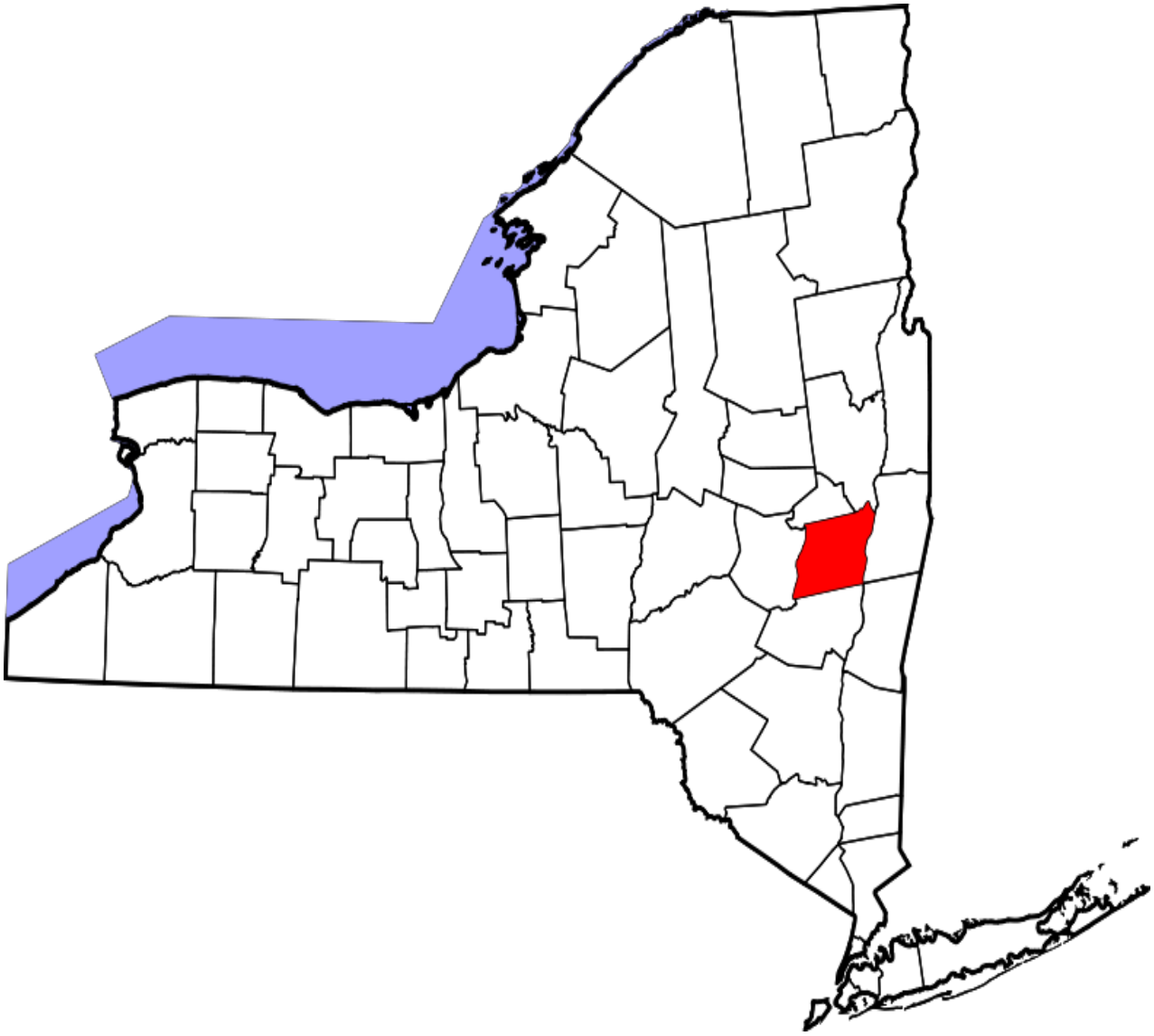


**Figure 2A. Practice Connection Rates with Public HIEs for Query-Based Exchange for the U.S., New York State, and Hixny HIE (Source: Hixny, New York eHealth Collaborative <NYeC>, and Office of the National Coordinator for Health Information Technology as of March 2013)**

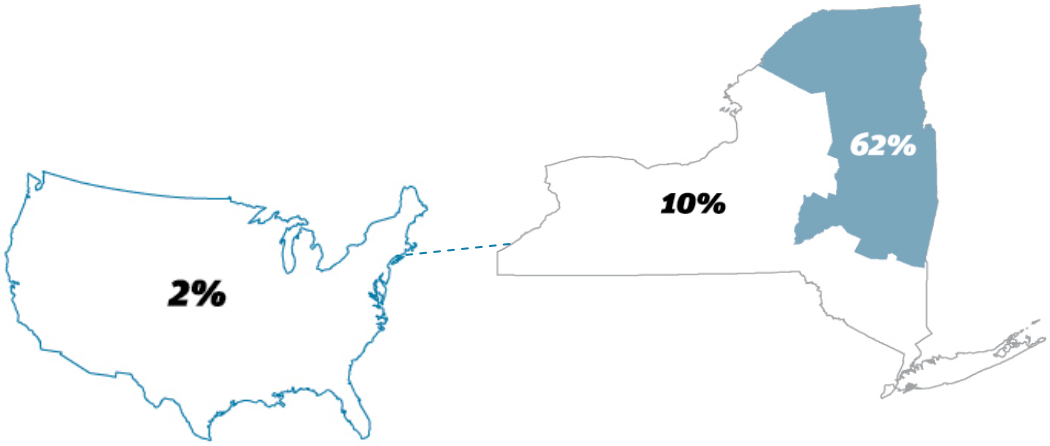



**Figure 2B. Practice Connection Rate by County in Hixny Service Area (Source: Hixny as of March 2013)**

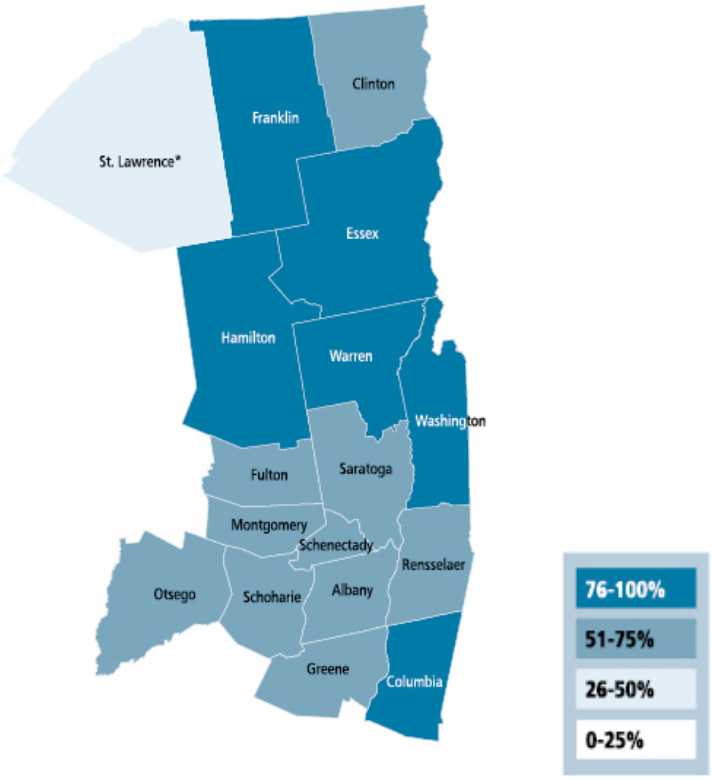


**Figure 3. Process of Data Extract, Transfer, and Load**

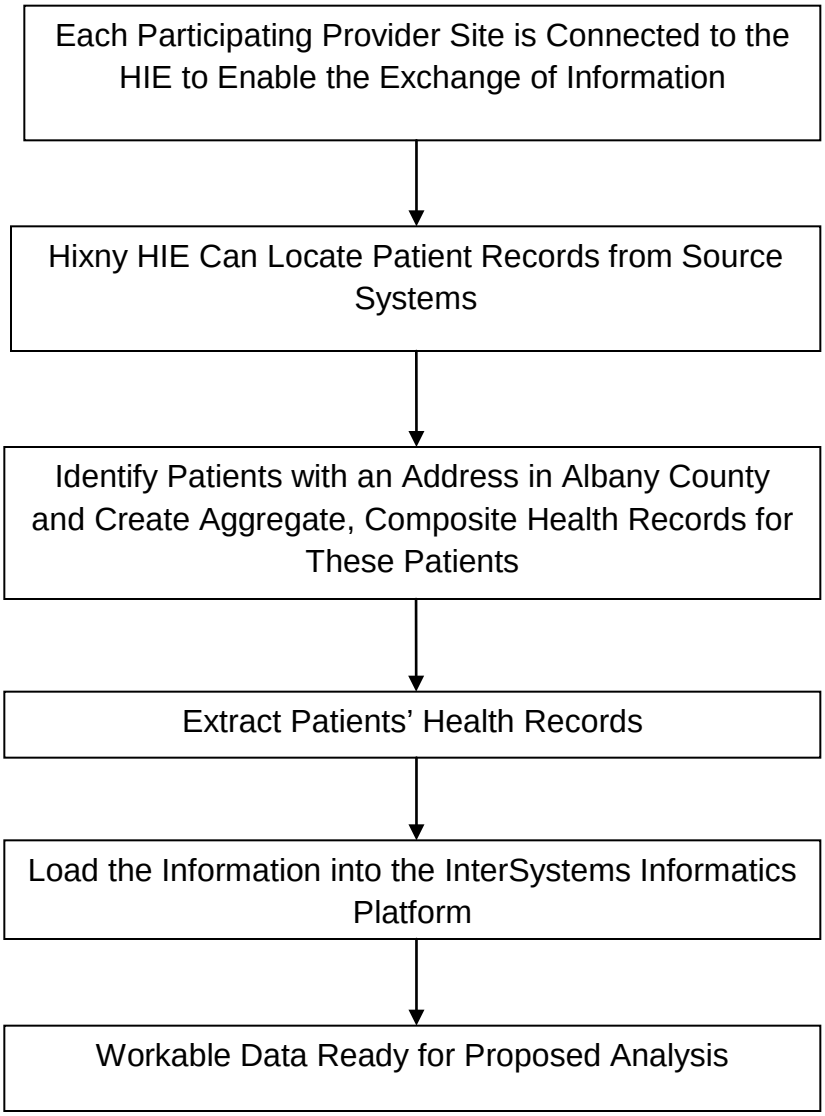


**Figure 4. Map of Albany County by Zip Code**

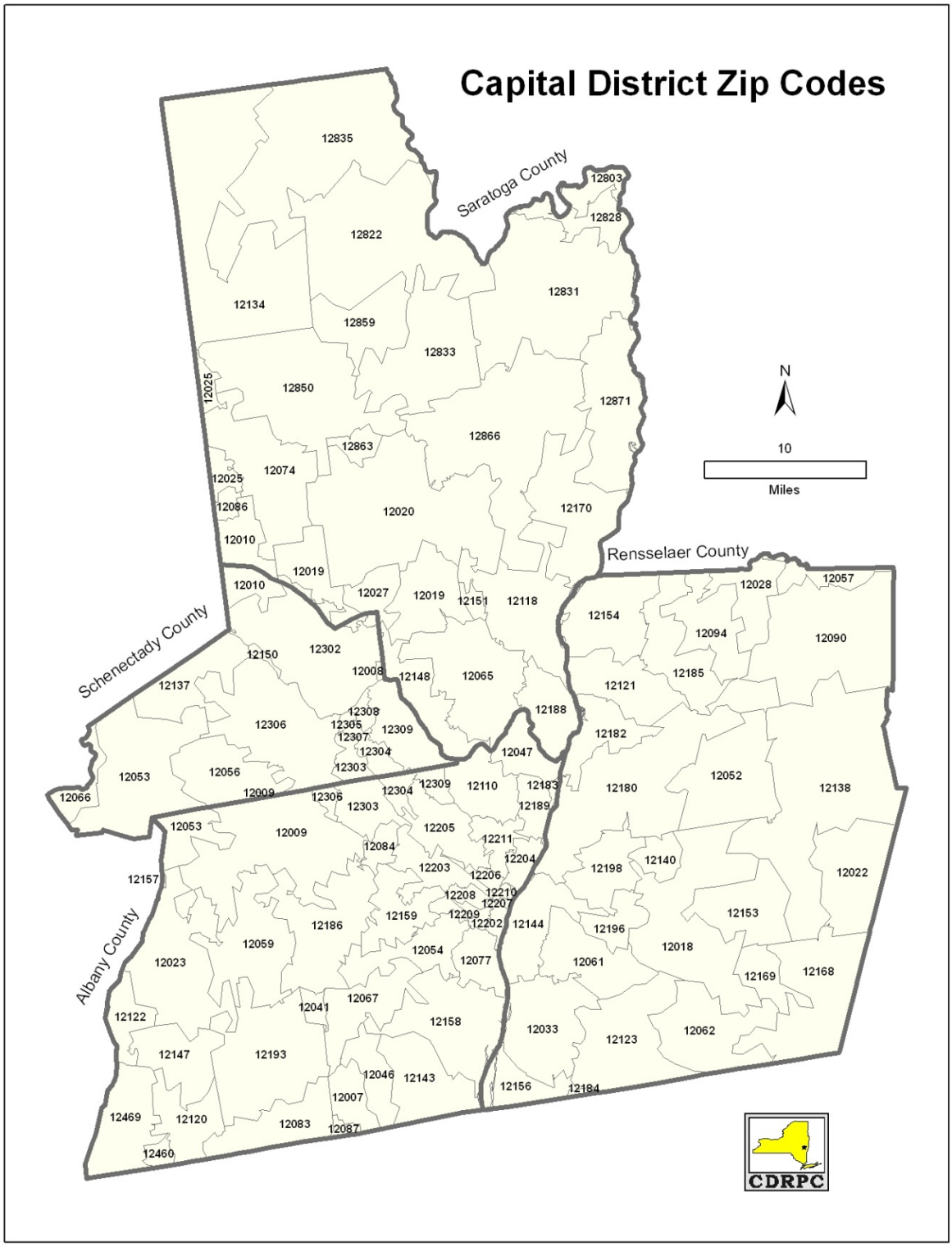


**Figure 5. Flow Chart of Getting the Final Study Sample**

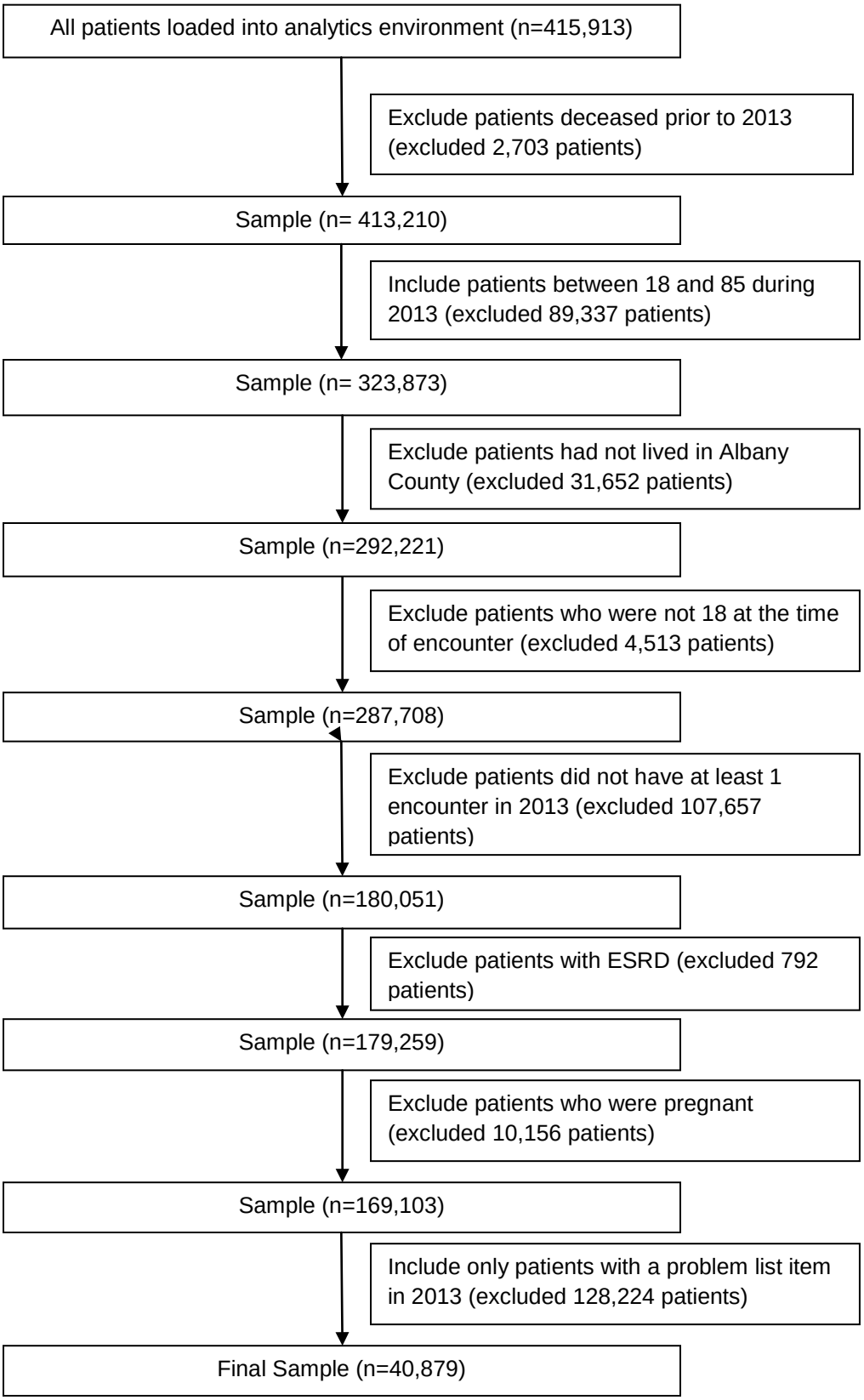
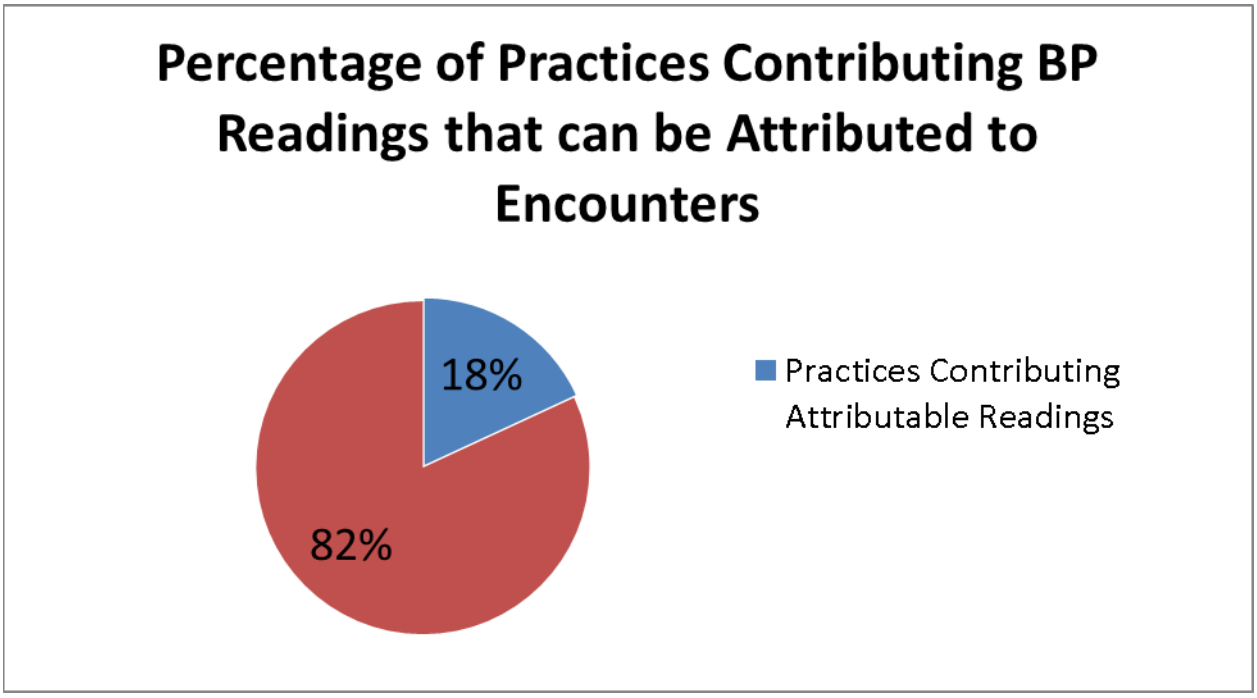


**Figure 6. Hixny HIE Connected Physician Practices Contributing Attributable BP Readings**



## Table 1. Detailed List of Albany County Zip Codes and Associated Cities/Towns

| Zip Code | Portion | County | City/Town |
|---|---|---|---|
| 12007 | Whole | Albany | Alcove |
| 12009 | Whole | Albany | Altamont/Thompsons Lake |
| 12023 | Part | Albany/Schoharie | Berne |
| 12041 | Whole | Albany | Clarksville |
| 12046 | Whole | Albany | Coeymans Hollow |
| 12047 | Whole | Albany | Cohoes |
| 12053 | Part | Albany/Montgomery/Schenectady/Schoharie | Delanson/Braman Corners |
| 12054 | Whole | Albany | Bethlehem/Delmar |
| 12055 | Whole | Albany | Westerlo/Dormansville |
| 12059 | Whole | Albany | East Berne |
| 12067 | Whole | Albany | Fuera Bush |
| 12077 | Whole | Albany | Bethlehem Center/Glenmont |
| 12083 | Part | Albany/Greene | Greenville |
| 12084 | Whole | Albany | Guilderland |
| 12110 | Whole | Albany | Latham |
| 12120 | Whole | Albany | Medusa |
| 12122 | Part | Albany/Schoharie | Middleburgh |
| 12143 | Whole | Albany | Ravena |
| 12147 | Whole | Albany | Rensselaerville |
| 12158 | Whole | Albany | Selkirk |
| 12159 | Whole | Albany | Slingerlands |
| 12183 | Whole | Albany | Green Island/Troy |
| 12186 | Whole | Albany | Voorheesville |
| 12189 | Whole | Albany | Watervliet |
| 12193 | Whole | Albany | Westerlo |

| | | | |
|---|---|---|---|
| 12202 | Whole | Albany | Albany |
| 12203 | Whole | Albany | Albany |
| 12204 | Whole | Albany | Albany/Menands |
| 12205 | Whole | Albany | Albany/Colonie |
| 12206 | Whole | Albany | Albany |
| 12207 | Whole | Albany | Albany |
| 12208 | Whole | Albany | Albany |
| 12209 | Whole | Albany | Albany |
| 12210 | Whole | Albany | Albany |
| 12211 | Whole | Albany | Albany/Loudonville |
| 12303 | Part | Albany/Schenectady | Schenectady |
| 12304 | Part | Albany/Schenectady | Schenectady |
| 12309 | Part | Albany/Schenectady | Niskayuna |
| 12469 | Part | Albany/Greene/Schoharie | Preston Hollow |

## Table 2. Specifications for Hypertension Indicator – Diagnosed Hypertension

**Measure:** Diagnosed Hypertension

**Technical Specifications:**

This measure is for patients aged 18 through 85 years seen during the reporting period. The performance period for this measure is 12 months. This measure may be reported by clinicians who perform the quality actions described in the measure based on the services provided and the measure-specific denominator coding.

**Denominator Criteria (Eligible Cases):**

Patients aged 18 through 85 years on date of encounter

**AND**

**Patient encounter during reporting period (CPT or HCPCS):** 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, G0402

**AND NOT**

Currently pregnant

Diagnosed with end stage-renal disease

Receiving treatment for end stage-renal disease

Who only have encounters with cardiologists

**NUMERATOR:**

**Diagnosis for hypertension (ICD-9-CM):** 401.0, 401.1, 401.9

**Diagnosis for hypertension (ICD-10-CM) [REFERENCE ONLY/Not Reportable]:** I10

(see denominator criteria for NQF0018)

## Table 3. Specifications for Hypertension Indicator - Hypertension Control

**Measure:** Hypertension Control

**Technical Specifications:**

This measure is for patients with hypertension seen during the reporting period. The performance period for this measure is 12 months. This measure may be reported by clinicians who perform the quality actions described in the measure based on the services provided and the measure-specific denominator coding.

**DENOMINATOR:**

Patients aged 18 through 85 years with the diagnosis of hypertension

**Denominator Criteria (Eligible Cases):**

Patients aged 18 through 85 years on date of encounter

**AND**

**Diagnosis for hypertension (ICD-9-CM):** 401.0, 401.1, 401.9

**Diagnosis for hypertension (ICD-10-CM) [REFERENCE ONLY/Not Reportable]:** I10

**AND**

**Patient encounter during reporting period (CPT or HCPCS):** 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, G0402

**AND NOT**

Currently pregnant

Diagnosed with end stage-renal disease

Receiving treatment for end stage-renal disease

**NUMERATOR:**

Patients whose most recent blood pressure<140/90 mmHg

## Table 4. Specifications for Hypertension Indicator – Undiagnosed Hypertension

**Measure 3:** Undiagnosed Hypertension

**Technical Specifications:**

This measure is for patients aged 18 through 85 years seen during the reporting period. The performance period for this measure is 12 months. This measure may be reported by clinicians who perform the quality actions described in the measure based on the services provided and the measure-specific denominator coding.

**Denominator Criteria (Eligible Cases):**

Patients aged 18 through 85 years on date of encounter

**AND**

**Patient has at least 2 encounters during the performance period encounter during reporting period (CPT or HCPCS):** 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, G0402

**AND NOT**

**Diagnosis for hypertension (ICD-9-CM):** 401.0, 401.1, 401.9

**Diagnosis for hypertension (ICD-10-CM) [REFERENCE ONLY/Not Reportable]:** I10

**NUMERATOR:**

Two or more encounters during recording period where systolic blood pressure readings ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg.

## Table 5. Proposed Stratification Analysis for Hypertension Indicators

**Stratification I:** Demographics (age, gender, race/ethnicity)

**Description:** Propose to calculate rates of the 3 hypertension measures by age, gender and race/ethnicity

**Rationale:** Patient level information could be used to focus outreach to populations within the county by patients' age, gender, and race/ethnicity

**Stratification II:** Zip Code

**Description:** Propose to calculate rates of the 3 hypertension measures by patient zip-code or zip-code groupings

**Rationale:** Zip code level information could be used to focus outreach to populations within the county by the county health department or Federally Qualified Health Centers (FQHCs)

**Stratification III:** Insurance Status

**Description:** Propose to calculate rates of the 3 hypertension measures by whether patient is covered by insurance and whether the patient is covered by Medicare, Commercial Insurance or Medicaid

**Rationale:** Evaluating the status of the 3 hypertension measures by insurance status can assist in defining the need in the population. The information could be useful in communicating with key partners and payers about the need for action

**Stratification IV:** Health Plan Type

**Description:** Propose to calculate rates of the 3 hypertension measures by the Health Plan in which the patient is enrolled. This could involve breaking down the insurance status measures to a more fine grain level of granularity

**Rationale:** ASTHO has encouraged States to involve Health Plans in the ASTHO Million Hearts State Collaborative. The availability of hypertension data by Health Plan could be a useful tool in bringing plans to the table to discuss strategies for improving the diagnosis and control of hypertension

## Table 6. Proposed Analysis to Check Hixny Data Completeness

**#1. Proportion of patients covered in HIE where there is sufficient data to determine numerator and denominator eligibility for each of the three hypertension measures**

**Rationale/Description:** This measure is intended to describe the proportion of the population represented in the HIE for which the quality measures can be calculated. Knowing the size of the sample on which HIE-level metrics (relative to the size of the population in the HIE) provides useful context for interpreting the hypertension metrics.

**Unit:** Patient

**Relevant Metrics:**

- # and percent of patients in HIE with complete information to determine denominator eligibility;
- # and percent of patients in HIE meeting denominator eligibility in which there is sufficient information to determine numerator eligibility;
- # and % of patients in HIE with sufficient information to determine numerator and denominator eligibility;
- For Undiagnosed hypertention - # and % of patients who fail to meet denominator criteria because of only having a single encounter

**#2. Sufficiency of the data from various reporting sources (e.g., primary care, specialty care, hospital ED)**

**Rationale/Description:** The sufficiency of the data for determining patients' eligibility for the denominator and numerator for the three metrics is likely to depend on where they access care and the reporting sources of their data. To evaluate the sufficiency of reporting from various sources, the unit to be evaluated ought to be the patient encounter as opposed to the patient.

**Relevance:** Because the Undiagnosed hypertension measure requires two encounters, this measure primarily applies to the hypertension and hypertension control Measures

**Unit:** Encounter

**Relevant Metrics:**

- # and percent of encounter records in HIE with sufficient information to determine denominator eligibility;
- # and percent of encounter records in HIE meeting denominator eligibility in which there is sufficient information to determine numerator eligibility;
- # and % of encounter records in HIE with sufficient information to determine numerator and denominator eligibility

**Table 7. Calculate 3 Hypertension Measures using Hixny Information**

| **Measure 1: Diagnosed Hypertension** | | | |
|---|---|---|---|
| **Patients** | **Numerator** | **Denominator** | **Measure %** |
| Patients with Diagnosis from Problem Lists | 6,981 | 40,879 | 17.1 |
| **Measure 2: Hypertension Controll** | | | |
| Patients with Diagnosis from Problem Lists | 2,199 | 6,981 | 31.5 |
| **Measure 3: Undiagnosed Hypertension** | | | |
| Patients with Diagnosis from Problem Lists | 1 | 22,787 | 0.0 |

**Table 8. Hypertension Control Measure by Zip Code (List 15 Zip Codes with the Greatest Values of Numerator; Patients with Diagnosis from Problem Lists)**

| Item | Numerator | Denominator | Hypertension Control (%) |
|---|---|---|---|
| **All Zip Codes** | 2199 | 6979 | 31.5 |
| *12303* | 238 | 452 | 52.7 |
| *12205* | 205 | 815 | 25.2 |
| *12309* | 204 | 423 | 48.2 |
| *12203* | 195 | 694 | 28.1 |
| *12047* | 144 | 372 | 38.7 |
| *12304* | 137 | 289 | 47.4 |
| *12110* | 127 | 369 | 34.4 |
| *12189* | 106 | 326 | 32.5 |
| *12208* | 104 | 447 | 23.3 |
| *12211* | 92 | 302 | 30.5 |
| *12206* | 72 | 278 | 25.9 |
| *12054* | 64 | 298 | 21.5 |
| *12209* | 52 | 203 | 25.6 |
| *12159* | 42 | 171 | 24.6 |
| *12210* | 42 | 130 | 32.3 |

**Table 9. Hypertension Control Measure by Age and Gender (Patients with Diagnosis from Problem Lists)**

| Patient Group | Numerator | Denominator | Hypertension Control % |
|---|---|---|---|
| *Female, 18-34 yrs* | 19 | 53 | 35.9 |
| *Female, 35-44 yrs* | 73 | 159 | 45.9 |
| *Female, 45-54 yrs* | 215 | 490 | 43.9 |
| *Female, 55-64 yrs* | 337 | 947 | 35.6 |
| *Female, 65-74 yrs* | 391 | 1049 | 37.3 |
| *Female, 75-85 yrs* | 435 | 1423 | 30.6 |
| *Male, 18-34 yrs* | 11 | 36 | 30.6 |
| *Male, 35-44 yrs* | 33 | 140 | 23.6 |
| *Male, 45-54 yrs* | 82 | 360 | 22.8 |
| *Male, 55-64 yrs* | 164 | 637 | 25.8 |
| *Male, 65-74 yrs* | 191 | 748 | 25.5 |
| *Male, 75-85 yrs* | 247 | 938 | 26.3 |

**Table 10. Hypertension Control Measure by Race (Patients with Diagnosis from Problem Lists)**

| Patients | Numerator | Denominator | Hypertension Control % |
|---|---|---|---|
| **All Patients** | 2198 | 6980 | 31.5 |
| **White** | 1530 | 4832 | 31.7 |
| **Black** | 190 | 637 | 29.8 |
| **Asian American** | 35 | 108 | 32.4 |

**Table 11. List of Practicing Sites Contributing Attributable BP Readings in 2013**

| Practice Sites | EMR | BP Readings Count in 2013 |
|---|---|---|
| #1 | eCW | 6525 |
| #2 - #18 | eCW | 5849 |
| #19 - #20 | athenahealth | 5112 |
| #21 | athenahealth | 516 |
| #22-62 | eCW | 106 |
| #63-64 | athenahealth | 90 |
| #65-66 | eCW | 55 |
| #67 | eCW | 24 |
| #68 | eCW | 21 |
| #69-85 | eCW | 18 |
| #86 | eCW | 18 |
| #87 | eCW | 16 |
| #88 | eCW | 14 |
| #89 | eCW | 10 |
| #90 | eCW | 4 |

**Table 12. Calculate 3 Hypertension Measures for 3 Homogeneous FQHCs (Hudson Headwaters Health Center, Whitney Young Health Center, and Hometown Health Center)**

| **Measure 1: Diagnosed Hypertension** | | | |
|---|---|---|---|
| | **Numerator** | **Denominator** | **Measure %** |
| Observation from FQHC | 400 | 3027 | 13.2 |
| **Measure 2: Hypertension Control** | | | |
| Observation from FQHC | 242 | 400 | 60.5 |
| **Measure 3: Undiagnosed Hypertension** | | | |
| Observation from FQHC | 5 | 1760 | 0.3 |

## References


1. Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Blaha MJ, Dai S, Ford ES, Fox CS, Franco S, Fullerton HJ, Gillespie C, Hailpern SM, Heit JA, Howard VJ, Huffman MD, Judd SE, Kissela BM, Kittner SJ, Lackland DT, Lichtman JH, Lisabeth LD, Mackey RH, Magid DJ, Marcus GM, Marelli A, Matchar DB, McGuire DK, Mohler ER, 3rd, Moy CS, Mussolino ME, Neumar RW, Nichol G, Pandey DK, Paynter NP, Reeves MJ, Sorlie PD, Stein J, Towfighi A, Turan TN, Virani SS, Wong ND, Woo D, Turner MB, American Heart Association Statistics C, Stroke Statistics S. Heart disease and stroke statistics--2014 update: A report from the american heart association. Circulation. 2014;129:e28-e292

2. Meyer H. Taking aim at america's number one killer--one key heart disease risk factor at a time. Health affairs. 2012;31:895-898

3. Wright JS, Wall HK, Briss PA, Schooley M. Million hearts--where population health and clinical practice intersect. Circulation. Cardiovascular quality and outcomes. 2012;5:589-591

4. Patel MM, Datu B, Roman D, Barton MB, Ritchey MD, Wall HK, Loustalot F, Centers for Disease C, Prevention. Progress of health plans toward meeting the million hearts clinical target for high blood pressure control - united states, 2010-2012. MMWR. Morbidity and mortality weekly report. 2014;63:127-130

5. Halamka JD. Connecting patients, providers, and payers improves quality, safety and efficiency. Journal of general internal medicine. 2013;28:167-168

6. Information exchange yields better decisions. ED management : the monthly update on emergency department management. 2010;22:103-104

7. Ancker JS, Miller MC, Patel V, Kaushal R, Investigators H. Sociotechnical challenges to developing technologies for patient access to health information exchange data. Journal of the American Medical Informatics Association : JAMIA. 2014;21:664-670

8. Vest JR, Grinspan ZM, Kern LM, Campion TR, Jr., Kaushal R, Investigators H. Using a health information exchange system for imaging information: Patterns and predictors. AMIA ... Annual Symposium proceedings / AMIA Symposium. AMIA Symposium. 2013;2013:1402-1411

9. Abramson EL, McGinnis S, Moore J, Kaushal R, investigators H. A statewide assessment of electronic health record adoption and health information exchange among nursing homes. Health services research. 2014;49:361-372

10. Vest JR, Kern LM, Campion TR, Jr., Silver MD, Kaushal R. Association between use of a health information exchange system and hospital admissions. Applied clinical informatics. 2014;5:219-231

11. Miller AR, Tucker C. Health information exchange, system size and information silos. Journal of health economics. 2014;33:28-42