Patient 360:

Using Health Information Exchange as a Community Care Platform

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Health Information Exchange

- "HIE is a process that links and integrates an individual patient's information from multiple, disparate data sources." [JAMIA 2010;17:302-307]

- HIE can be accomplished through a variety of different architectural strategies

360 degree view of patients

- A true 360 degree view of a patient is only achievable by having access to *all* their patient records
- Will require virtualized access to the patient's record in multiple healthcare organizations
- Health Information Exchange (HIE) provides a means of accomplishing this

HIEs Today

- 2009 - 75 operational HIEs in the US. covering 721 (14%) of US hospitals and 6,879 (3%) of ambulatory practices. 73 planned. 13 (17%) of HIEs facilitated exchange required for meaningful use criteria.
- Many struggling with financial viability.
- Types of services/functionality across 75 HIEs
  - 44 (59%) - data exchange between practices and hospitals
  - 39(52%) – exchange of laboratory results
  - 32 (43%)– exchange of summary records
  - 21 (28%)– e-prescribing
  - 19 (25%) – enable provider to submit data to public health departments
  - 18 (24%) – offered quality reporting

[Adler-Milstein, et al. Ann Intern Med. 2011;154:666-671]

Successful HIEs

–Santa Cruz – Since 1996, 400 practices

–HealthBridge – Since 1997, 5500 physicians, 28 hospitals,

–Hudson Valley – Since 2001, 800 providers, 15-20 hospitals

–Indiana Health Information Exchange – Since 2004, 58 hospitals, 13,000 clinicians, 3 payors

Common Services Among Successful HIEs

- Lab/Radiology results reporting
- Electronic prescribing
- Access to a "Virtual Record" even for providers without EHRs
- Electronic communication (messaging) across the HIE
  - replaced fax machines...
- Public Health Reporting (HB, Hudson)
- Multiple EHR interface support
  - HB supports interfaces from 25+ EHR vendors
  - Hudson supports interfaces from 20+ EHRs

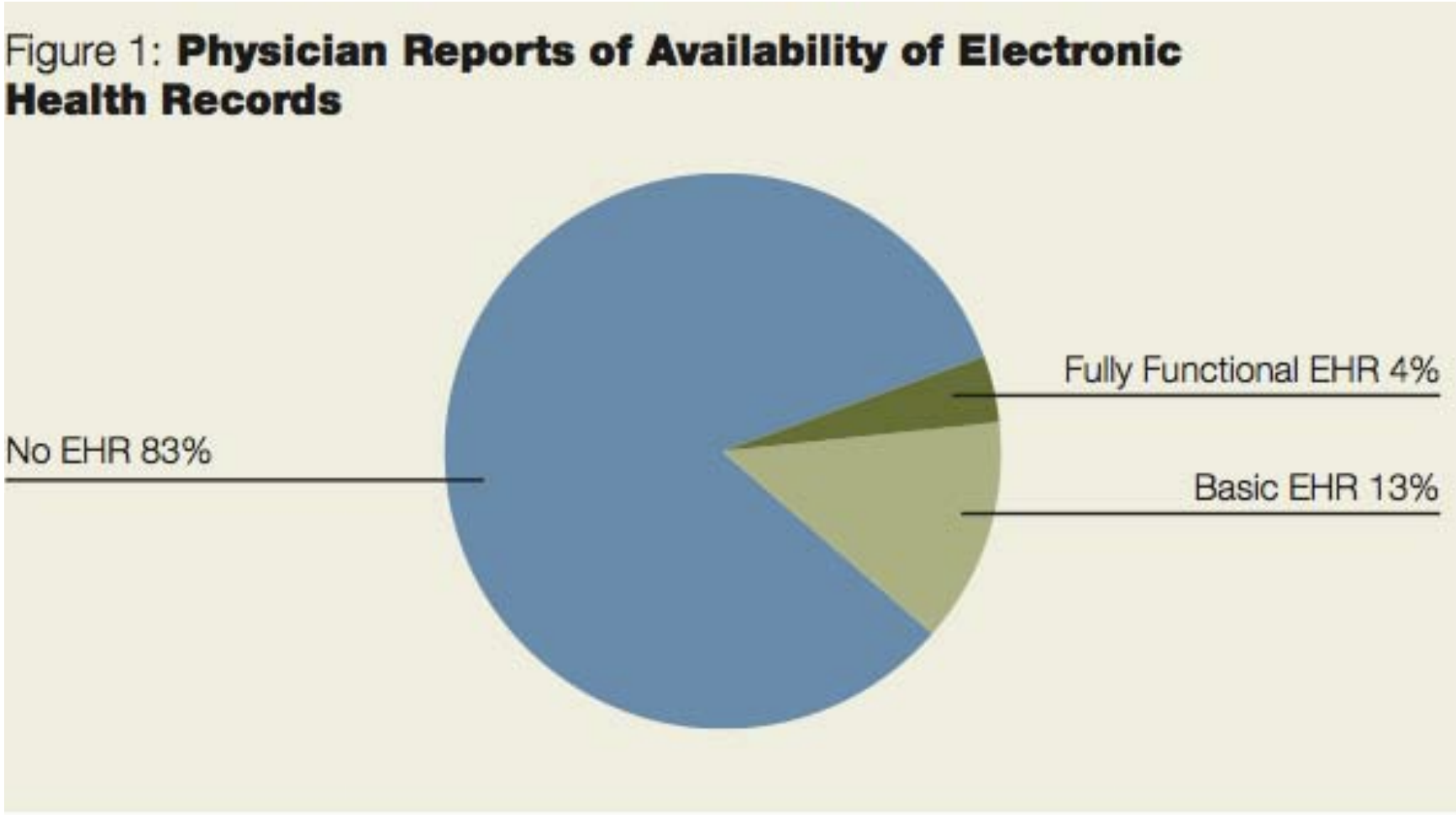
Potential Benefits of HIE's in Healthcare

- Walker and colleagues concluded that fully standardized HIE would result in a net savings of $**77.8 billion** annually (5% of 1.661 trillion spent on US healthcare in 2004)
  - Avoided tests and improved efficiencies (faster access)
  - Access to longitudinal test results
  - Reduction of order-related phone calls (particularly with medication prescriptions)
  - Improved safety through access to a complete and current medication list
  - Improved efficiencies in provider-to-provider interactions (consultations)
  - Improved public health reporting (reportable labs, immunizations)

Jan Walker, et al. *Health Affairs*, 2005 Jan-Jun; Suppl. Web Exclusives: W5 10-18

Why are HIE's not taking off just yet?

EHR Adoption is still low



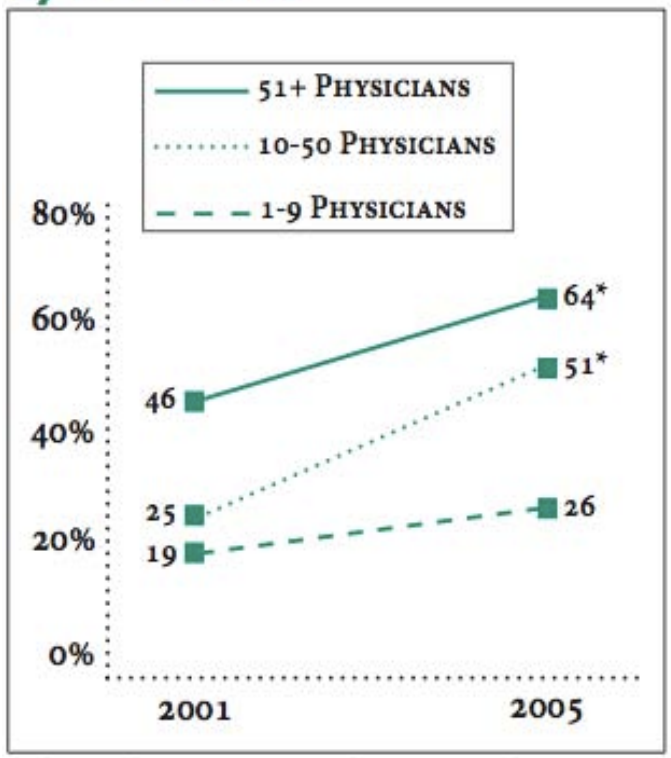
Hing ES, Burt CW, Woodwell DA „Electronic Medical Record Use by Office-Based Physicians and Their Practices: United States" Adv Data 2007, 393: 1–7, 2006

Low value of HIE's in Paper Centered Practices

- Value of an HIE is marginal
  - Staff is still managing paper – electronic is printed and filed with the paper chart (very little difference from traditional mailed/faxed reports)
- HIE's begin providing significant benefits when physicians are using EHRs
  - Because without an HIE, one would be *typing* results into the EHR (ugh…)
  - HIE's provide the opportunity for e-messaging being integrated into EHR records (consult notes)
  - HIE's provide the opportunity for electronic ordering, e-prescribing, all integrated into an EHR
- Today, only the ~17% of physician practices with EHRs would get significant benefits from an HIE – not very robust market

Adoption is improving…

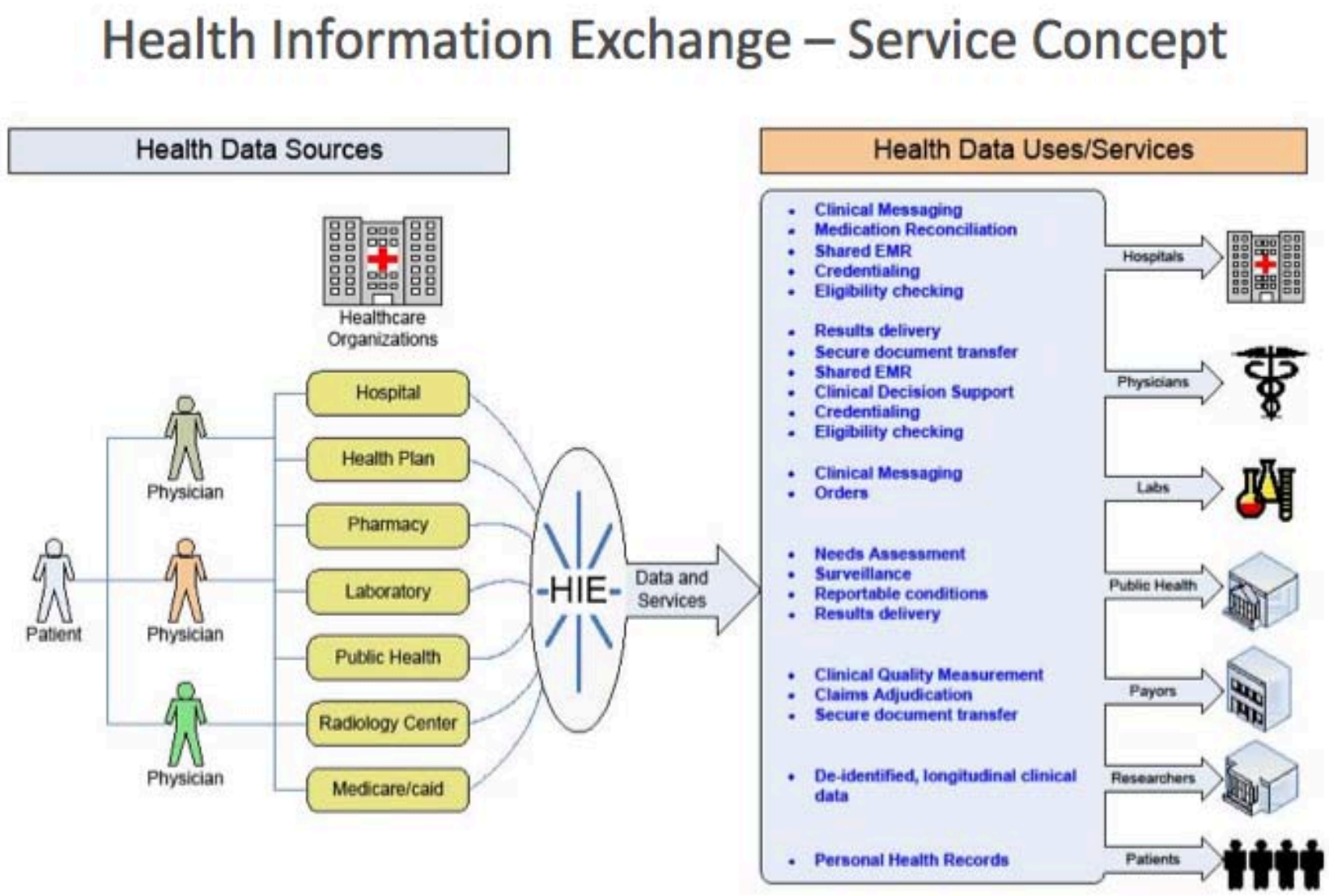
Physicians in Group Practices with IT for at Least Three of Five Clinical Activities in 2000-01 and 2004-05, by Practice Size



* Changes between 2000-01 and 2004-05 in the gaps between group practices with 1-9 physicians and group practices with 10-50 physicians and 51+ physicians were statistically significant at $p < .05$.

Source: HSC Community Tracking Study Physician Survey

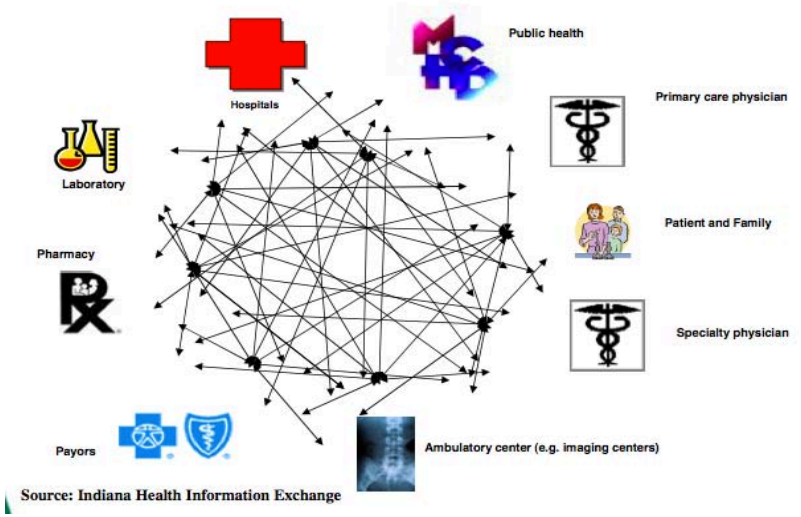
A Prototypical 'Successful' HIE – Value Add Services!



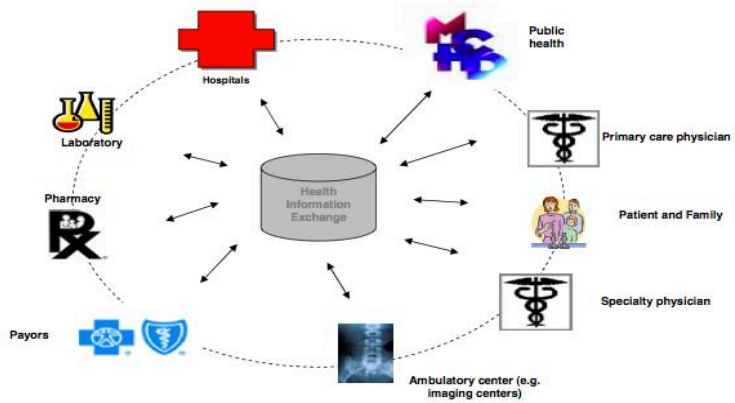
Indiana Health Information Exchange: http://www.ihie.org/pdfs/HIMSS10%20IHIE%20slides.pdf

HIE's – they are inevitable!

- HIE's are inevitable as EHR adoption accelerates and practices need reported data electronically...



- It is an obvious benefit to have a central 'hub'
  - One connection = many



HIE as a Community Care Platform

- An HIE is in a good position to provide value added services based on having a 360 degree view of patients

- Community Care Platform
  - **What is it?**: Using an HIE and the 360 view of patients to provide decision support, intervention suggestions.
  - **Who does it?**: The HIE itself or another entity that is provided connections to the HIE in order to access a patient's virtualized record and provide value-added services, decision support for their physician, etc..

The HIE COPD Project

- COPD is a progressive disease, timely diagnosis is key
  - Patients take an average of 8years to report symptoms to a healthcare provider
  - Average 7 year delay between presentation of symptoms and diagnosis of COPD
  - 50% of COPD patients are first misdiagnosed with asthma
  - 50% lung function may be lost by the time one is diagnosed
- Treatment varies significantly
  - 31% of COPD patients are not prescribed maintenance therapy

The Premise of the HIE COPD Project

- Is it possible to screen, diagnose and treat COPD and smoking within the scope of an entire medical community using an HIE?

Pfizer – Redwood Med Net COPD Project

Phase 1 Goals:

- Improved COPD identification and smoker identification at the time of hospital discharge

Phase 2 Goals:

- Determine how appropriate care transitions program can improve care coordination and outcomes in these areas.

- Examine the potential effects of Meaningful Use requirements on the Exchange standards (standards fomat)

- Optimize process between HIE and practical intervention methodologies

Venue: Redwood MedNet HIE, Alliance Medical Center

Pfizer – Redwood Med Net COPD Project

- Investigation funded by Pfizer – Michael Sasko
- Redwood MedNet – Will Ross
- Technology Partner – Mirth Corp.
- Initial Clinical Cohort – Alliance Medical Center
  - Mark Street, CTO
  - Located in Healdsburg, California
  - 11,000 patients
- Data sources
  - Initially test against the Epic Clarity database at Alliance
  - Add live data streams via HIE from other EHRs (enabled by Cal eConnect HIE Expansion Grant)

Identifying the Cohort

- Real-time 'screening' of HIE traffic
  - Use the "river of data" emanating from the HIE participants
  - Advantages: real-time, can potentially uncover pattern suggestive of a disease process even if not documented
  - Disadvantages: partial data, HIE exchange is often missing data

- Virtual Community Data Repository
  - Leverage HIE-to-EHR connections to connect to organizational data repositories
  - Advantages: more comprehensive view of the patient's records, access to 'current status' of problem list, med list, laboratory/radiology studies, etc..

Identifying a COPD / Smoking Patient Cohort

- **ICD-9 Code** - related to COPD – (indicating a history of COPD diagnosis)

OR

- **CPT Code** – related to COPD – (indicating a past billing for COPD illness)

OR

- **Pharmacy History** for identified list of COPD-indicated products (from eRX, Chart or Pharmacy adjudicated Claim)

OR

- **Hospital Discharge Summary** containing any mention of COPD (utilizing Mirth Inc. open-source interoperability technology construct platform)

OR

- **Any Pulmonary Lab Testing** (to include FEV1 pulmonary function tests)

OR

- **History of Smoking** (as evaluated by threshold of determined pack-years)

OR

- **Clinical Notes** related to COPD symptoms and Smoking (utilizing **NLP – Natural Language Processing** – a text scan technology use to identify COPD candidates as depicted in written or scanned clinical comments

GOLD Criteria

- **G**lobal Initiative for Chronic **O**bstructive **L**ung **D**isease
- Criteria
  - At Risk: Chronic productive cough, normal spirometry, smoker or history of smoking
  - Stage I: Mild. FEV1/FVC <70%, or FEV1 >=80%
  - Stage II: Moderate. FEV1/FVC<70%; FEV1 50%-79%
  - Stage III: Severe. FEV1/FVC<70%; FEV1 30%=49%
  - Stage IV: Very Severe. FEV1/FVC<70%; FEV1<30% or <50% with chronic respiratory failure

FEV1 = Forced Expiratory Volume at 1 second
FVC = Forced Vital Capacity

Criteria for COPD Identification

- 5 sources:
  - ICD-9-CM codes in health claims
  - clinical narrative phrases
  - medication lists/e-prescriptions
  - Chest Xray or Chest CT radiology reports
  - Pulmonary Function tests (PFTs)

ICD-9-CM – Problem list, Health Claims

- ICD-9-CM – consistent with COPD:
  - 491.21 - COPD with cute exacerbation
  - 492 - Emphysema
  - 492.0 - Emphysematous bleb
  - 492.8 - Other emphysema
  - 496 - Chronic airway obstruction not elsewhere classified
- ICD-9-CM – suggestive of COPD:
  - 491 - Chronic bronchitis
  - 491.0 - Simple chronic bronchitis
  - 491.1 - Mucopurulent chronic bronchitis
  - 491.2 - Obstructive chronic bronchitis
  - 491.20 - Obstructive chronic bronchitis without exacerbation
  - 491.21 - Obstructive chronic bronchitis with (acute) exacerbation
  - 491.22 - Chronic bronchitis with acute bronchitis
  - 491.8 - Other chronic broncitis
  - 491.9 - Unspecified chronic bronchitis

Clinical Narrative Phrase Criteria

- Clinical narrative phrase patterns consistent with chronic obstructive pulmonary disease
  - "COPD"
  - "chronic obstructive pulmonary disease"
  - "pulmonary emphysema"
  - "emphysema"
  - "obstructive emphysema"

Medication Criteria for COPD

- Drugs consistent with COPD
  - ipratropium (Atrovent)
  - tiotropium (Spiriva, HandiHaler)

- Drugs suggestive of COPD
  - albuterol (ProAir, Proventil, Ventolin), levalbuterol (xopenex), pirbuterol (Maxair, Autohaler)

  - in an person >60 years old

  - salmeterol (Serevent)
  - formoterol (Foradil)

Radiology Report Criteria

- Radiology report phrases consistent with COPD
  - "Bullae", "bullous emphysema", "emphysematous bleb", "chronic bullous emphysema", "COPD", "chronic obstructive pulmonary disease", "obstructive pulmonary disease", "emphysematous change"
- Radiology report phrases suggestive of COPD
  - "Hyperinflation", "hyperinflated", "flattening of hemidiaphragm", "flattening of diaphragm", "hyperlucency", "hyperlucent", "barrel-shaped thorax/ chest", "large AP diameter"

Pulmonary Function Testing Criteria

- Pulmonary function testing consistent with COPD
  - pulmonary function testing: FEV1 less than 80% of predicted
  - pulmonary function testing: FEV1/FVC ratio less than 70%

FEV1 = Forced Expiratory Volume at 1 second
FVC = Forced Vital Capacity

Preliminary Observations – many challenges

- Analysis of real-time HIE message data
  - PFT results not done in labs, thus not part of HIE exchange stream
  - Health claim data with procedures not part of HIE exchange
    - Unable to determine if PFT performed
  - Limited exchange of clinical encounter data (CCD)
    - Difficult to determine if COPD is a documented problem
  - Smoking history not available in structured format
- Clinical Data Repository
  - A very rich data environment
  - Current access to a patient's "lists" – problem list, medication lists
  - Access to clinical results including PFTs
  - Access to structured smoking history
  - May provide additional data beyond what is in the EHR (health claims)

ICD-9-CM - Smoking Identification

- 305.1 - Tobacco use disorder
- V15.82 - History of tobacco use
- 649.0 - Smoking complicating pregnancy
- 649.00 - Tobacco use disorder complicating pregnancy, childbirth, or the puerperium, unspecified as to episode of care or not applicable
- 649.01 - Tobacco use disorder complicating pregnancy, childbirth, or the puerperium, delivered, with or without mention of antepartum condition
- 649.02 - Tobacco use disorder complicating pregnancy, childbirth, or the puerperium, delivered, with mention of postpartum complication
- 649.03 - Tobacco use disorder complicating pregnancy, childbirth, or the puerperium, antepartum condition or complication
- 649.04 - Tobacco use disorder complicating pregnancy, childbirth, or the puerperium, postpartum condition or complication
- 305.2 - Nondependent cannabis abuse
- 305.20 - Nondependent cannabis abuse unspecified use
- 305.21 - Nondependent cannabis abuse continuous use
- 305.22 - Nondependent cannabis abuse episodic use

Smoking – clinical narratives

- Clinical narrative phrase patterns suggestive of smoker:
  - "history of smoking", "nicotine use"

- Clinical narrative phrase patterns consistent with smoker
  - "smoker", "smoking", "tobacco", "packs per day", "cannabis use", "cannabis abuse", "smoking cessation clinic", "tobacco cessation clinic"

Smoking – medication criteria

- Drugs consistent with smoker
  - Varenicline (Chantix)
  - Nicotine gum (Nicorette, Nicogum
  - Nicotine lozenge
  - Nicotine transdermal patches (Nicoderm)

- Drugs suggestive of smoker
  - bupropion

Preliminary Observations

- Even a relatively simple and prevalent disorder like COPD may be difficult to identify in HIE streams or a CDR!
- HIE's may require re-alignment of message types and access to CDRs to optimally support decision support, chronic disease management
- Even EHRs may not have all relevant data
  - Health claims (diagnoses, procedures)
- HIE-to-EHR 'connectivity' (contractual, technical) can be used to access organizational CDRs
  - provide additional information beyond traditional clinical care documents

Next Steps

- Focus primarily on CDR approach
  - Alliance uses Epic – Epic Clarity access

- Use HIE 'data stream' approach if CDR is not accessible or available from an organization
  - Radiology reports
  - Medication lists
  - Clinical Summaries (CCD)

Something to consider – Virtual CDR (Community Care Platform)

- A ‘community wide’ virtual CDR -- *not* just connecting EHRs
- Many successful HIE’s are:
  - Managing multiple result messages, ADT, e-prescribing
  - Most are providing a virtualized EHR for patients
  - This virtualized EHR could be used to create a CDR like record
- CDRs often include more than EHR data