Corporate Information Services

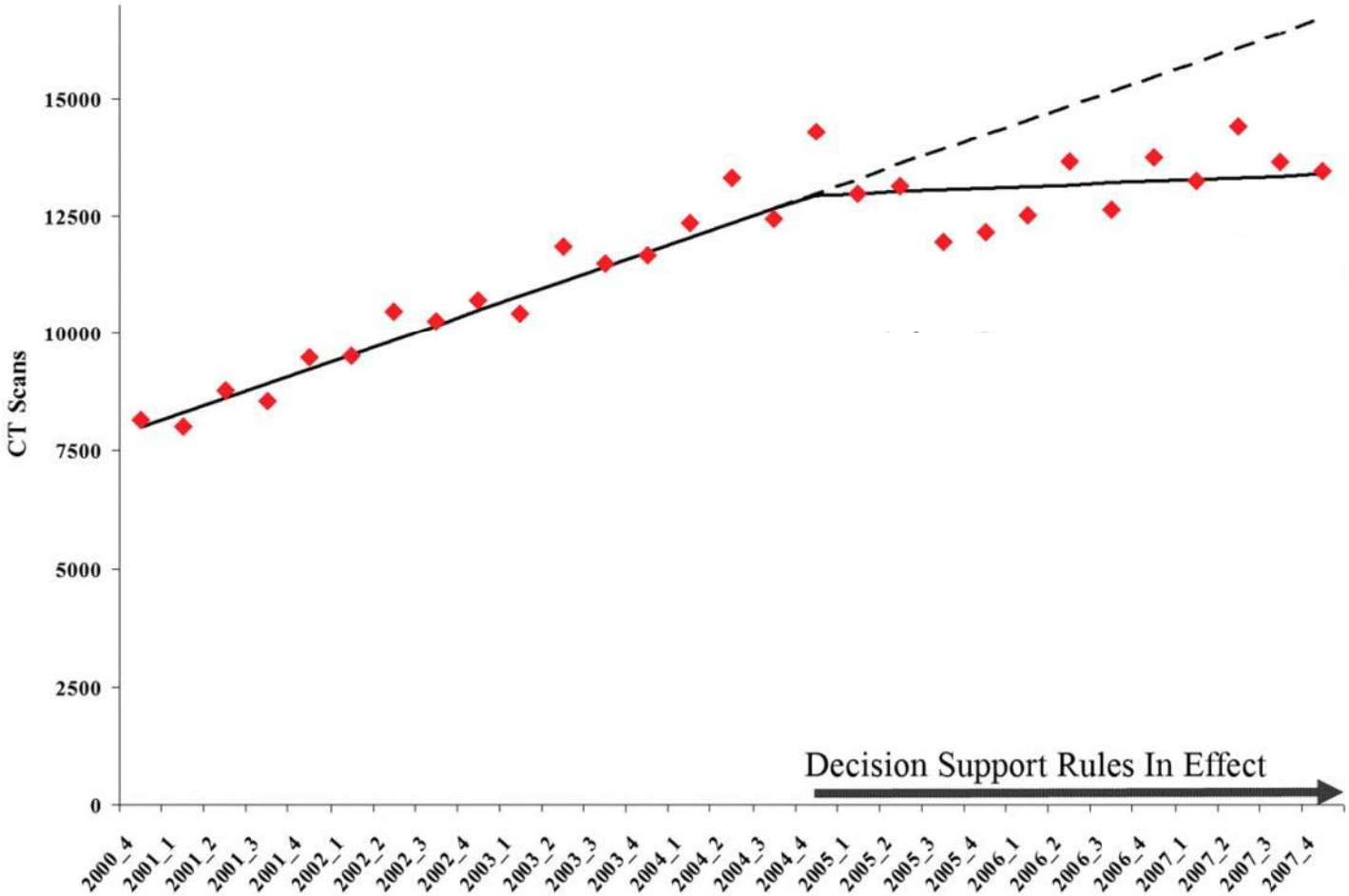
Imaging Decision Support

Penn Medicine

Imaging Decision Support

- Payers increasingly use radiology benefit managers (RBMs, “pre-authorization”) to control imaging utilization
- Imaging decision support systems (DSS):
  - Alternative to RBMs
    - Integrated with EHR (Epic, Emtrac, and eventually Sunrise)
  - Advice to ordering clinicians
    - At the point of order
    - Evidence-based
    - Configurable based on Penn Medicine needs
  - Enables Penn Medicine management of imaging utilization
    - Gain exemption from proposed Medicare RBMs
    - Facilitates risk/benefit-sharing agreements with payers

Scatterplot of outpatient CT examination volumes (y-axis) per calendar quarter (x-axis) represented by red diamonds.



Sistrom C L et al. Radiology 2009;251:147-155
(Massachusetts General Hospital)

Medicare Demonstration Project

- Funded by contracts from CMS, NIBIB, GE Healthcare
  - Consortium: Brigham and Women's, Penn, Cornell, Geisinger
  - Other consortia: Henry Ford Health System, Maine Medical Center, University of Wisconsin, National Imaging Associates
- Scope
  - CPUP providers, Medicare fee-for-service outpatients
  - 11 imaging exams:
    - CT brain, L-spine, sinus, thorax, abdomen, pelvis
    - MR brain, L-spine, shoulder, knee
    - Nuclear imaging (SPECT) of the heart
- 2 year project, led by corporate IS
  - 6 month baseline period
  - 18 month intervention period

1) Select imaging exam in Epic

UPENN TEST - TEST - GENERAL INTERNAL MED COOPER 3701 MARKET 6TH FL - MICHAEL

Epic | Chart | Encounter | Telephone Call | Mark Patients For Merge | Secure | UPHS Links | Epic Team Help | Print | Log Out

Zzzepic,Jordan

EpicCare

Zzzepic,Jordan | 600157408 | Adv Dir: None | Allergies | Prescriptions: None | Patient FYIs: None | myPennMedicine: Inacti... | Research: N
100 y.o., Male, 11/11/1911 | PCP: KARPE... | Code: None | Unknown: Not on File | Problems: None | Health Maintenan... | Primary Ins.: None | CSN: 233815

Preference List Search - Zzzepic,Jordan

CT CHEST | Search | Browse (F4) | Preference List (F5) | Database Lookup (F7)

Medications | Procedures | Order Panels | Split

Name	Sig	Code	Type	Pref List	D	Dis	Copay	Coverage	Formulary	Type
CT CHEST W IV CONTRAST PULMOI		CTCEPE	Imaging	GIM IMAGING						
CT CHEST WO IV CONTRAST (7125C		CTCU	Imaging	GIM IMAGING						
CT CHEST WO IV CONTRAST EVALU		CTCULP	Imaging	GIM IMAGING						

To place an order with Imaging Support, first select your imaging exam in Order Entry.

3 loaded. No more to load. | Select & Stay | Accept | Cancel

More Activities | Auth Prov: TEST, PHYSCIAN (SURGERY) [1056] | Pharmacy: <none selected> | No unsigned orders

MICHAEL | Open Orders | Staff Message | 12:55 PM

2) Sign Orders

UPENN TEST - TEST - GENERAL INTERNAL MED COOPER 3701 MARKET 6TH FL - MICHAEL

Epic | Chart | Encounter | Telephone Call | Mark Patients For Merge | Secure | UPHS Links | Epic Team Help | Print | Log Out

Zzzepic,Jordan

Zzzepic,Jordan 600157408 Adv Dir: None Allergies Prescriptions: None Patient FYIs: None myPennMedicine: Inacti... Research: N
100 y.o., Male, 11/11/1911 PCP: KARPE... Code: None Unknown: Not on File Problems: None Health Maintenan... Primary Ins.: None CSN: 233815

Place orders (Enc Date: 11/16/2011) - Wt: (Not entered for this visit) Ht: (Not entered for this visit)

Chart Review | MedView | Flowsheets | Graphs | Results Review | Demographics | Patient Files | Letters | Problem List | History | Allergies | Medications | Order Entry | Immunizations | Health Maintenance | Doc Flowsheets | MAR | Synopsis | Visit Navigator | More Activities

Association | New Order | Pref List | Interactions | Pharmacy | Providers | CC Results | Open Orders | Pend Orders | Sign Orders | SmartSets | Calculator

New order: Search | Next | Edit Multiple

New order defaults: Not using defaults

Procedures (1 Order)

CT CHEST WO IV CONTRAST (71250) | Remove

Radiology, Routine

Order F8- Next Order

Associate a diagnosis with the order and click **Sign Orders** as usual.

Diagnoses | Edit

Add Diagnosis | Edit | Remove

P	Diagnosis	Code
1.	Chest pain, unspecified	786.50
2.	Palpitations	785.1

New Problem | Show Resolved | Edit | Resolve

Link	Problem	Code	Noted
No problems defined for the patient.			

Auth Prov: TEST, PHYSCIAN (SURGERY) [1056] | Pharmacy: <none selected> | 1 order entered

MICHAEL Open Orders Staff Message 12:55 PM

3) Order validation

UPENN TEST - TEST - GENERAL INTERNAL MED COOPER 3701 MARKET 6TH FL - MICHAEL

Chart | Encounter | Telephone Call | Mark Patients For Merge | Secure | UPHS Links | Epic Team Help | Print | Log Out

Zzzepic,Jordan

Zzzepic,Jordan
100 y.o., Male, 11/11/1911
600157408
PCP: KARPE...
Adv Dir: None
Code: None
Allergies
Unknown: Not on File
Prescriptions: None
Problems: None
Patient FYIs: None
Health Maintenan...
myPennMedicine: Inacti...
Primary Ins.: None
Research: N
CSN: 233815

Place orders (Enc Date: 11/16/2011) - Wt: (Not entered for this vis

Association | New Order | Pref List | Interactions | Pharmacy | Providers | artSets | Calculator

New order: Search

New order defaults: Not using defaults

Next | Edit Multiple

Procedures (1 Order)

CT CHEST WO IV CONTRAST (71250)

Remove

F8- Next Order

Order Validation

The following information is missing or may need your attention

Imaging Decision Support:

Clinical indications must be documented for **CT Chest without contrast** before the order can proceed. Click **Enter Indications**.

When you've completed indications documentation, click **OK** below and **Sign** the order again to proceed.

Enter Indications

These orders cannot be signed.

OK

Edit

Resolved | Edit | Resolve

Code | Noted

1. Chest pain, unspecified 786.50
2. Palpitations 785.1

No problems defined for the patient.

Auth Prov: TEST, PHYSCIAN (SURGERY) [1056]

Pharmacy: <none selected>

1 order entered

Chart Review
MedView
Flowsheets
Graphs
Results Review
Demographics
Patient Files
Letters
Problem List
History
Allergies
Medications
Order Entry
Immunizations
Health Maintenance
Doc Flowsheets
MAR
Synopsis
Visit Navigator
More Activities

MICHAEL

Open Orders | Staff Message

12:55 PM

You must enter clinical indications by clicking **Enter Indications**.

4) Select indications

Check off the appropriate indications and click **Proceed with Order Validation**.

UPENN TEST - TEST - GENERAL INTERNAL MED COOPER 3701 MARKET 6TH FL - MICHAEL

Chart | Encounter | Telephone Call | Mark Patients For Merge | Secure | UPHS Links | Epic Team Help | Print | Log Out

Zzzepic,Jordan
100 y.o., Male, 11/11/1911
600157408
PCP: KARPE...
Adv Dir: None
Code: None

Place orders (Enc Date: 11/16/2011) - Wt: (Not e

http://170.166.20.139:5000/?medicalis_

Patient ID: Z4742 Gender: Male
Provider: Requested Procedur

Proceed with Order Validation

Select indications below then click **Proceed with order validation** to proceed.

Signs And Symptoms SSx
- [x] Chest Pain
- Pain Duration
- [ ] Cough
- [ ] Dyspnea
- [ ] Pulmonary Nodule
- [ ] Hypoxemia
- [ ] Fever
- [ ] Unexplained Weight Loss
- [ ] Back Pain
- [ ] Hemoptysis
- [ ] Deep Vein Thrombosis
- more...

Relevant History Hx
- Relevant Prior Imaging Specify
- Recommended by Specialty Specify
- [x] History of Smoking
- Malignancy (Known Active) Type
- Metastasis (Known) Specify
- Chest Trauma Type
- [ ] COPD
- [ ] Solitary Pulmonary Nodule
- [ ] Pneumonia
- Cardiac Arrhythmia Status
- [ ] Bronchiectasis
- [ ] Asbestosis
- [ ] Chest Wall Mass
- [ ] Sarcoidosis
- [ ] Cystic Fibrosis
- [ ] Pneumothorax
- [ ] Lung Mass
- Trauma Time Since

Differential Diagnosis DDx
- Malignancy (Suspected) Type
- [ ] Interstitial Lung Disease
- [ ] Pulmonary Embolism
- [ ] Pneumonia
- [ ] Metastatic Disease
- [ ] Cavitary Lung Disease
- [ ] Thoracic Aortic Aneurysm
- [ ] Bronchiectasis
- [ ] Pneumothorax
- [ ] COPD
- [ ] Lung Cancer
- [ ] Pleural Effusion
- [ ] Lung Mass
- [ ] Unruptured Aneurysm
- [ ] Brachial Plexopathy
- more...

Chart Review | MedView | Flowsheets | Graphs | Results Review | Demographics | Patient Files | Letters | Problem List | History | Allergies | Medications | Order Entry | Immunizations | Health Maintenance | Doc Flowsheets | MAR | Synopsis | Visit Navigator | More Activities

Auth Prov: TEST, PHYSCIAN (SURGERY) [1056] | Pharmacy: <none selected> | 1 order entered

MICHAEL | Open Orders | Staff Message | 12:56 PM

5) Questions

UPENN TEST - TEST - GENERAL INTERNAL MED COOPER 3701 MARKET 6TH FL - MICHAEL

Epic | Chart | Encounter | Telephone Call | Mark Patients For Merge | Secure | UPHS Links | Epic Team Help | Print | Log Out

Zzzepic,Jordan | 600157408 | Adv Dir: None | Allergies: Unknown: Not on File | Prescriptions: None | Patient FYIs: None | myPennMedicine: Inacti... | Research: N

100 y.o., Male, 11/11/1911 | PCP: KARPE... | Code: None | Problems: None | Health Maintenan... | Primary Ins.: None | CSN: 233815

Place orders (Enc Date: 11/16/2011) - Wt: (Not entered for this visit) Ht: (Not entered for this visit)

http://170.166.20.139:5000/ - Medicalis Clinical Decision Support - Windows Internet Explorer

Procedure Not Validated
for CT Chest without contrast
Estimated radiation dose:8.0 mSv

Select all that apply

- * [x] Substernal chest pain or discomfort
- [ ] Symptoms provoked by exertion or emotional stress
- [ ] Symptoms relieved by rest or nitroglycerin
- [ ] None of the above

Select one

- * ( ) Acute symptoms
- (•) Chronic symptoms

Close | Continue

Fields marked with an asterisk (*) are required.

You may be required to answer some clinical questions. Click off the appropriate answers and click **Continue**.

Auth Prov: TEST, PHYSCIAN (SURGERY) [1056] | Pharmacy: <none selected> | 1 order entered

MICHAEL | Open Orders | Staff Message | 12:56 PM

6) Validation

As indicated on the Order Validation screen, you must click **OK** and **Sign** the order again to proceed.

UPENN TEST - TEST - GENERAL INTERNAL MED COOPER 3701 MARKET 6TH FL - MICHAEL

Zzzepic,Jordan
600157408
100 y.o., Male, 11/11/1911
PCP: KARPE...

Place orders (Enc Date

Association | New Order | Sign Orders | SmartSets | Calculator

New order:
New order defaults:
Not using

Procedures (1 Order

CT CHEST WO IV CONTR

Order Validation

The following information is missing or may need your attention

Imaging Decision Support:

Clinical indications must be documented for **CT Chest without contrast** before the order can proceed. Click **Enter Indications**.

When you've completed indications documentation, click **OK** below and **Sign** the order again to proceed.

Enter Indications

These orders cannot be signed.

OK

1. Chest pain, unspecified 786.50
2. Palpitations 785.1

No problems defined for the patient.

Auth Prov: TEST, PHYSCIAN (SURGERY) [1056]
Pharmacy: <none selected>
1 order entered

MICHAEL
Open Orders Staff Message
12:57 PM

7) Sign Orders

UPENN TEST - TEST - GENERAL INTERNAL MED COOPER 3701 MARKET 6TH FL - MICHAEL

Chart | Encounter | Telephone Call | Mark Patients For Merge | Secure | UPHS Links | Epic Team Help | Print | Log Out

Zzzepic,Jordan — EpicCare

Zzzepic,Jordan 600157408 Adv Dir: None Allergies Prescriptions: None Patient FYIs: None myPennMedicine: Inacti... Research: N
100 y.o., Male, 11/11/1911 PCP: KARPE... Code: None Unknown: Not on File Problems: None Health Maintenan... Primary Ins.: None CSN: 233815

Place orders (Enc Date: 11/16/2011) - Wt: (Not entered for this visit) Ht: (Not entered for this visit) ? Resize

Association | New Order | Pref List | Interactions | Pharmacy | Providers | CC Results | Open Orders | Pend Orders | Sign Orders | SmartSets | Calculator

New order: Search | Next | Edit Multiple

New order defaults: Not using defaults

Orders have been signed. No more pending orders.

This patient has open orders.

Previously Signed Orders (1) — Reprint All Presc.

CT CHEST WO IV CONTRAST (71250) — Cancel

Radiology, Routine

Clicking **Sign Orders** completes the order.

Diagnoses — Associate... | Associate All — Level of service: Edit

Add Diagnosis — Edit | Remove

P	Diagnosis	Code
1.	Chest pain, unspecified	786.50
2.	Palpitations	785.1

New Problem — Show Resolved | Edit | Resolve

Link	Problem	Code	Noted
	No problems defined for the patient.		

Chart Review | MedView | Flowsheets | Graphs | Results Review | Demographics | Patient Files | Letters | Problem List | History | Allergies | Medications | Order Entry | Immunizations | Health Maintenance | Doc Flowsheets | MAR | Synopsis | Visit Navigator | More Activities

Auth Prov: TEST, PHYSCIAN (SURGERY) [1056] | Pharmacy: <none selected> | No unsigned orders

MICHAEL — Open Orders Staff Message — 12:58 PM

Imaging Decision Support Update

- NIBIB and CMS contracts awarded, GE research agreement pending
- Decision support rules reviewed by:
  - UPHS Decision Support committee
  - Relevant radiology section chiefs
  - UPHS ambulatory EMR Operations committee
- Phased go-live starting in early December: 3701 Market, Neurology, GI Surgery