Overview of HealthInfoNet

Devore S. Culver

March 3, 2016

What is HealthInfoNet?

HealthInfoNet operates Maine's **statewide Health Information Exchange (HIE)**

- **Maine-based:** The Board of Directors are active and prominent in the Maine medical community and represent a variety of organizations and interests.
- **Multi-stakeholder:** Involves Consumers, Providers, Payers, Business and Government.
- **Independent:** HealthInfoNet is independent and is not owned by insurance companies, health care organizations, associations, employers or government.
- **Nonprofit:** HealthInfoNet is a private nonprofit organization. It is funded by many sources including charitable foundations, Maine health care providers, and state and federal government.

HealthInfoNet: A National Leader

"What is unique to Maine and HealthInfoNet is its robust and cutting-edge approach to Health Information Exchange.

Maine formed what is now recognized as the ***first independently run statewide comprehensive health data exchange in the country*** *- long before the Office of the National Coordinated invested $600M of federal monies in similar efforts across 50 states."*

- **Karen Bell, MD, MMS**

Director, Center for Sustainable Health and Care, Boston

Former Interim National Coordinator for Health Information Technology

Mission and Vision

MISSION

To deliver trusted health information exchange services that help the healthcare community create lasting system-wide improvements in the value of patient care.

VISION

To be the leading resource of health information exchange services in Northern New England. Partnering with the health care community, HealthInfoNet will deliver innovative technical tools built on comprehensive, timely and actionable information. Services will be responsive to changing clinical decision-making and operational needs across the care continuum.

What Differentiates HealthInfoNet's HIE?

- HealthInfoNet manages clinical information on **97% Maine residents**
  - No other state has this level of penetration in both hospital and outpatient care
- **100% of Maine hospitals** participating in statewide HIE
  - Very few other HIEs have buy-in from all hospital systems in their state/region
- **456 Outpatient organizations**
  - Most HIEs do not have robust data coming from outpatient providers
- Shared clinical data across all **disparate & unaffiliated entities**
  - Competition in the marketplace nationally between health systems has made cross-entity data sharing rare and difficult
- Statewide **data repository & secondary use**
  - Most other HIEs share small subsets of data point-to-point. Without aggregating and agreeing to secondary data use, analytics and population health are not possible
- **National connectivity** starting with Veteran's Administration (VA) and NH hospitals
  - Maine is the only state where VA has access to the local HIE to see care veterans are getting outside the VA Health System

HealthInfoNet History

- **2004** - Maine Health Access Foundation, Maine CDC, Maine Quality Forum and Maine Health Information Center study need and support for an exchange in Maine.
- **2005** - Stakeholders begin planning and development.
- **2006** - HealthInfoNet incorporated
- **2008** - Demonstration phase begins.
- **2010** – Statewide roll-out begins.
- **2012** – Analytic tools introduced
- **2013** – First behavioral health facility connected to the HIE, State Innovations Model (SIM) Testing Grant awarded to the State of Maine with HealthInfoNet as one primary sub-contractor partners
- **2014** – Delivered single sign-on to the State Prescription Drug Management Program
- **2015** – Veterans Affairs (VA) connected to HealthInfoNet

HealthInfoNet

Board of Directors

The HealthInfoNet board includes individuals representing business, healthcare providers, healthcare payers, consumers, and state government.

Members

- **Richard White** (Chair) – General Manager, Martin's Point Health Care, Retired
- **Karen M. Bell, MD, MMS** (Vice Chair) - Director, Center for Sustainable Health and Care, JBS Int.
- **Ann Sullivan** (Secretary) – Consumer
- **Peter Mills** (Treasurer) – Executive Director, Maine Turnpike Authority
- **Lynn F. Duby** – Behavioral Health Provider, Retired
- **Kyle Johnson** – CIO, Eastern Maine Healthcare Systems
- **Edward J. Kane, Esq.** – Vice President, Maine, for Harvard Pilgrim Health Care
- **Donald W. Krause, MD** – Director, Rheumatology Section, St. Joseph Healthcare
- **Kevin Lewis** – CEO, Maine Community Health Options
- **Mary Mayhew** – Commissioner, Department of Health and Human Services
- **Ken "Mac" McCall, PharmD** – Professor, College of Pharmacy, UNE
- **Dervilla McCann, MD** – Chief of Population Health, Central Maine Health Care
- **Michelle Probert** – Manager, Integrated Health Services, Bath Iron Works
- **Stephen Sears, MD, MPH** – Chief of Staff, VA Maine
- **Paul Stein** – COO, MaineGeneral Medical Center
- **Carol Timberlake** – Carol M. Timberlake, LNHA, FACHCA, Administrator, The Knox Center
- **Edward Trainer, Dr.P.H** – Public Health Administrator, Retired
- **Marie Vienneau** – President & CEO, Mayo Regional Hospital

Portfolio of Services

- **Health Information Exchange** - Manage near real time connections to electronic medical record systems across the state of Maine to aggregate patient level clinical, encounter and diagnostic coding data that is then standardized and organized around individual persons so that providers engaged in treating patients have a central resource for accessing patient specific information to support coordination of care and treatment decisions.

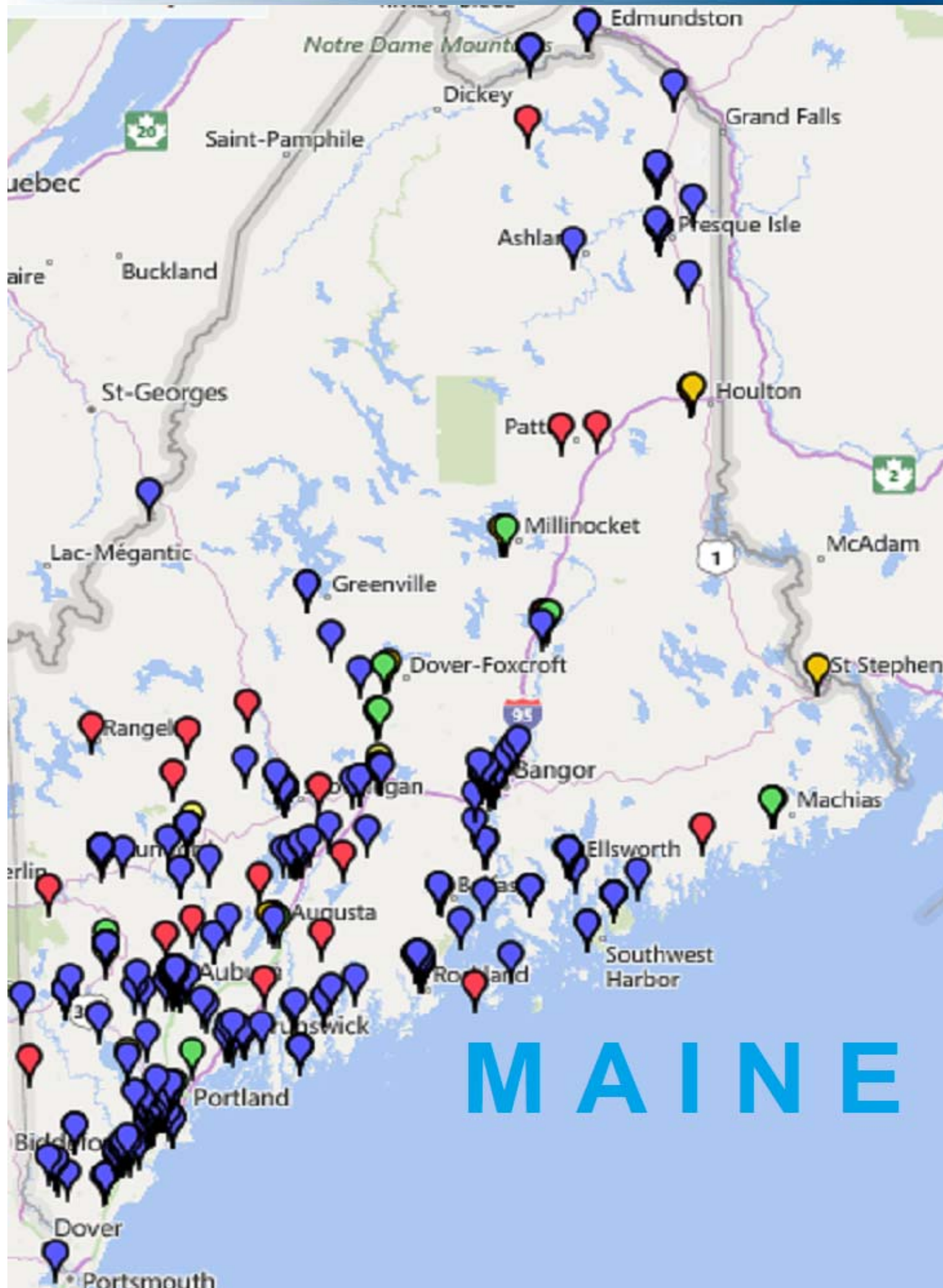
- **Notification Services -** Provide near real-time notifications via e-mail and daily reports to providers and care management staff for specific events of care such as admission to the hospital or emergency room, discharge from the hospital or emergency room, discharge from skilled nursing facilities, etc. This service is being expanded to include the delivery of reports pushed to the provider related to specific event of care.

Portfolio of Services

- **Automated Laboratory Reporting-** Serving hospital and reference labs in meeting State of Maine reporting requirements to notify Maine CDC when specific lab results indicate the existence of one of seventy two diseases that are mandated for timely reporting by the State.
- **Syndromic Surveillance-** Continuous reporting of events of care presenting at hospitals and clinics where the chief complaint provided by a patient indicates possible event of a disease or condition that requires review/intervention by the Maine CDC for public safety and health.
- **Accountable Care Data Services-** Provide near real time data export on patient event of care activity (admission, discharge, transfer) and selected clinical data (lab results) for patients that are being managed under an accountable care risk contract arrangement.

Portfolio of HIN Services

- **Reporting and Analytics-** Near real time tools to support client analysis of statewide market share and volume information along with population level predictive analytics that support enhanced proactive clinical care management to address risk and improve clinical outcomes.
  - HIE Data on 1.4M Patients over 6 years
  - Claims Data from Medicaid for 450K patients over 4 years

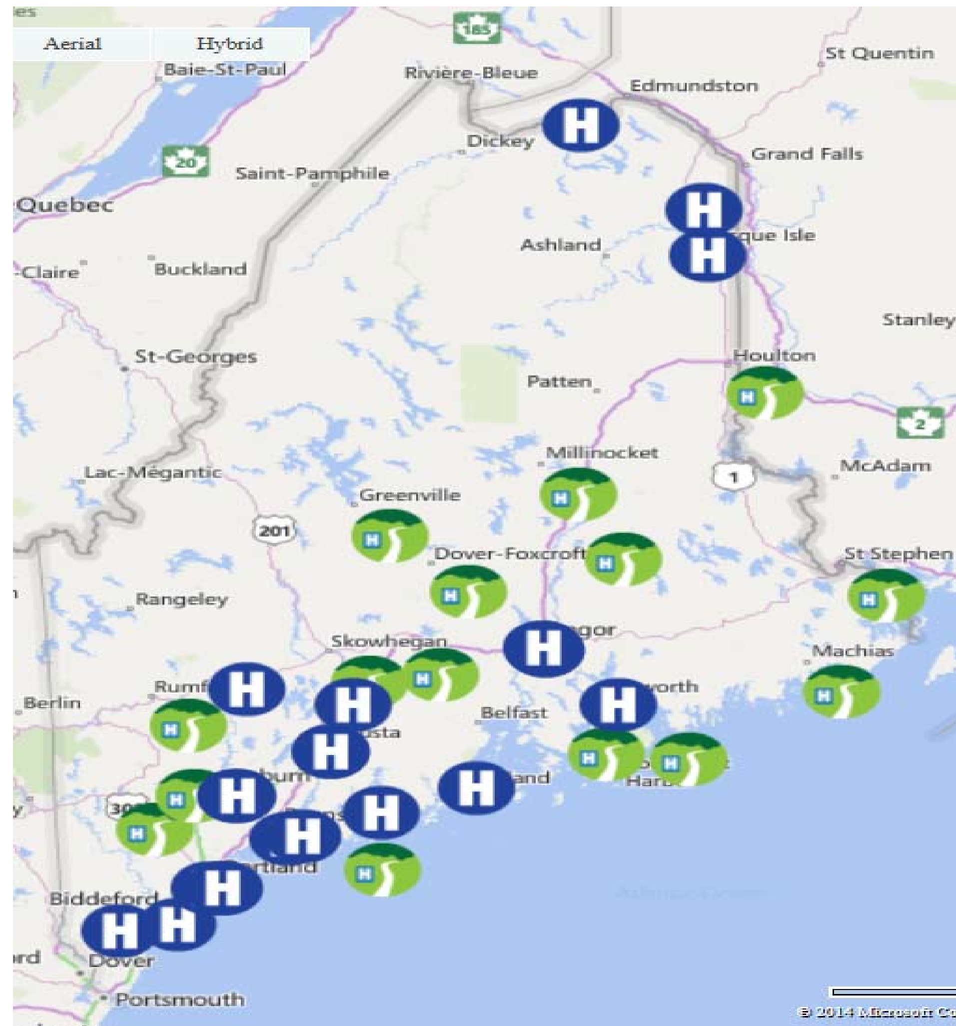


HealthInfoNet HIE Connections

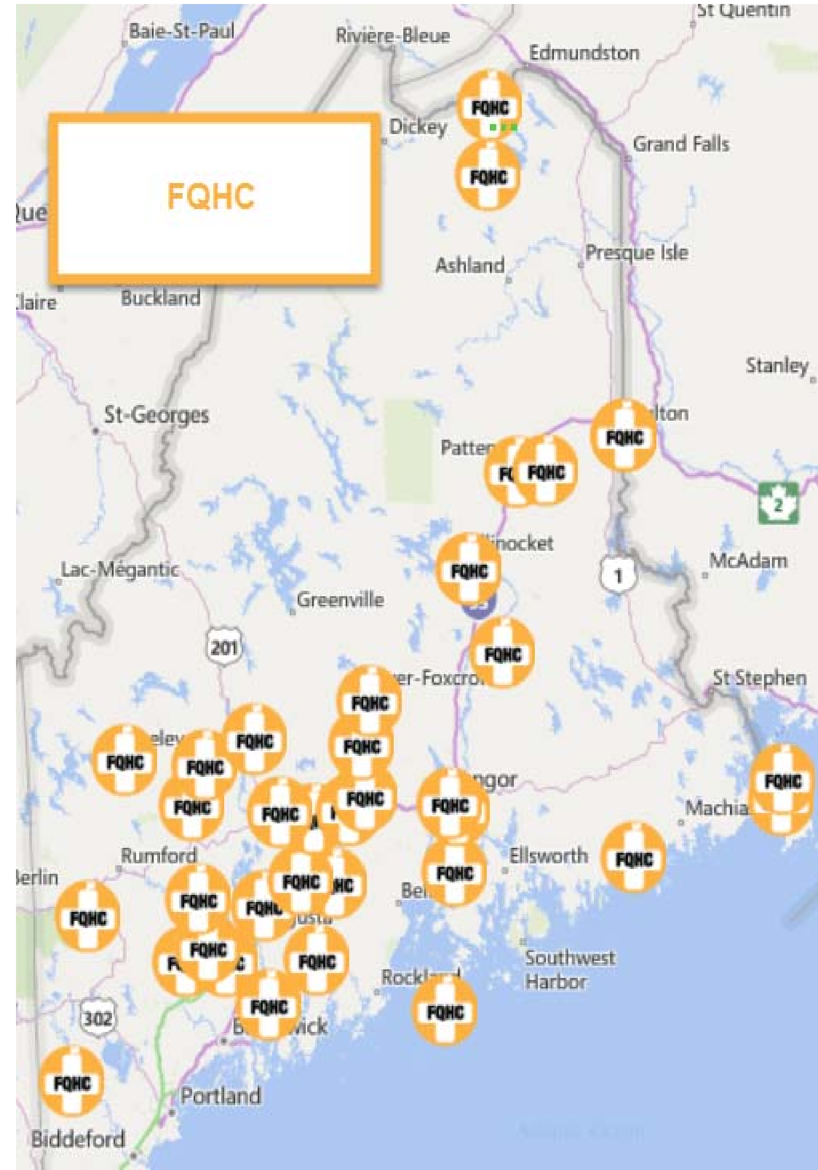
- 37 hospitals
- 38 Federally Qualified Health Centers
- 456 outpatient sites (physician practices, behavioral health, long-term care)
- National connectivity to:
  - Veterans Affairs (VA)
  - Nationwide Health Information Network

HealthInfoNet

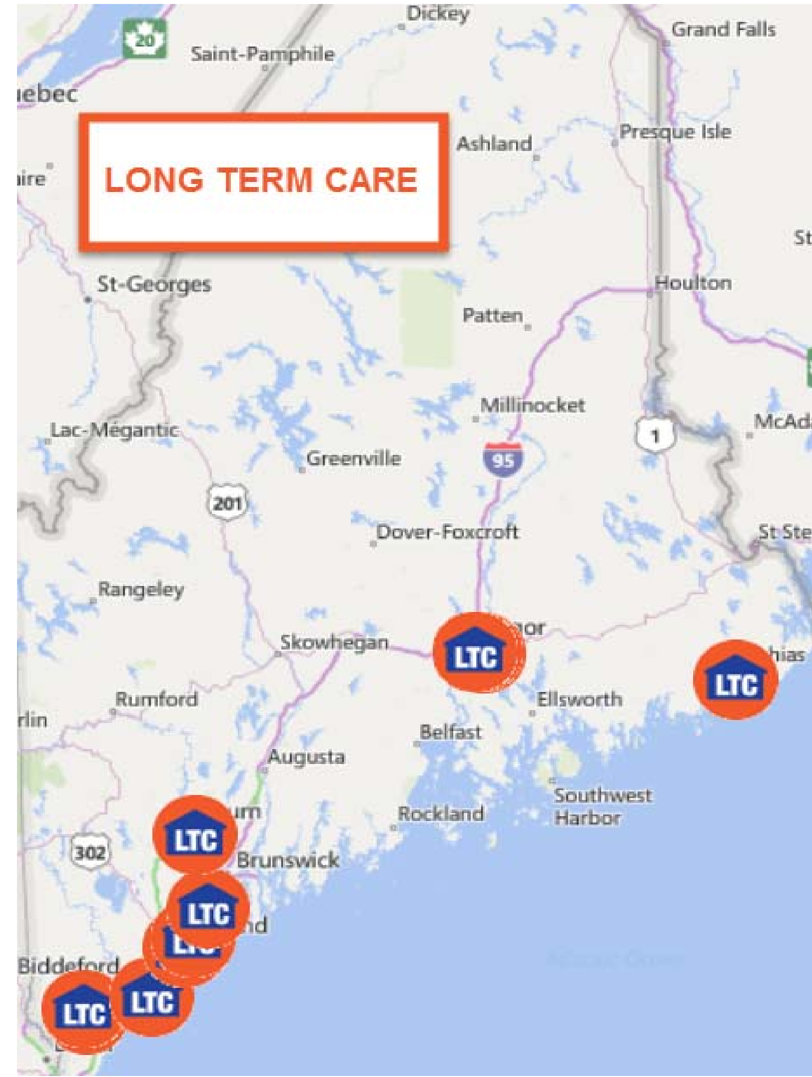
Hospitals and Critical Access Hospitals



HealthInfoNet



HealthInfoNet



HealthInfoNet

Data available in the HIE

- Patient Identifier, demographics & PCP *(registration data)*
- Encounter/Visit History
- Laboratory and Microbiology Results
- Vital signs *(new data)*
- Radiology Reports
- Adverse Reactions/Allergies
- Medication History from Pharmacies & Medicaid Claims
- Diagnosis/Conditions/Problems (primary and secondary)
- Immunizations *(primarily adult)*
- Documents (Discharge summaries, office notes, reports, etc.)
- Continuity of Care Documents (CCD)

HealthInfoNet

Consent Policy

- Maine law requires HealthInfoNet & all participants follow an **opt-out consent policy**.
- Patients can opt-out online, on paper, or over the phone.
- When patients choose to opt-out, they only opt-out **once for all care locations** at which time their clinical data is removed from the HIE.
- **Patients can opt back in,** however their records will start from that day forward. The system does not go back.

HealthInfoNet

Sensitive Information

- Per state law, access to some mental health and HIV/AIDS information is limited. This includes:
  - Information from a licensed mental/behavioral health provider or facility
  - HIV diagnoses and results of HIV tests
- Patients give consent in one of two ways:
  - for each provider at the time of care or admission for that time only
  - using a consent form available from HealthInfoNet to opt-in all information all the time
- State law permits providers access without patient consent in an emergency situation. Providers record this in the system.

HealthInfoNet

Security Processes

- Uses a Virtual Private Network (VPN) and protected by a dedicated Firewall.
- Data is encrypted at all times (in motion and at rest) and stored separately from clinical data.
- All users are given unique passwords approved and managed by their employer.
- System user activity logs are audited daily by HealthInfoNet staff and the employers identified auditor who will access the “Audit Portal” at any time.
- Users must confirm they have a relationship with the patient and a need to see their information. This is recorded in the system.

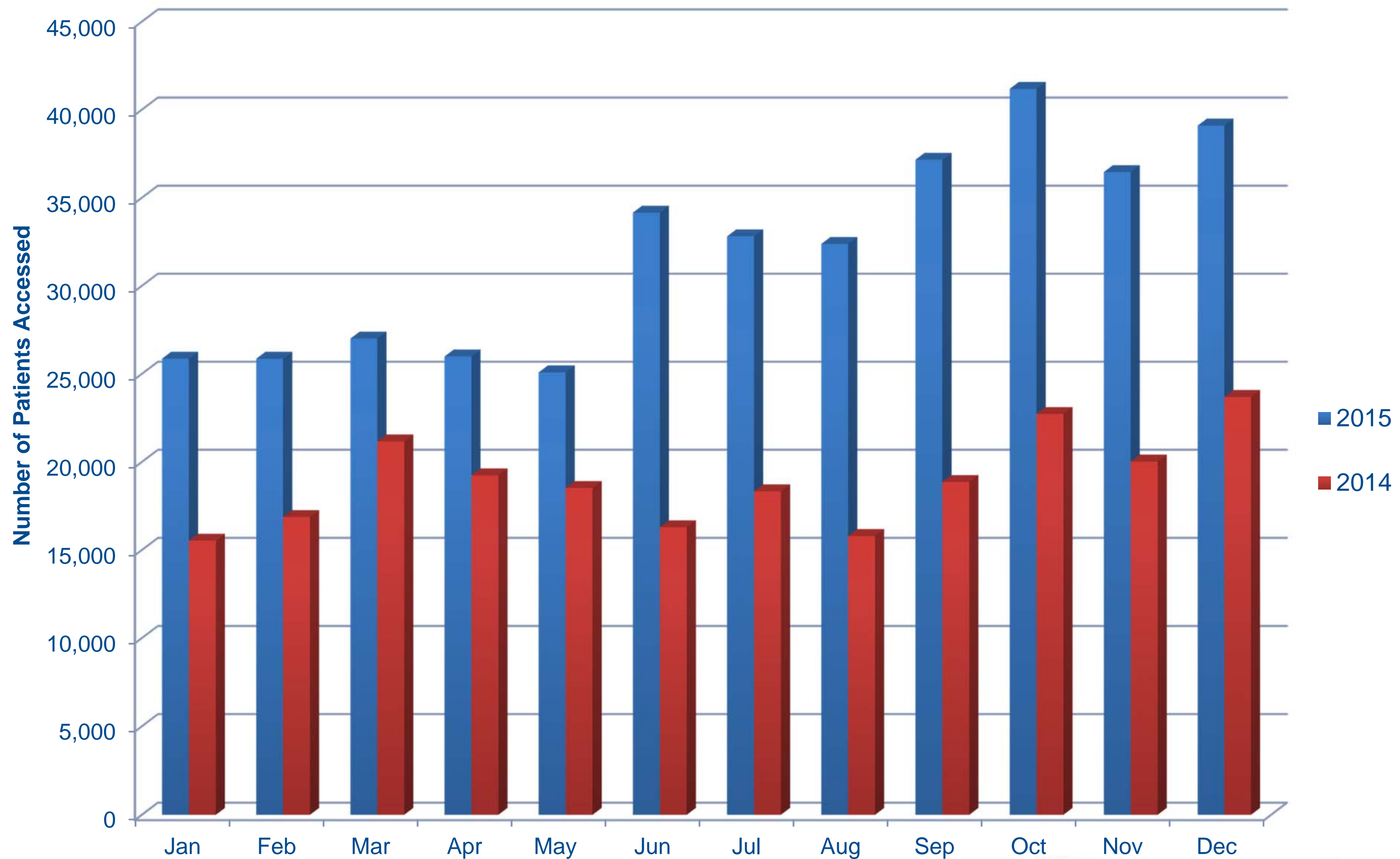
HealthInfoNet

Key Statistics

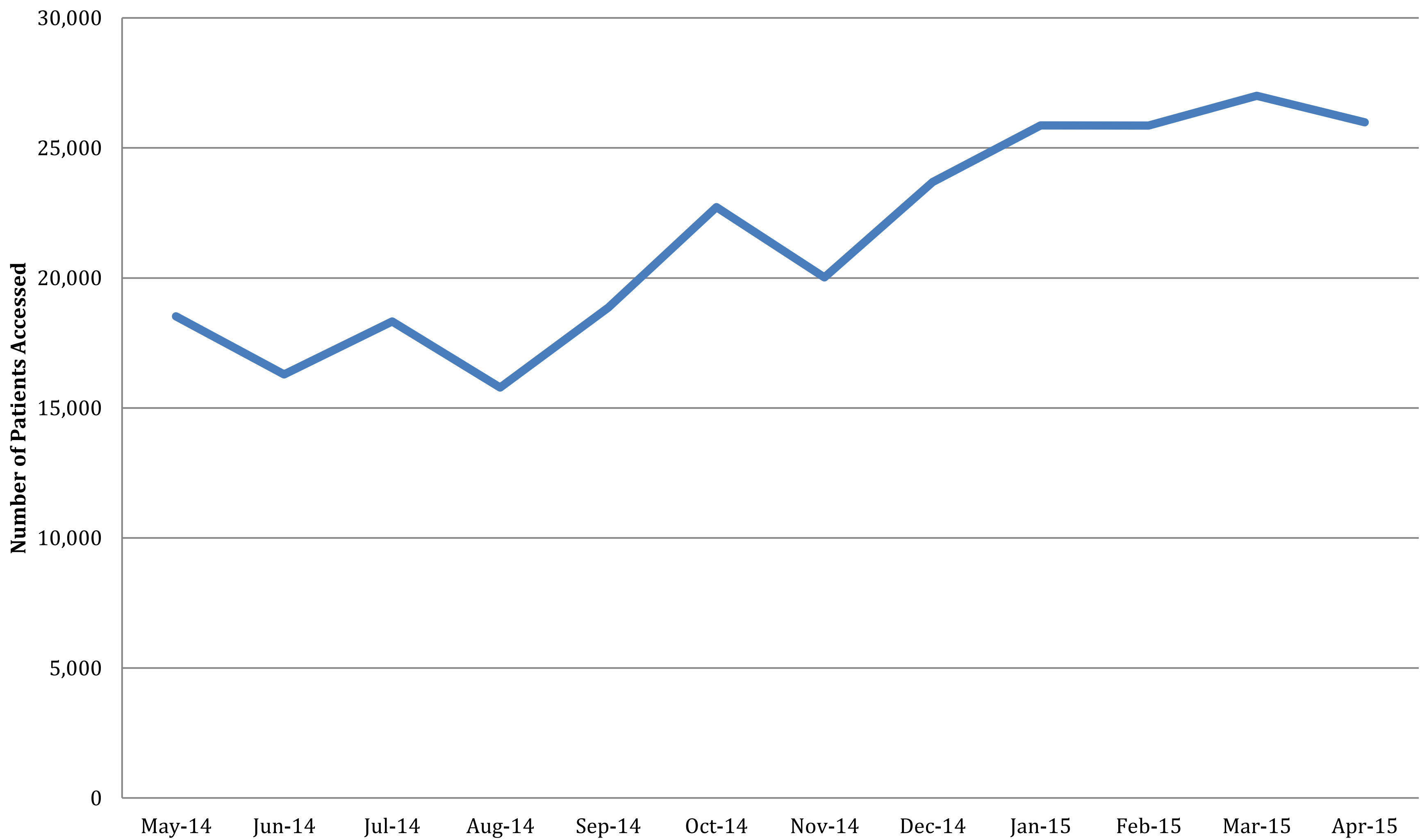
- **562,348** Maine residents had encounter and clinical content added to the exchange in the past 12 months
- **97%** of all Maine residents have clinical information in the exchange
- **41,000** patients are accessed each month by clinical users of the exchange
- **12,700** real time notifications of patient encounter activity generated each month
- **253,000** automated laboratory results and syndromic surveillance messages sent to Maine CDC each month

HealthInfoNet

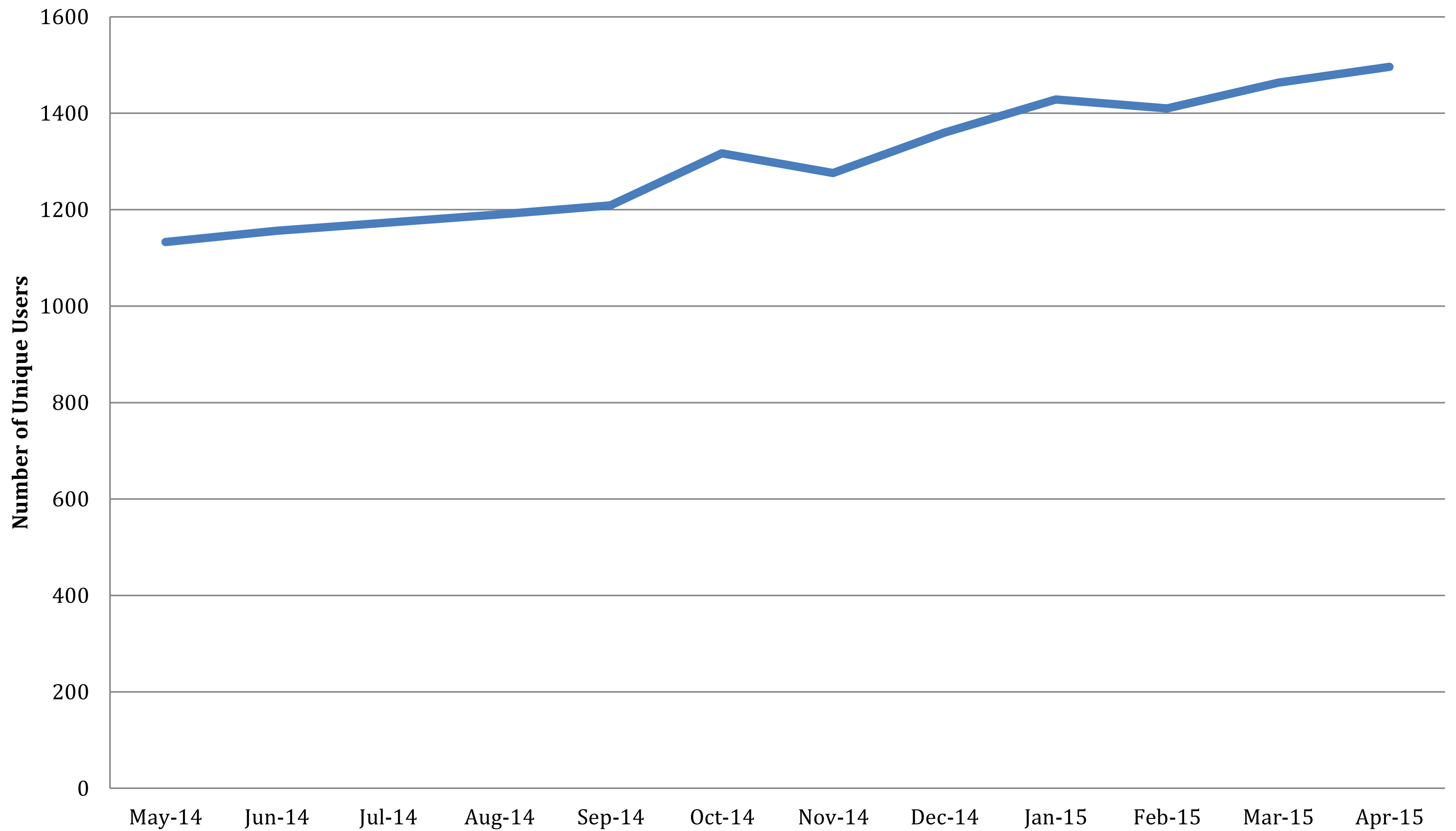
HIE Monthly Usage 2014 – 2015



HealthInfoNet



HealthInfoNet



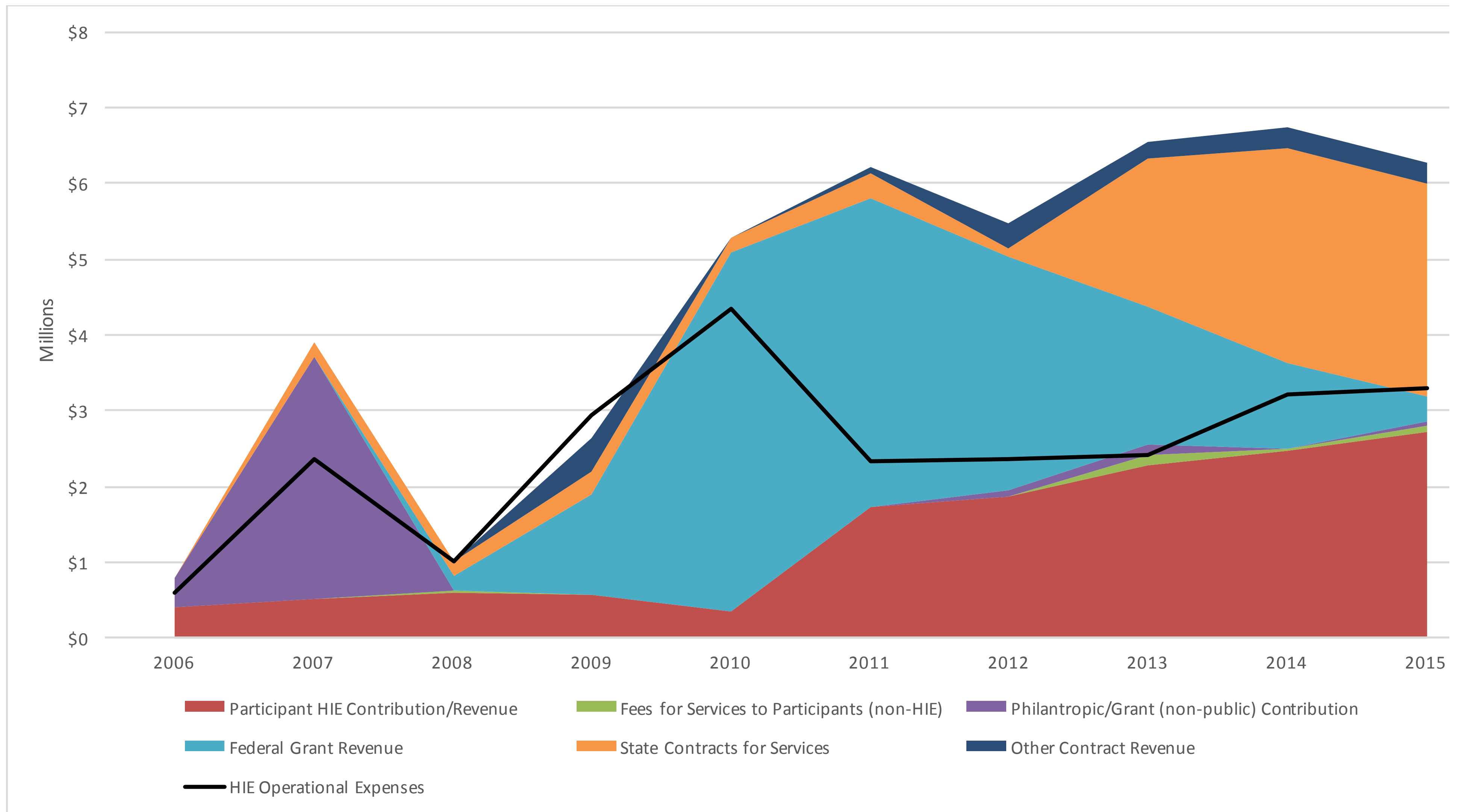
HealthInfoNet

2015 Revenue Sources

- 60% Federal grants and private foundation funds, State contracts
- 40% subscription fees and service contracts with providers
- Revenue from subscription fees and service contracts covers the core cost of running the exchange

HealthInfoNet

HealthInfoNet Revenue and HIE Operational Expenses



HealthInfoNet Income Statements 2014-2015

	Projected Year End	Actual
	2015	2014
REVENUES		
State and Federal Government Contracts and Grants (Public & Private)	$3,111,359	$4,218,261
Hospital and Provider Service Subscription Fees	2,591,163	2,419,387
Resale/Interest/New Business	568,719	71,244
TOTAL REVENUES	**$6,271,241**	**$6,708,892**
EXPENSES		
Personnel	$2,915,732	$2,866,040
Outsourced Services Related to Contracts and Grants (subcontracts)	329,916	2,480,167
Operations (Software (Licenses, Support, & Maintenance) hardware and G&A)	2,178,071	1,198,832
TOTAL EXPENSES	**$5,423,719**	**$6,545,039**
PROJECTED SURPLUS/DEFICIT*	**$847,522**	**$163,853**

*Note – 2015 surplus attributed to staffing and capital costs not incurred due to planned development efforts in 2016/2017 that would leverage capital on hand.

HealthInfoNet

HealthInfoNet Balance Sheet 2014 - 2015

	Projected Year End 2015	Actual 2014
ASSETS		
Current Assets		
Cash	$2,750,225	$1,549,041
Accounts Receivable	448,128	367,567
Prepaid Expenses and Other Current Assets	200,048	245,625
Total Current Assets	3,398,402	2,162,233
Property and Equipment		
Furniture & Equipment	1,086,656	1,040,797
Accumulated Depreciation	-687,701	-497,992
	398,955	542,805
Other Assets		
Intangible Assetw - Software Licenses	3,074,232	3,074,232
Accumulated Amortization	-2,882,627	-2,468,083
	191,605	606,149
Total Assets	**$3,992,487**	**$3,311,187**
LIABILITIES AND NET ASSETS		
Current Liabilities		
Accounts Payable	$148,478	$182,009
Accrued Expenses and Other Current Liabilities	110,354	89,380
Deferred Hospital/Provider Subscription Fees	454,357	608,020
Total Current Liabilities	713,189	879,409
Unrestricted Net Assets	3,279,298	2,431,778
Total Liabilities & Net Assets	**$3,992,487**	**$3,311,187**

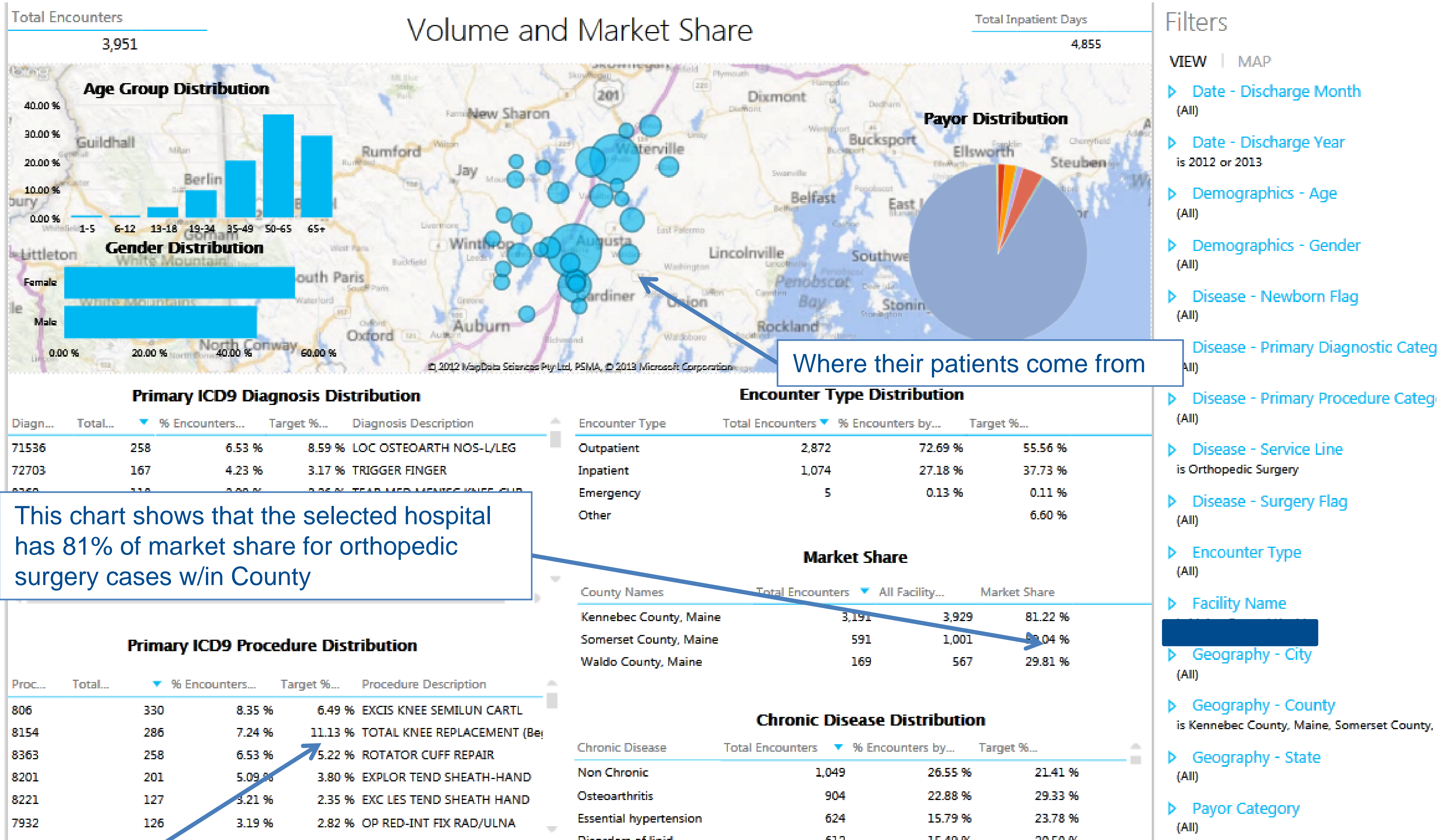
Note – HealthInfoNet policy is to maintain 3-4 months operating expenses on hand in order to support any potential disruptions in revenue from contracts and subscriptions.

HealthInfoNet

Reporting & Analytics

- **Administrative**
  - Budgeting and volume forecasting
- **Care Management – Hospital & Primary Care**
  - Manage high risk ED patients / over utilizers
  - 30-day readmission management
- **ACO – Pioneer CMS, State Employees, Commercial**
  - Population management – risk stratification and proactive care management
- **Medical Group with Insurance Product**
  - Population management – risk stratification and proactive care management
- **Medicaid SIM Project**
  - New enrollee risk identification and proactive care management

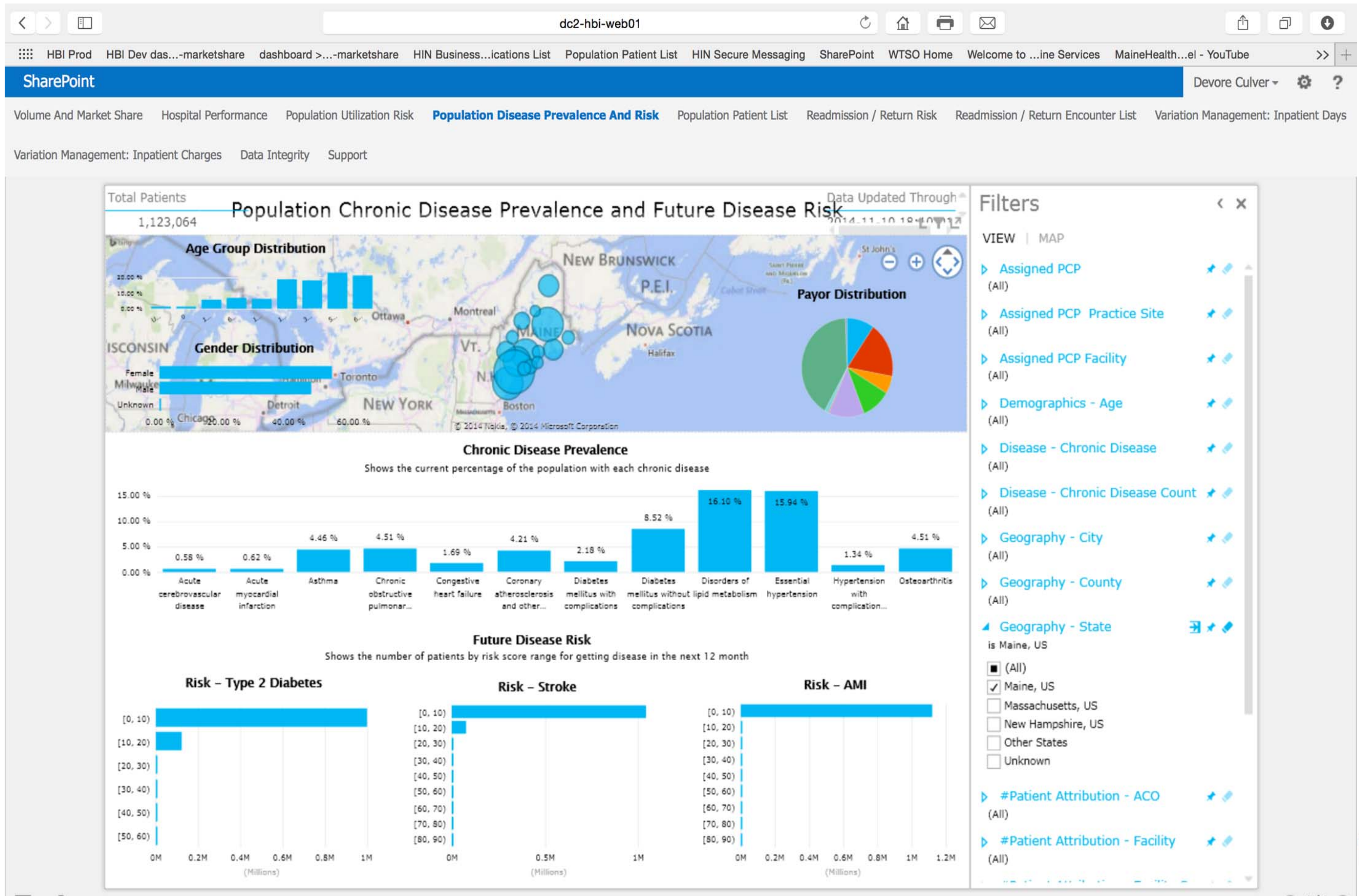
Volume and Market Share Dashboard



And the highest volume procedures.

HealthInfoNet

Population Risk Management Dashboards: Chronic Disease Profile



Population Risk Management Dashboards: Individual Patient Summary

Patient Summary

Patient Information

First Name :	295871
Last Name :	295871
Middle Name :	A
Age :	59
Gender :	F
Date Of Birth :	02/03/1954
Date Of Death :	

Patient Current Risk Profile

High Cost Risk Score :	75
IP Admission Risk Score :	89
ED Visit Risk Score :	8
Last 30 Day Readmission Risk Score :	42
Last IP Encounter Discharge Date :	

Patient Previous 12 Months History

Inpatient Admissions :	5
Inpatient Total Patient Days :	21
ED Visits :	14
Outpatient Visits :	36

The summary above shows that this 59 year old female had 5 inpatient admissions, 14 ED visits, and 36 outpatient visits in the last 12 month period.

The chart shows the timing of each encounter along with the risk scores increasing over time.

30

How Maine hospitals are predicting your next trip to the ER

Gabor Degre | BDN

Jessica Taylor, a nurse at St. Joseph Internal Medicine in Bangor has been using a predictive modeling tool that helps identify patients at risk of needing emergency room care or in need of support. Hospitals can use the real-time data to tailor care and lower readmission rates.

OPEN ACCESS Freely available online PLOS | ONE

Risk Prediction of Emergency Department Revisit 30 Days Post Discharge: A Prospective Study

Shiying Hao[1,2¶], Bo Jin[1¶], Andrew Young Shin[3¶], Yifan Zhao[1¶], Chunqing Zhu[1], Zhen Li[2], Zhongkai Hu[1], Changlin Fu[1], Jun Ji[1], Yong Wang[4,6], Yingzhen Zhao[2], Dorothy Dai[1], Devore S. Culver[5], Shaun T. Alfreds[5], Todd Rogow[5], Frank Stearns[1], Karl G. Sylvester[2‡], Eric Widen[1‡], Xuefeng B. Ling[2*‡]

1 HBI Solutions Inc., Palo Alto, California, United States of America, **2** Department of Surgery, Stanford University, Stanford, California, United States of America, **3** Department of Pediatrics, Stanford University, Stanford, California, United States of America, **4** Department of Statistics, Stanford University, Stanford, California, United States of America, **5** HealthInfoNet, Portland, Maine, United States of America, **6** Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing, China

Abstract

Background: Among patients who are discharged from the Emergency Department (ED), about 3% return within 30 days. Revisits can be related to the nature of the disease, medical errors, and/or inadequate diagnoses and treatment during their initial ED visit. Identification of high-risk patient population can help device new strategies for improved ED care with reduced ED utilization.

Methods and Findings: A decision tree based model with discriminant Electronic Medical Record (EMR) features was developed and validated, estimating patient ED 30 day revisit risk. A retrospective cohort of 293,461 ED encounters from HealthInfoNet (HIN), Maine's Health Information Exchange (HIE), between January 1, 2012 and December 31, 2012, was assembled with the associated patients' demographic information and one-year clinical histories before the discharge date as the inputs. To validate, a prospective cohort of 193,886 encounters between January 1, 2013 and June 30, 2013 was constructed. The *c*-statistics for the retrospective and prospective predictions were 0.710 and 0.704 respectively. Clinical resource utilization, including ED use, was analyzed as a function of the ED risk score. Cluster analysis of high-risk patients identified discrete sub-populations with distinctive demographic, clinical and resource utilization patterns.

Conclusions: Our ED 30-day revisit model was prospectively validated on the Maine State HIN secure statewide data system. Future integration of our ED predictive analytics into the ED care work flow may lead to increased opportunities for targeted care intervention to reduce ED resource burden and overall healthcare expense, and improve outcomes.

Citation: Hao S, Jin B, Shin AY, Zhao Y, Zhu C, et al. (2014) Risk Prediction of Emergency Department Revisit 30 Days Post Discharge: A Prospective Study. PLoS ONE 9(11): e112944. doi:10.1371/journal.pone.0112944

HealthInfoNet

5 Year Strategic Plan

Three Key Focus Areas

1.Develop the Service and Product Infrastructure

- ***Goal:*** An organizational infrastructure will be in place to support a financially stable core operation with flexibility to attract soft funding that compliments the organization's financial and operational requirements.

2.Expand HIN HIE and Analytic Products into National and Regional Markets

- ***Goal:*** Out-of-state services will provide additional funding for HealthInfoNet and will provide support for the funding requirements of core operation.

3.Enhance and Expand HIE Services

- ***Goal 1:*** Use of the exchange services data will be expanded to meet reporting/analytics, notification requirements, and quality/efficiency improvement activities.
- ***Goal 2:*** HealthInfoNet data will be recognized as a high quality and reliable clinical data source. Pharmacies will participate as members of HIE.

HealthInfoNet