



Pilot Results

Beth Israel Deaconess Medical Center (BIDMC)
Massachusetts eHealth Collaborative (MAeHC)



Health in the 21st Century

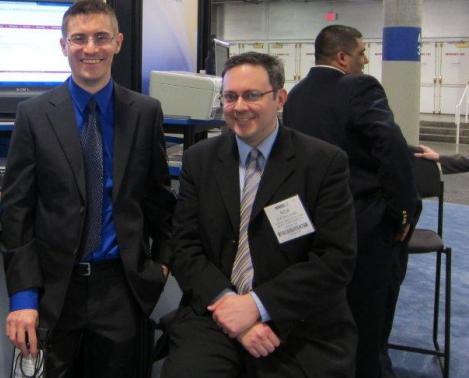
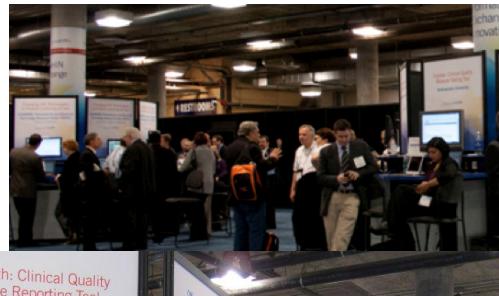
MITRE

THANK YOU!



Beth Israel Deaconess
Medical Center

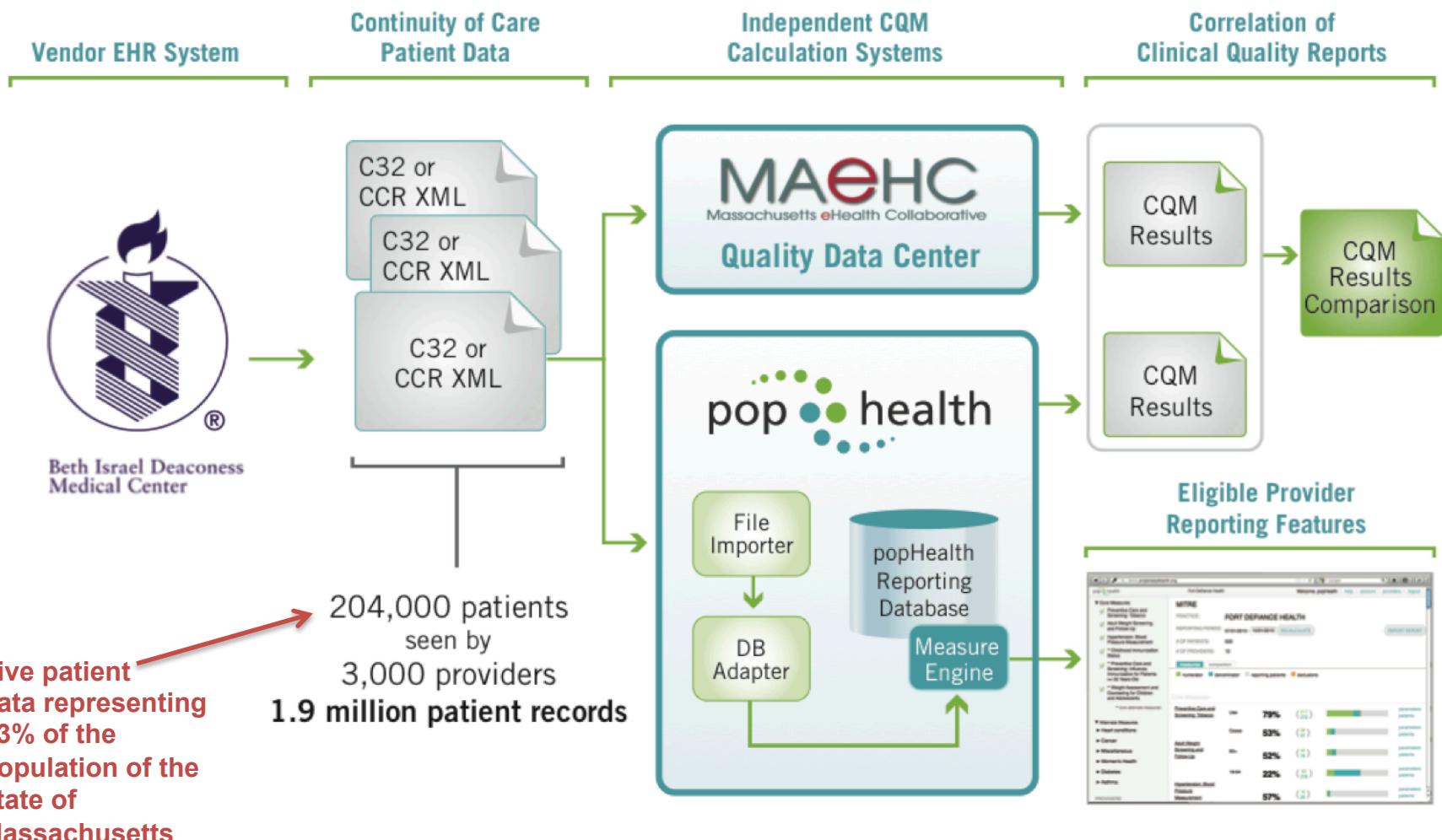
MAeHC
Massachusetts eHealth Collaborative



Pilot Objectives

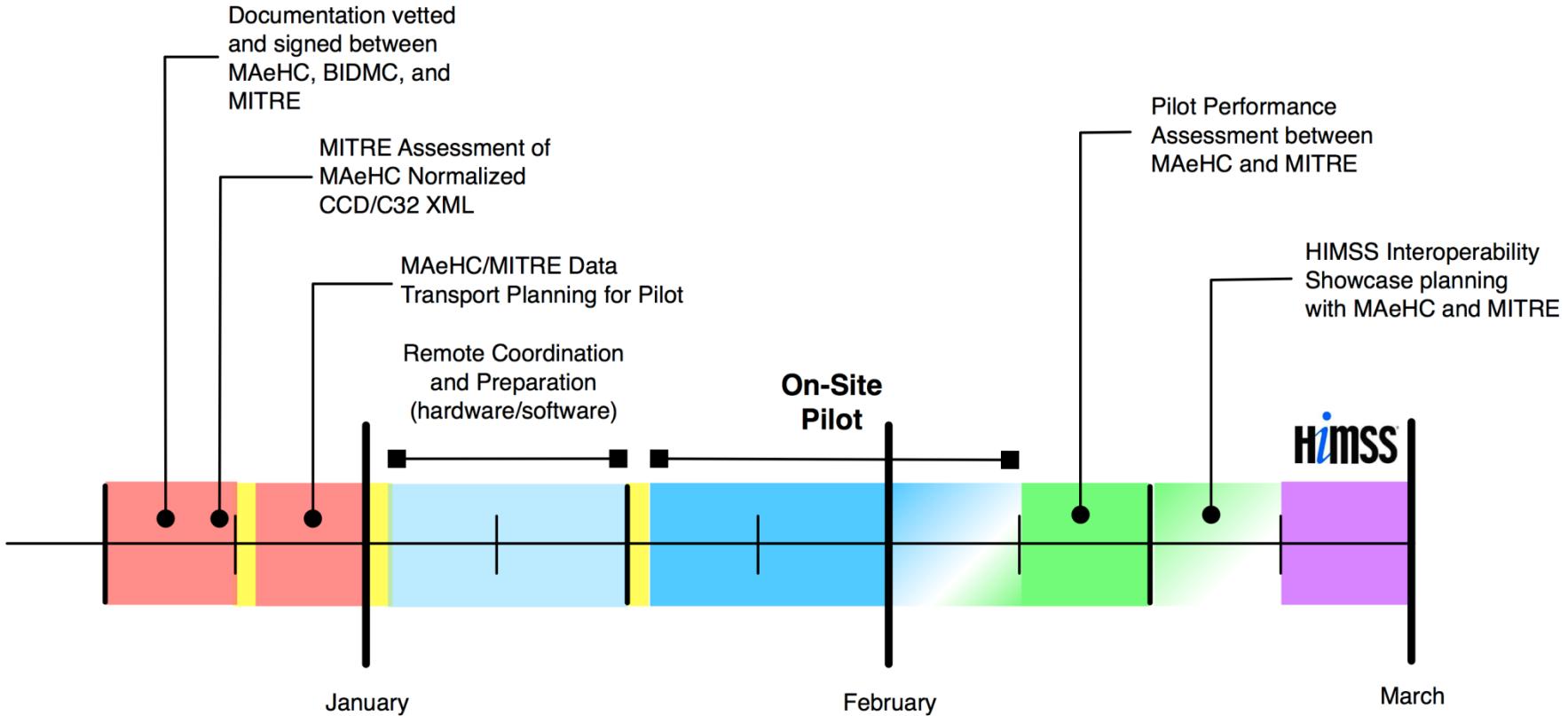
- Test the scalability of popHealth on a large dataset (1.9 million continuity of care records)
- Compare Clinical Quality Measure (CQM) calculations using two independent systems for an identical dataset:
 - popHealth and MAeHC Quality Data Center (QDC)
- Collect critical feedback on CQM reporting to guide the evolution of popHealth
- Demonstrate the results of the pilot at the HIMSS 12 Conference as part of the ONC Interoperability Showcase

Pilot Concept of Operations





pop health Pilot Schedule



Pilot Performance and Execution

■ Initial Performance Issues

- Multiple C32s for one patient
- HTTP upload identified as a bottleneck for transferring records over the MAeHC network
- Initial estimates of popHealth performance were 1M records over 1 week of continuous processing

■ Improved Performance By End Of Pilot

- Introduced new merging rules into popHealth
- Upload of C32 data performed over the MAeHC file system
- Increased hardware resources reduced load time to 1M records over 1 day of continuous processing

High-Level CQM Results for BIDMC

- Clinical quality measure results produced for all 44 MU Stage 1 measures in both popHealth and Quality Data Center system
- The 18 CQMs with “good” results indicate some value in re-purposing continuity of care XML documents for calculating CQMs
 - Some shortcomings still remain with respect to the ability of the C32 standard to automatically cover any CQM
- Use of the continuity of care XML documents as inputs to CQMs still under debate
 - Continuity of care data standards not designed for CQMs and do not have 100% coverage of all clinical attributes and codes
 - Root causes include optional data fields and lack of coordination with codes in the C32, vs. codes in the CQMs

Comparative results for 18 CQMs are presented on the next page, followed by a detailed discrepancy report for one BIDMC provider (results have been de-identified)

popHealth : An Open Source Quality Measure Reference Implementation

129.83.174.104:3000

Beth Israel Deaconess Medical Center

Welcome, pophealth | help | account | admin | providers | logs | logout

Core Measures

- Hypertension: Blood Pressure Measurement
- Preventive Care And Screening: Tobacco
- Adult Weight Screening And Follow-Up
- ** Weight Assessment And Counseling For Children And Adolescents
- ** Childhood Immunization Status
- ** Preventive Care And Screening: Influenza Immunization For Patients >= 50 Years Old

** core alternate measures

Alternate Measures

Asthma

- Asthma Assessment
- Use Of Appropriate Medications For Asthma
- Asthma Pharmacologic Therapy

Miscellaneous

- Appropriate Testing For Children With Pharyngitis
- Initiation And Engagement Of Alcohol And Other Drug Dependence Treatment
- Controlling High Blood Pressure
- Smoking And Tobacco Use Cessation, Medical Assistance
- Pneumonia Vaccination Status For Older Adults
- Primary Open Angle Glaucoma (POAG): Optic Nerve Evaluation
- Low Back Pain: Use Of Imaging Studies
- Anti-depressant Medication Management

PRACTICE: Beth Israel Deaconess Medical Center

REPORTING PERIOD: 10/01/2011 - 01/01/2012

OF PATIENTS: 263882

OF PROVIDERS: 11

[export report](#)

measures comparison

CORE MEASURES

Hypertension: Blood Pressure Measurement **88%** (25722 / 29073) parameters patients

CORE ALTERNATE MEASURES

Preventive Care and Screening: Influenza Immunization for Patients >= 50 Years Old **10%** (5219 / 49678) parameters patients

ASTHMA

Use of Appropriate Medications for Asthma 5-11 **41%** (10 / 24) parameters patients

12-50 **84%** (398 / 470) parameters patients

5-50 **82%** (408 / 494) parameters patients

Asthma Pharmacologic Therapy **52%** (1097 / 2107) parameters patients

MISCELLANEOUS

Controlling High Blood Pressure **41%** (7296 / 17739) parameters patients

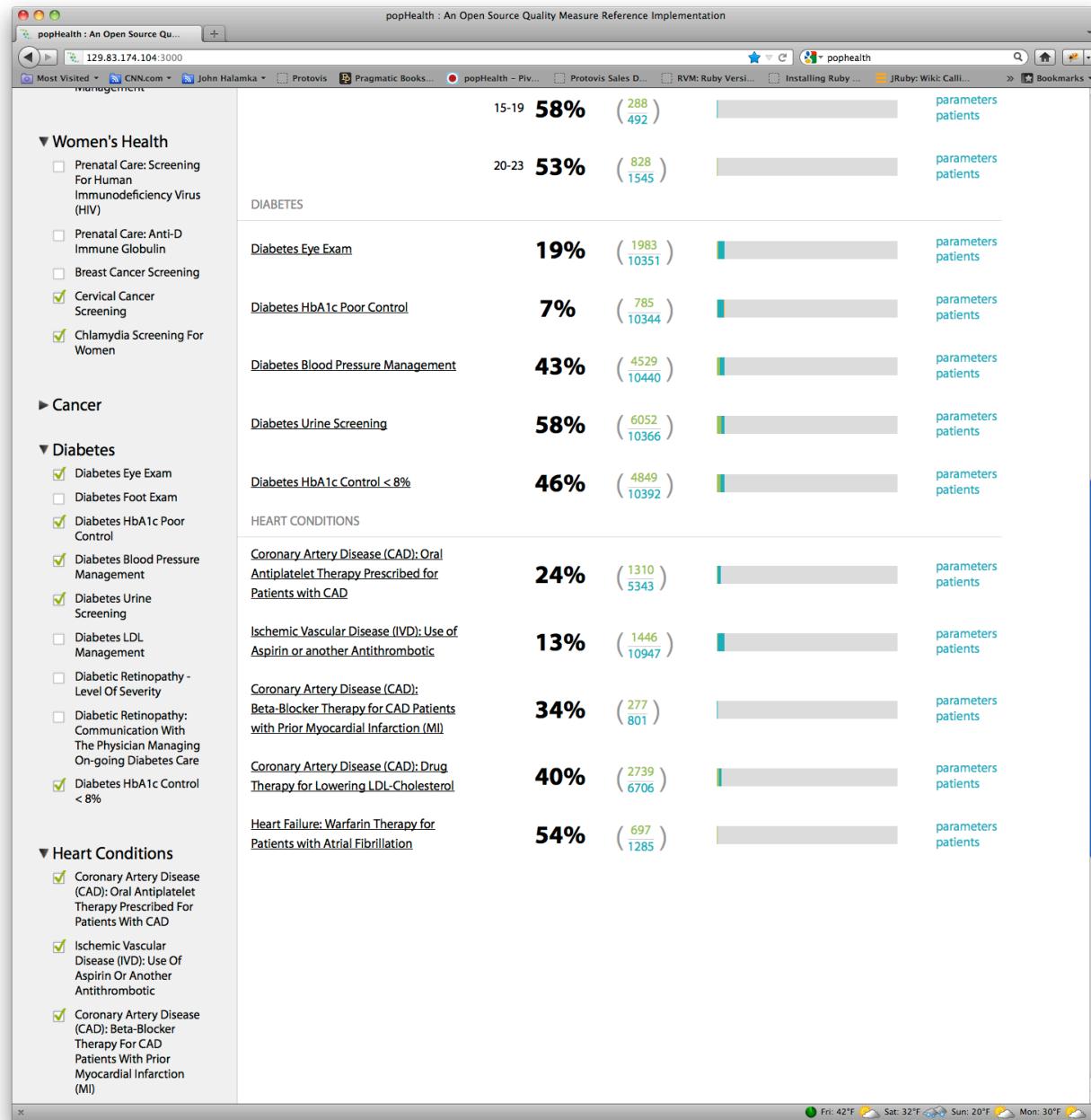
Pneumonia Vaccination Status for Older Adults **5%** (2221 / 41554) parameters patients

WOMEN'S HEALTH

Cervical Cancer Screening **28%** (49364 / 175264) parameters patients

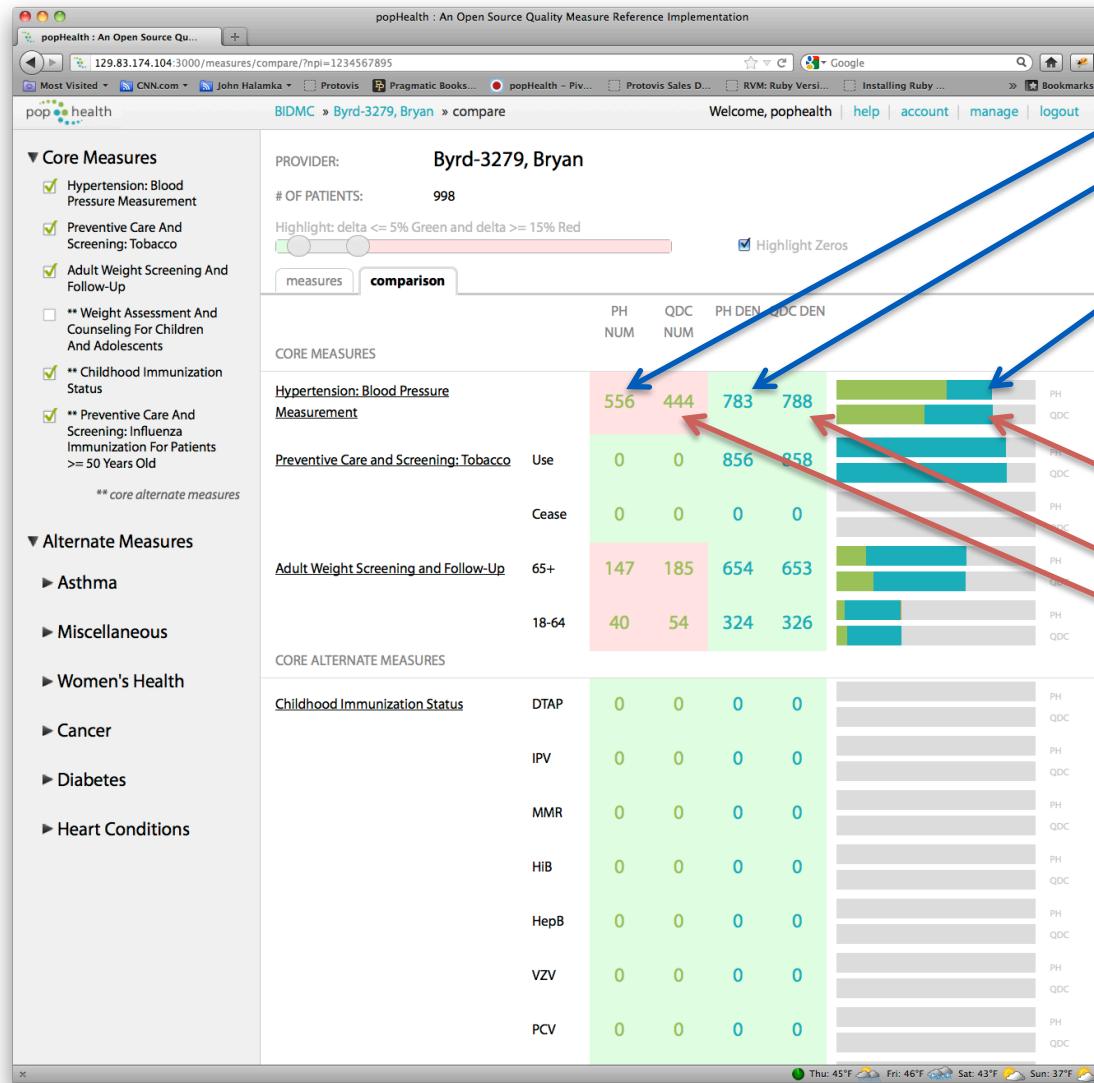
Chlamydia Screening for Women 15-23 **54%** (1116 / 2037) parameters patients

parameters

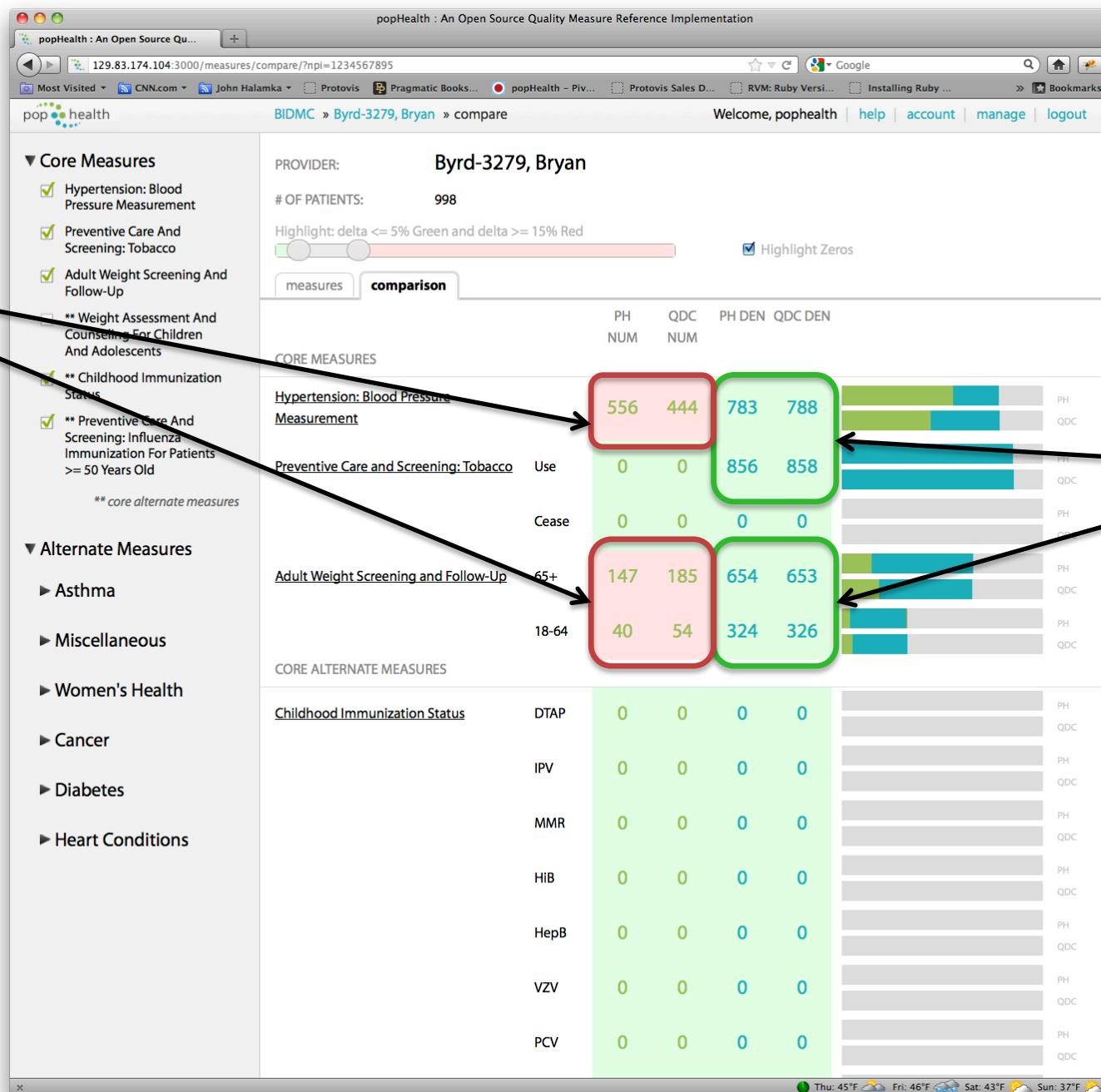


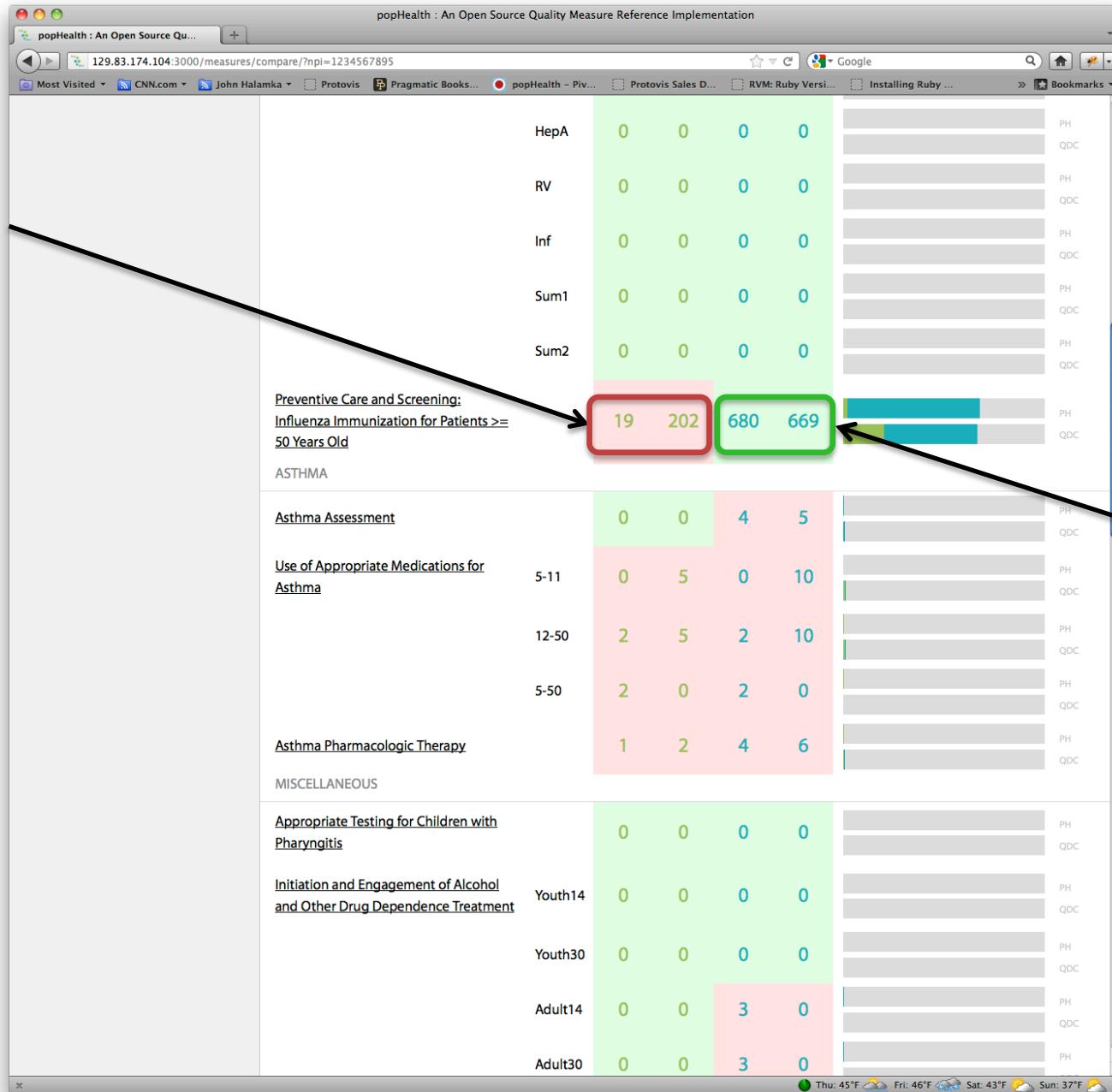
How To Read Comparison Results

popHealth
Measure
Results

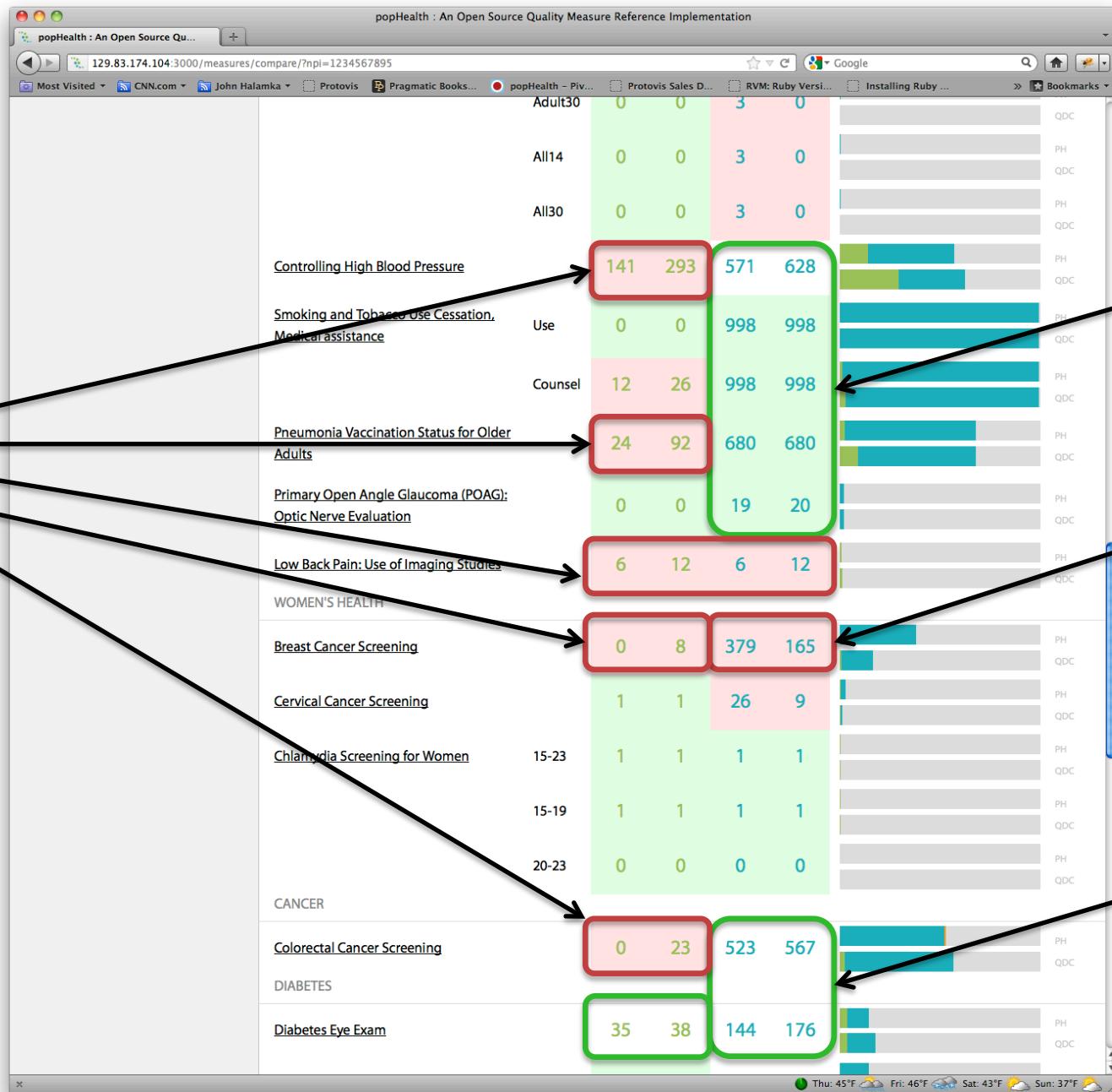


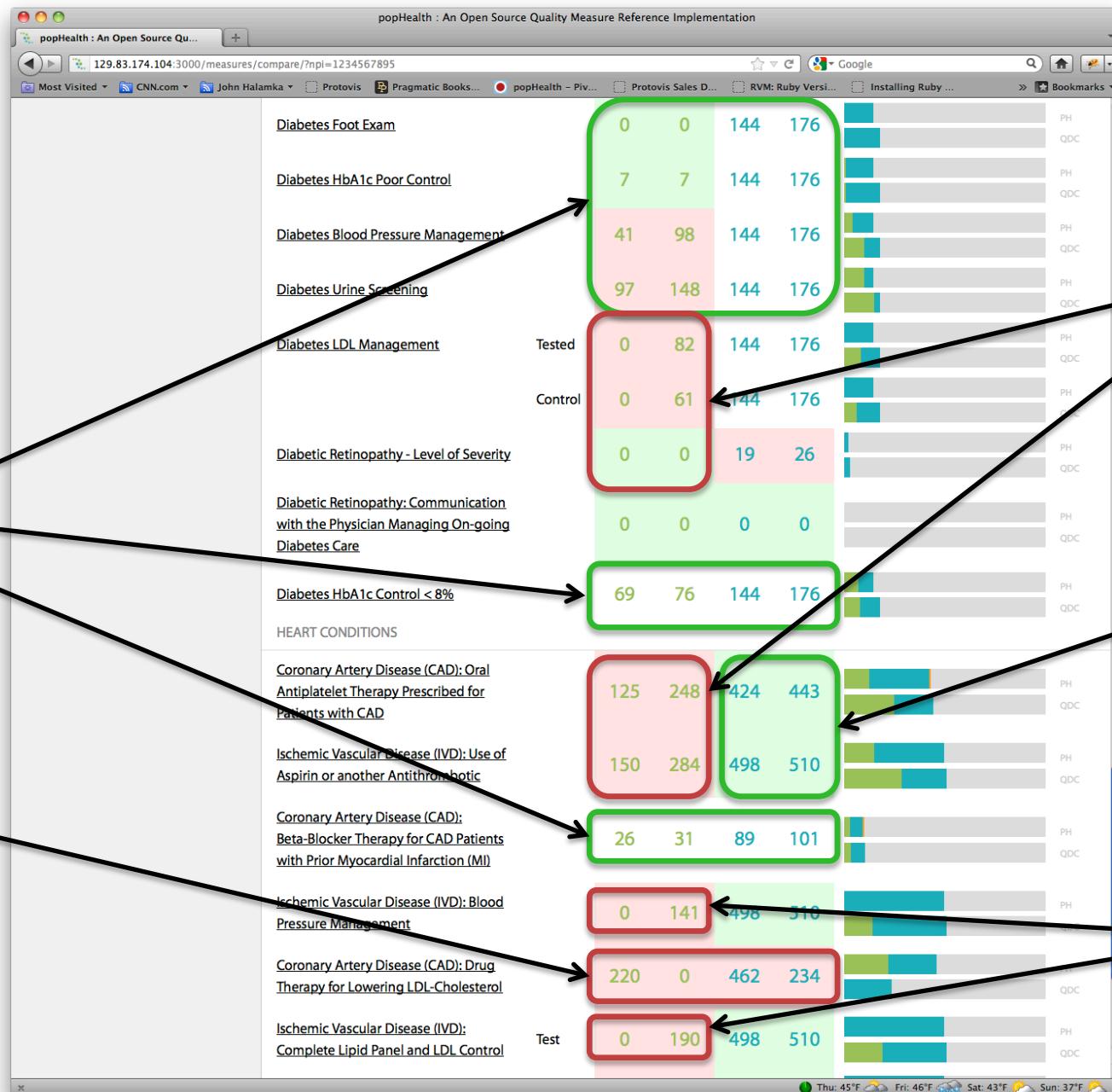
QDC
Measure
Results





Encouraging Correlation





Pilot Evaluation

- Detailed investigation on CQM results conducted for 10 providers
- Perfect and exact correlation not observed on any of the 44 CQMs
 - Values were similar, but often off by several patients
- Identified 3 primary categories for differences
 1. Use of the Patient Continuity of Care Document (C32) record specification as a “*post-encounter message*” vs. as a “*document*”
 2. Code mismatches between those published in MU rules vs. the BIDMC operational codes
 3. Ambiguity in interpretation of the measure definitions

Use of Continuity of Care Documents

- The C32 was designed by HITSP and HL7 to be a continuity of care summary record
 - popHealth was expecting each C32 to contain the complete clinical history for one patient
- BIDMC successfully uses the C32 operationally as a post-encounter message format
 - 1 C32 record per encounter, resulting in multiple records per patient
 - Message C32s can come from multiple systems
 - Message C32 clinical data were *merged* within popHealth to perform a comparison test of a patient's full record

Use of Continuity of Care Documents cont.

- ***Merging* process for C32 record is not well defined**
- **Different interpretations in the merge processes between MITRE and MAeHC led to some of the CQM discrepancies**
 - Required coordination with MAeHC to agree on similar assumptions
- **During this pilot, popHealth was enhanced to support multiple post-encounter message C32 records**
 - This functionality is now available for others via the open source popHealth project and community

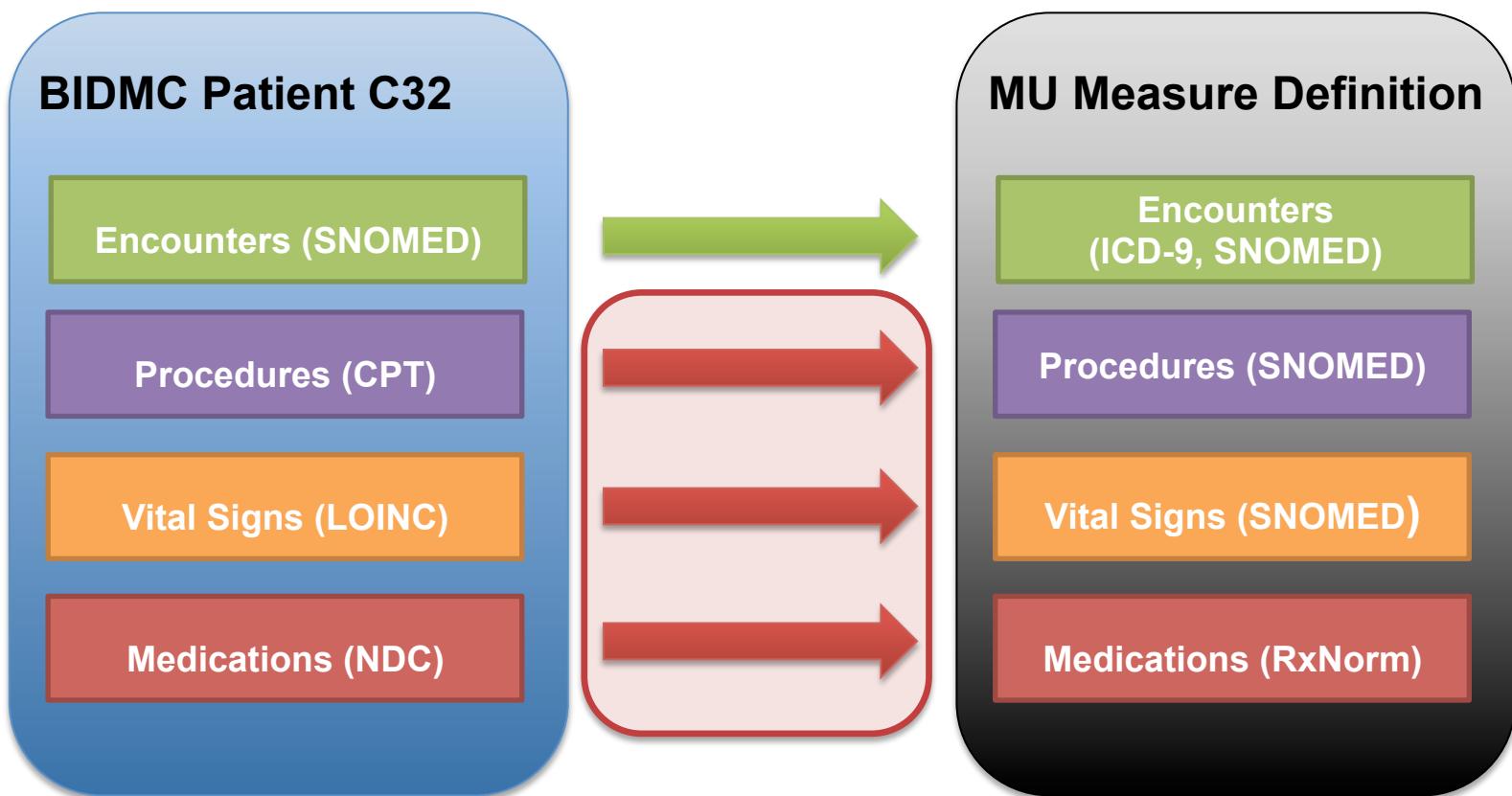
Continuity of Care Documents cont.

■ Patient to Provider Attribution not well defined

- popHealth expected the C32 Provider Section to detail the providers associated with the patient
 - C32 records used at BIDMC map the provider to the C32 Encounter Section
- Potential exists to incorrectly attribute a patient's clinical data to a provider for the wrong CQMs
 - This would be exist when using other non-QDC systems with the BIDMC C32s for the purposes of calculating quality measures
 - The QDC system and supporting infrastructure almost certainly had to be specialized for the BIDMC C32 messaging approach

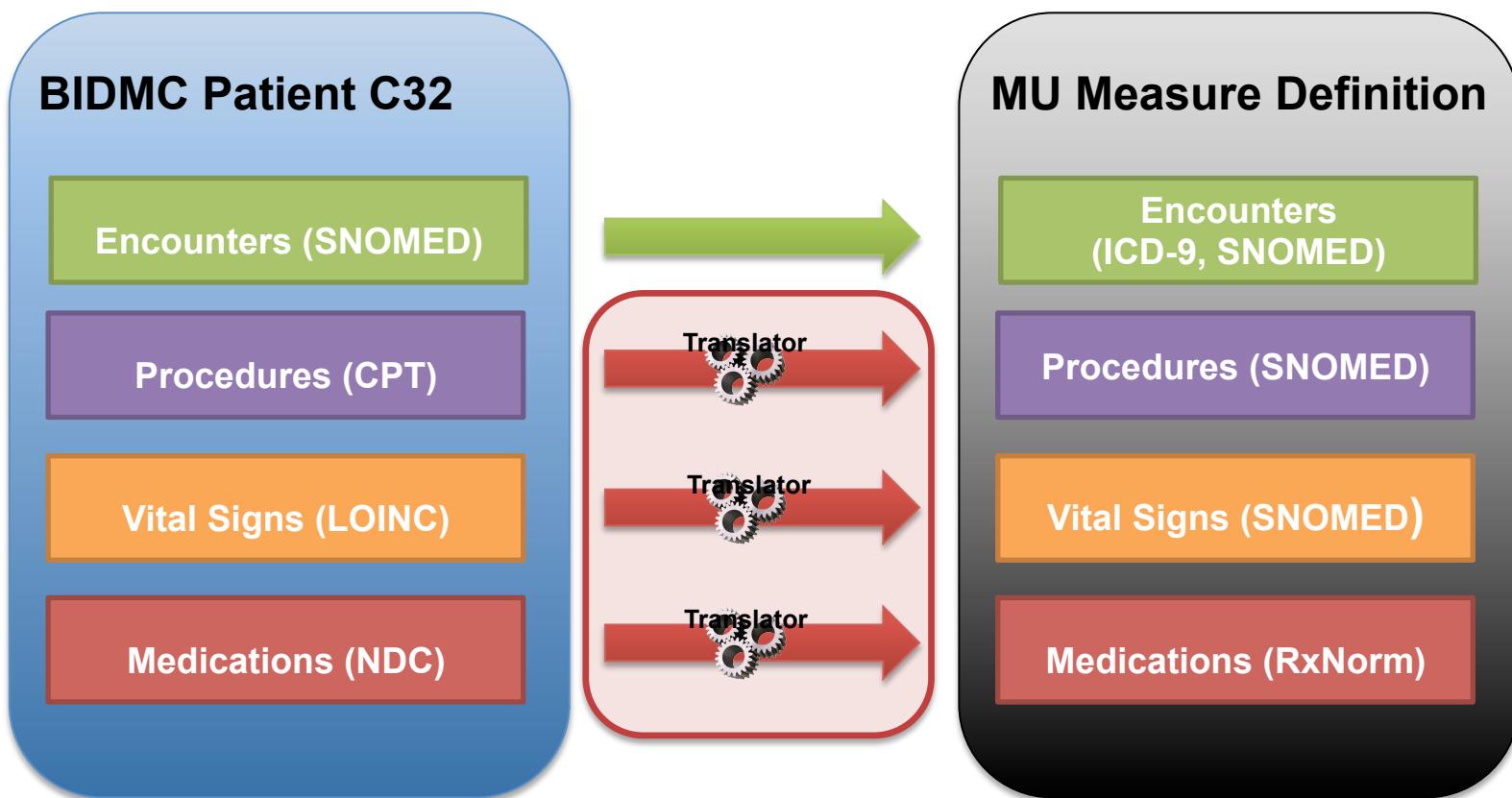
Code Set Mismatch

Mismatches occurred between the code sets specified in the CQM definitions and the code sets used by BIDMC



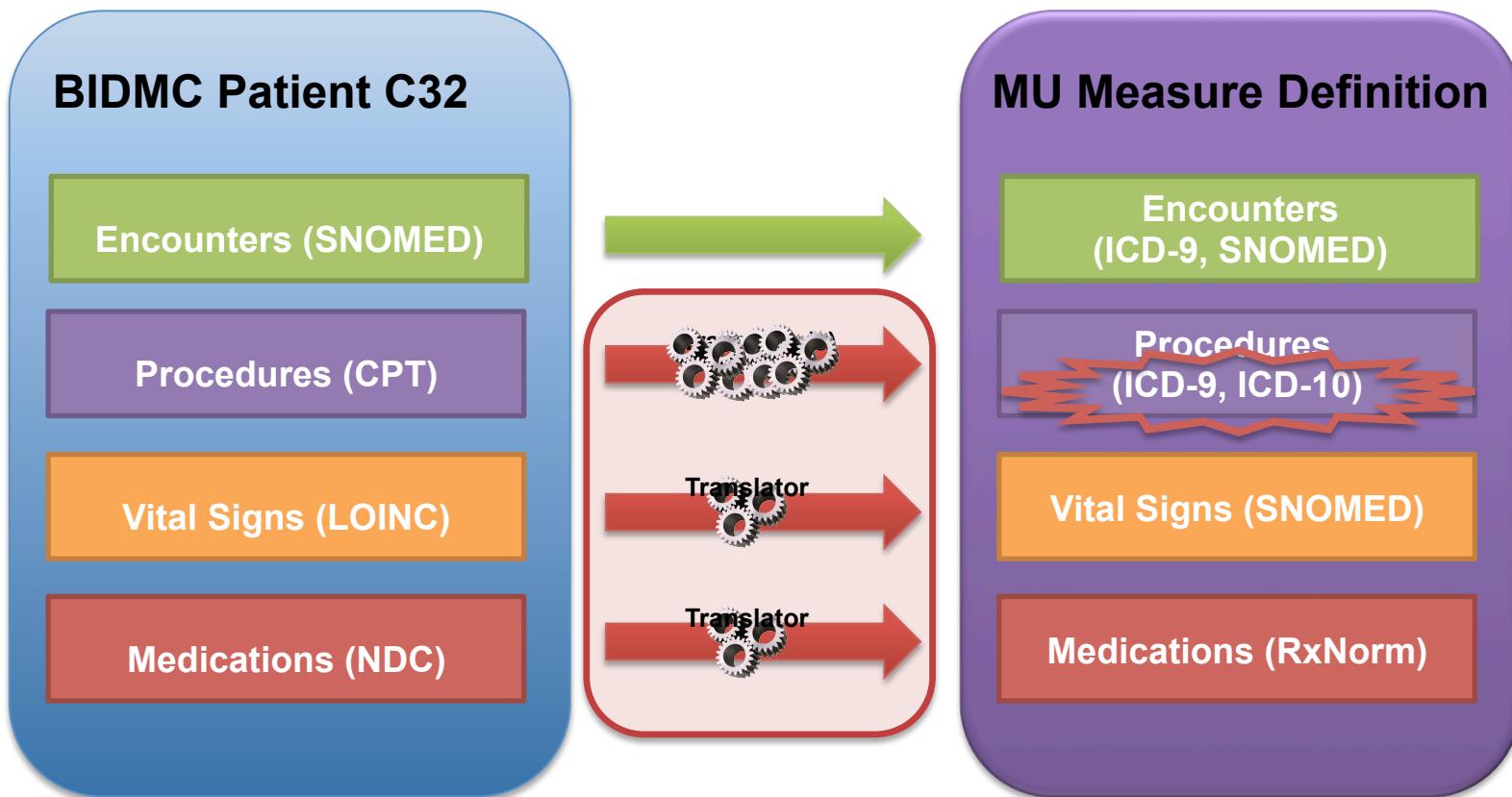
Code Set Mismatch

Translator scripts were introduced to convert from the codes used by BIDMC to the codes specified by the CQM definition



Code Set Mismatch

Translations are not always clearly defined



Code Set Mismatch

- **Consistent use of code sets are needed across each of the clinical concepts**
 - i.e. conditions should always include codes translated to ICD-9, ICD-10, SNOMED for all MU CQMs
 - This will be addressed in MU Stage 2 with a consistent set of codes which will map to each of the clinical terms in any of the MU CQMs

Measure Definition Ambiguity

Ambiguity exists in the measure definitions so that different interpretations are possible

■ Measures defined in text format:

Population criteria

- Initial Patient Population =
 - AND: "Patient characteristic: birth date" (age) >=17 and <=84 years to capture all patients who will reach the ages between 18 and 85 years during the "measurement period";
- Denominator =
 - AND: All patients in the initial patient population;
 - AND: "Diagnosis active: hypertension" <= 6 months after "measurement start date";
 - AND: "Encounter: encounter outpatient";
 - AND NOT:
 - OR: "Procedure performed: procedures indicative of ESRD";
 - OR: "Diagnosis active: pregnancy";
 - OR: "Diagnosis active: ESRD";
- Numerator =
 - AND: MINIMUM "Physical exam finding: diastolic blood pressure" < 90 mmHg during MOST RECENT "Encounter: encounter outpatient";
 - AND: MINIMUM "Physical exam finding: systolic blood pressure" <140 mmHg during MOST RECENT "Encounter: encounter outpatient";
- Exclusions =
 - None;

One example
measure
specification
logic as
published on
the CMS
Stage 1 MU
CQM site

Measure Definition Ambiguity

■ Measures defined in text format

Population criteria

- Initial Patient Population =
 - AND: "Patient characteristic: birth date" (age) ≥ 17 and ≤ 84 years to capture all patients who will reach the ages between 18 and 85 years during the "measurement period";
- Denominator =
 - AND: All patients in the initial patient population;
 - AND: "Diagnosis active: hypertension" ≤ 6 months after "measurement start date";
 - AND: "Encounter: encounter outpatient";
 - AND NOT:
 - OR: "Procedure performed: procedures indicative of ESRD";
 - OR: "Diagnosis active: pregnancy";
 - OR: "Diagnosis active: ESRD";
- Numerator =
 - AND: MINIMUM "Physical exam finding: diastolic blood pressure" < 90 mmHg during MOST RECENT "Encounter: encounter outpatient";
 - AND: MINIMUM "Physical exam finding: systolic blood pressure" < 140 mmHg during MOST RECENT "Encounter: encounter outpatient";
- Exclusions =
 - None;

This simple logic for ≤ 84 years old is open to misinterpretation and was a problem between popHealth and QDC thresholds:

"84 years and 364 days old"

vs.

"84 years and 0 days old"

This logic is open to interpretation between "last outpatient encounter" vs. "last outpatient encounter where BP was recorded" again causing discrepancies

Recommendations

- Promote consistency of CQM results so that different organizations should generate precisely the same results
- Improve CQM definitions:
 1. Standardize CQM definitions to reduce ambiguity with interoperable algorithm definitions: Tractable and machine understandable eMeasure specification for CQM logic
 2. CQM Clinical Code Sets: Consistent use of Code Sets for clinical terms used across all MU CQMs (underway in MU Stage 2)
- Address Lack of Continuity of Care Transactions:
 1. Continuity of Care Data Merging Transactions: Identify and publish agreed upon transactions for merging patient records (ie. Post-encounter Message C32s vs. Document C32s)