Strategies to Improve Problem List Management within Clinical EHR Workflow

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Northwestern Medicine™

Agenda

- The Northwestern Medicine Setting
- Problem List Background
- Strategies to Optimize Use
- Future Directions
- Summary

Setting: Academic Center + affiliates

- US News Honor Roll; “Most preferred in Chicago”
- Public quality: http://www.nmh.org/nm/quality-rating-view
- 850 bed urban and 225 bed suburban hospital (>80k ED)
- Inpatient Medical Record System: Cerner PowerChart
    - MU Stage 1 completed
- Outpatient Medical Record Systems: Epic (and others)
    - MU Stage 1 completed

Problem List for MU

More than 80% of all unique patients seen by the EP or admitted to the eligible hospital have at least one entry or an indication that no problems are known for the patient recorded as structured data

- **Stage 2 and 3 increase emphasis on Care Plans exchange of content leveraging completed problem lists.**

Philosophy of Problem lists

- **Downstream utility is essential**
  - **“At a glance understanding” – without clicks!**
  - **Prevent handoff errors, understand next steps, etc.**
  - **Timeline based views**

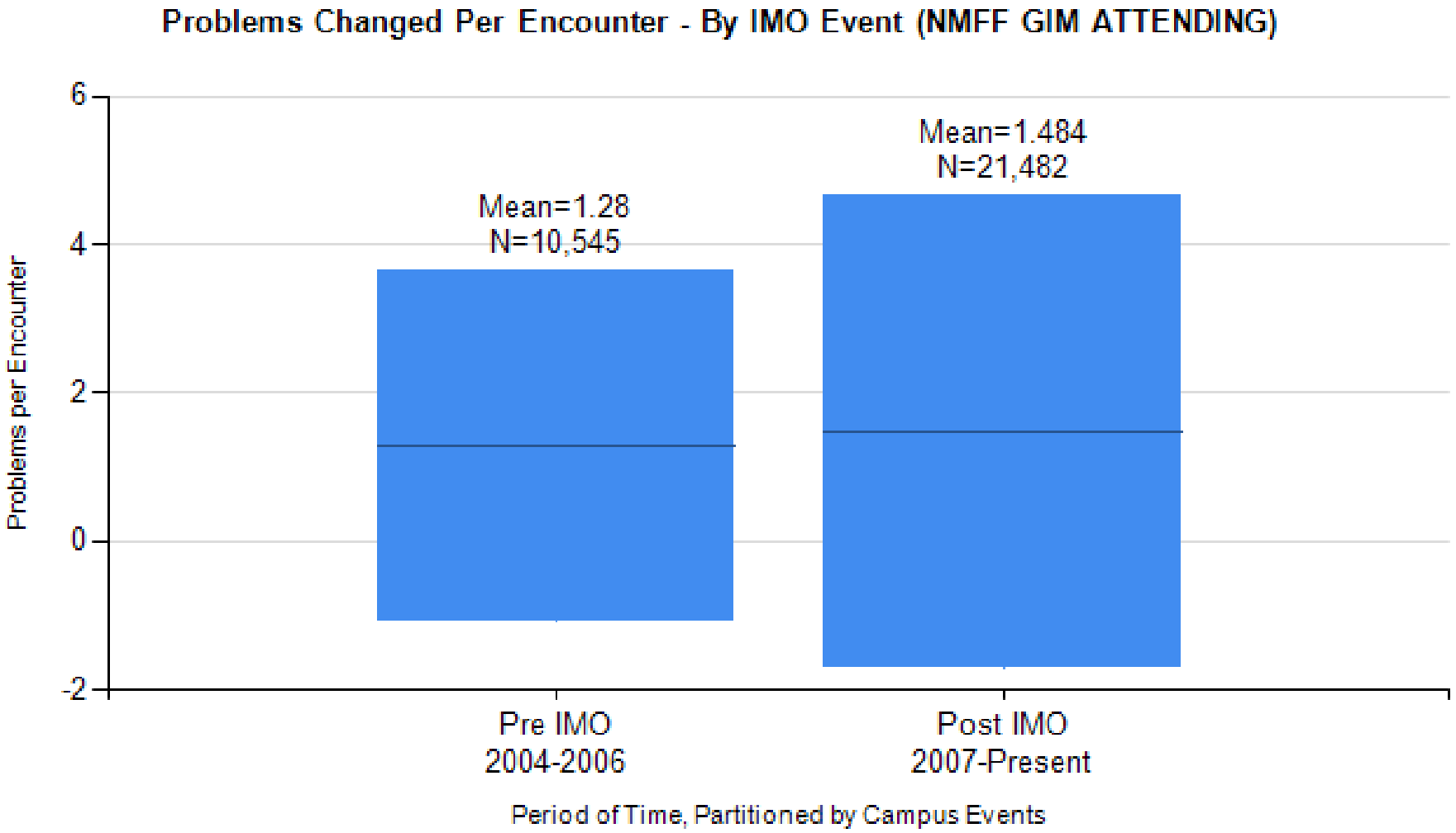
- **Workflow integration is similarly essential**
  - **Charting as a byproduct of workflow**
  - **Recognition and anticipation – missing in EHR’s**

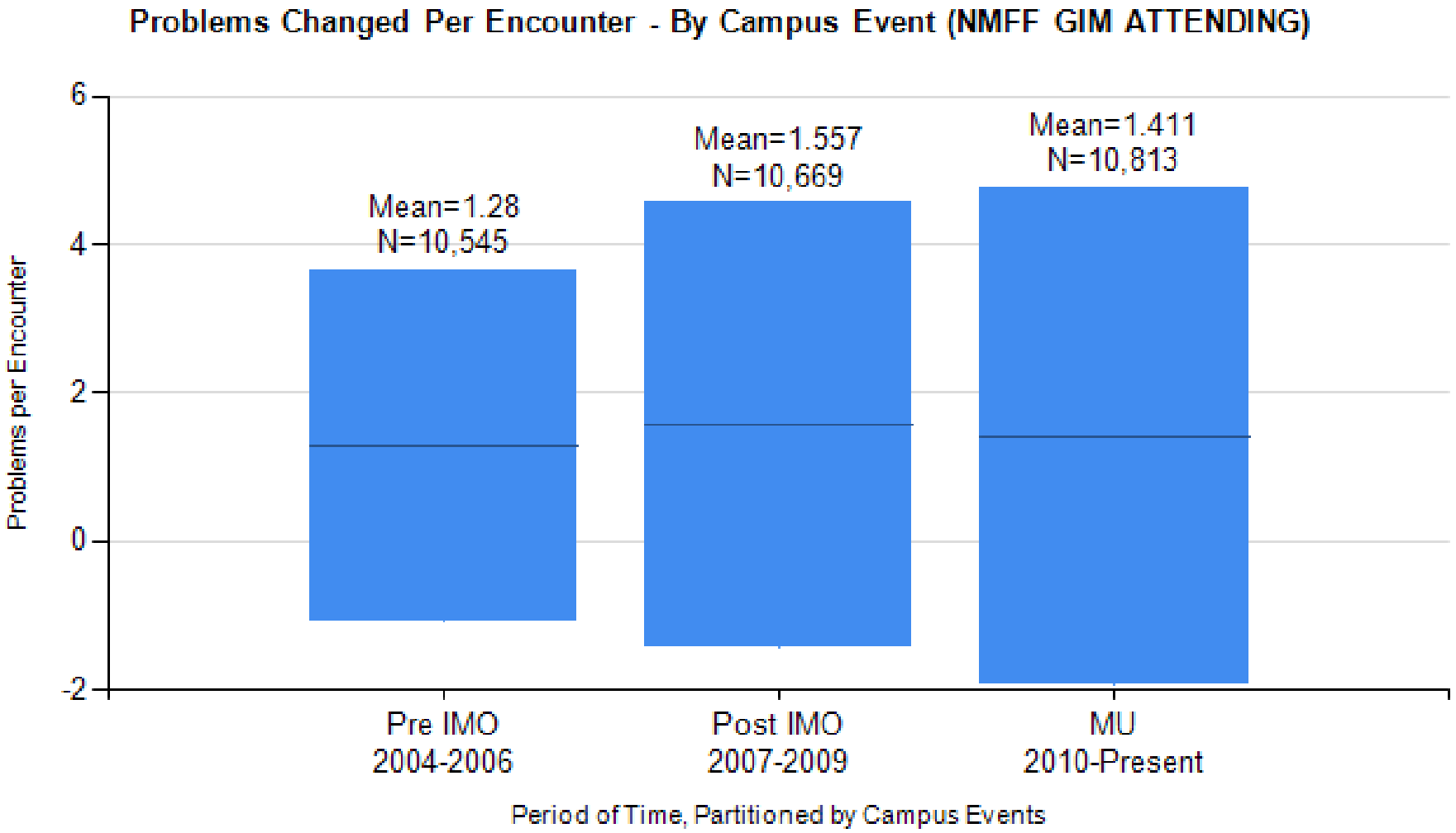
Strategies to Improve the Problem List

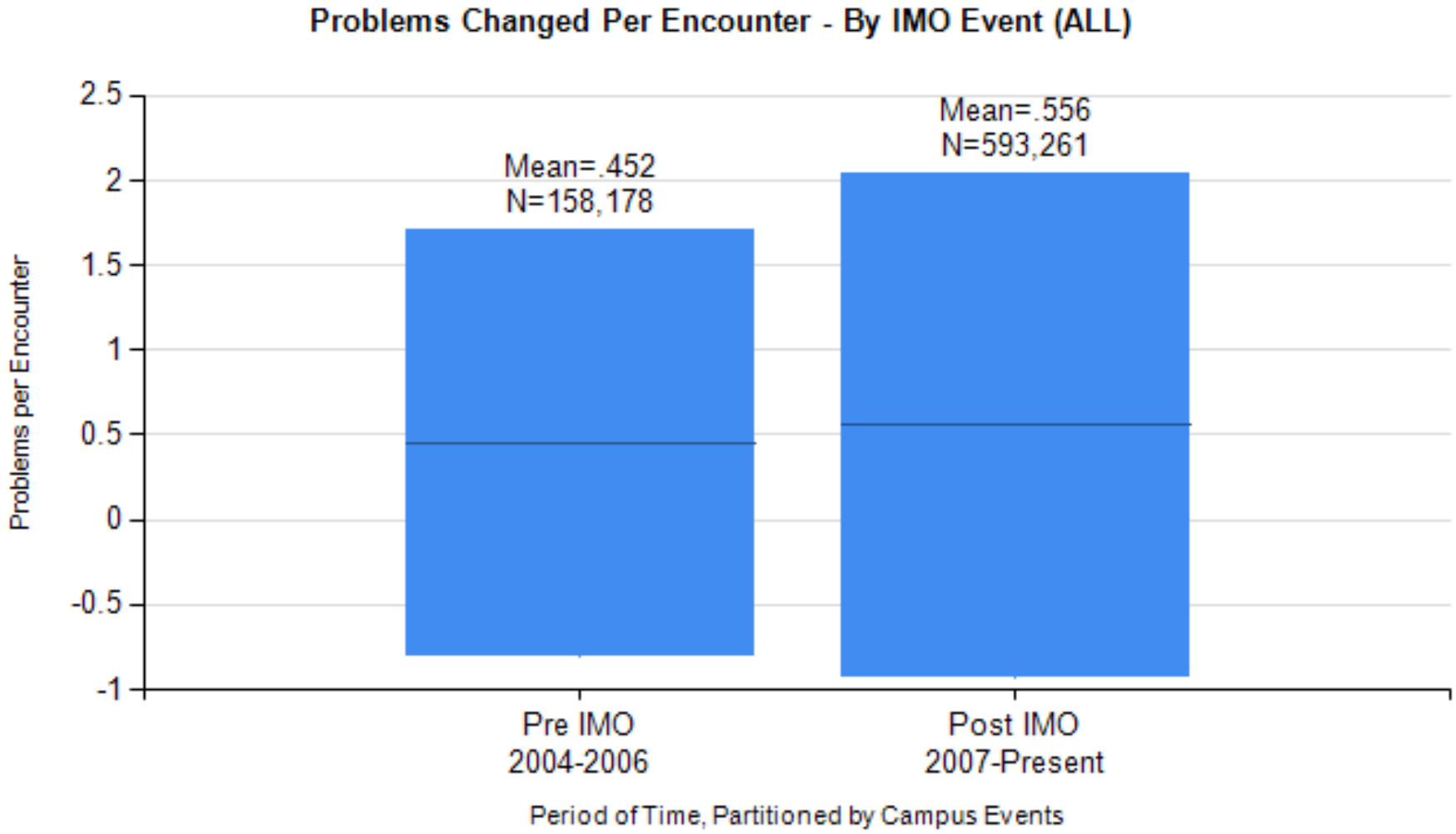
- Augment clinical flexibility to terminology
- Decision support prompts
- Automated algorithms
- Past diagnoses
- Synchronize across EHRs
- Mobile devices may help
- NLP up front

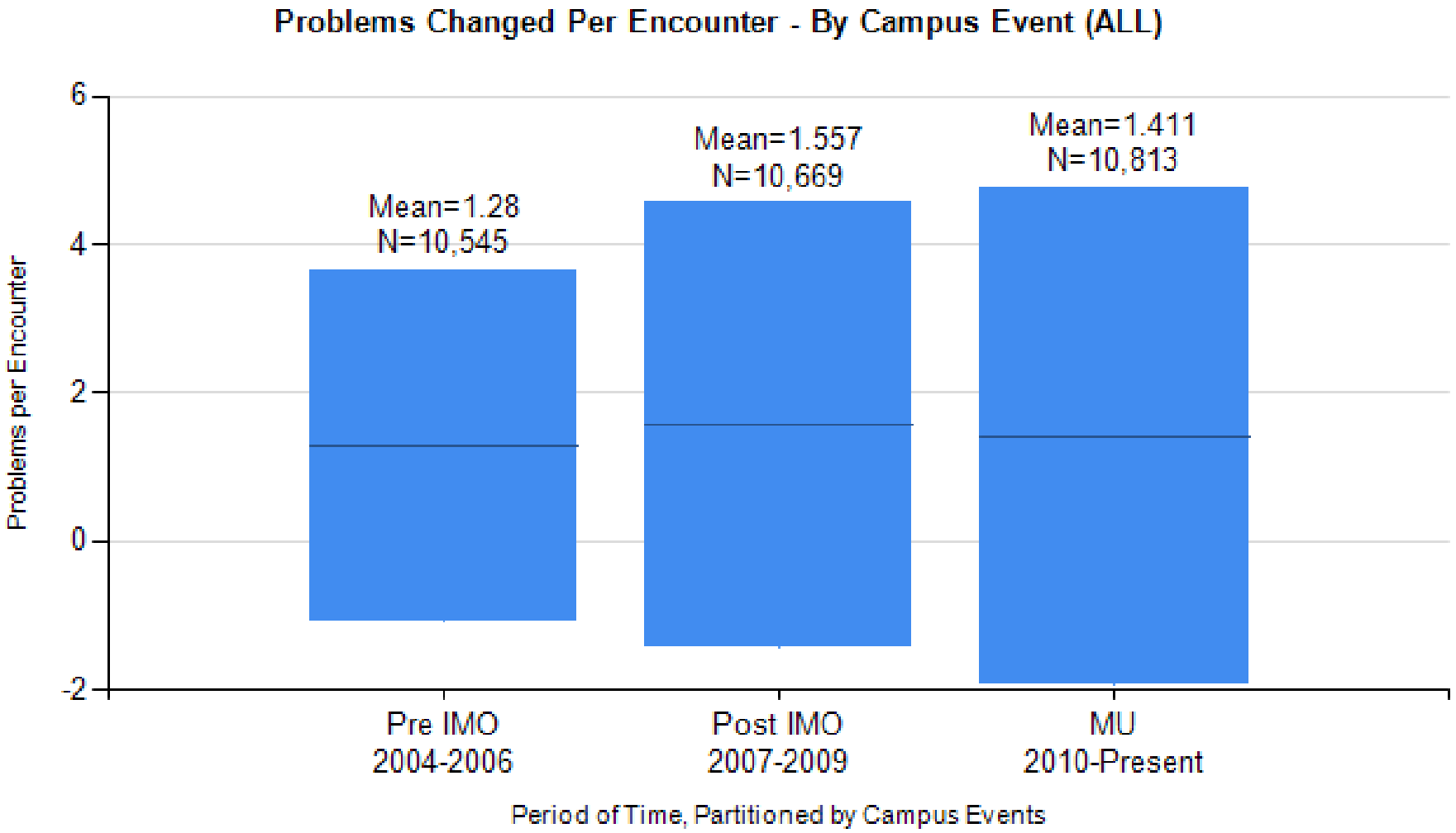
Clinical Terminology Example

- **Epic used by Northwestern Medical Faculty Foundation**
- **Incorporated use of Intelligent Medical Objects Terminology November 2006; previously ICD9; cross-mapping to SNOMED incorporated**


Problems Changed Per Encounter - By IMO Event (NMFF GIM ATTENDING)
Problems per Encounter
6
4
2
0
-2
Mean=1.28
N=10,545
Mean=1.484
N=21,482
Pre IMO
2004-2006
Post IMO
2007-Present
Period of Time, Partitioned by Campus Events


Problems Changed Per Encounter - By Campus Event (NMFF GIM ATTENDING)
Problems per Encounter
6
4
2
0
-2
Mean=1.28
N=10,545
Mean=1.557
N=10,669
Mean=1.411
N=10,813
Pre IMO
2004-2006
Post IMO
2007-2009
MU
2010-Present
Period of Time, Partitioned by Campus Events


Problems Changed Per Encounter - By IMO Event (ALL)
Problems per Encounter
2.5
2
1.5
1
0.5
0
-0.5
-1
Mean=.452
N=158,178
Mean=.556
N=593,261
Pre IMO
2004-2006
Post IMO
2007-Present
Period of Time, Partitioned by Campus Events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Implications of increase in usage

- **Preliminary assessment suggests:**
  - **Physicians update problem lists more often after implementation of an expanded set of terms (e.g., mild intermittent asthma, diastolic heart failure NYHA Class 2, etc.)**
- **Potential confounders:**
  - **Problem list encouragement with MU**
  - **Increasing sophistication of users**
  - **Academic center**

Decision Support can help!

- **Prompt physicians when entering medication orders:**
  - **Hyperlipidemia, DM, hypothyroidism, HIV, asthma, stroke/TIA**
  - **For example, If glipizide – prompt to consider adding diabetes to the problem list, etc.**
- **Alert yield: 76%**

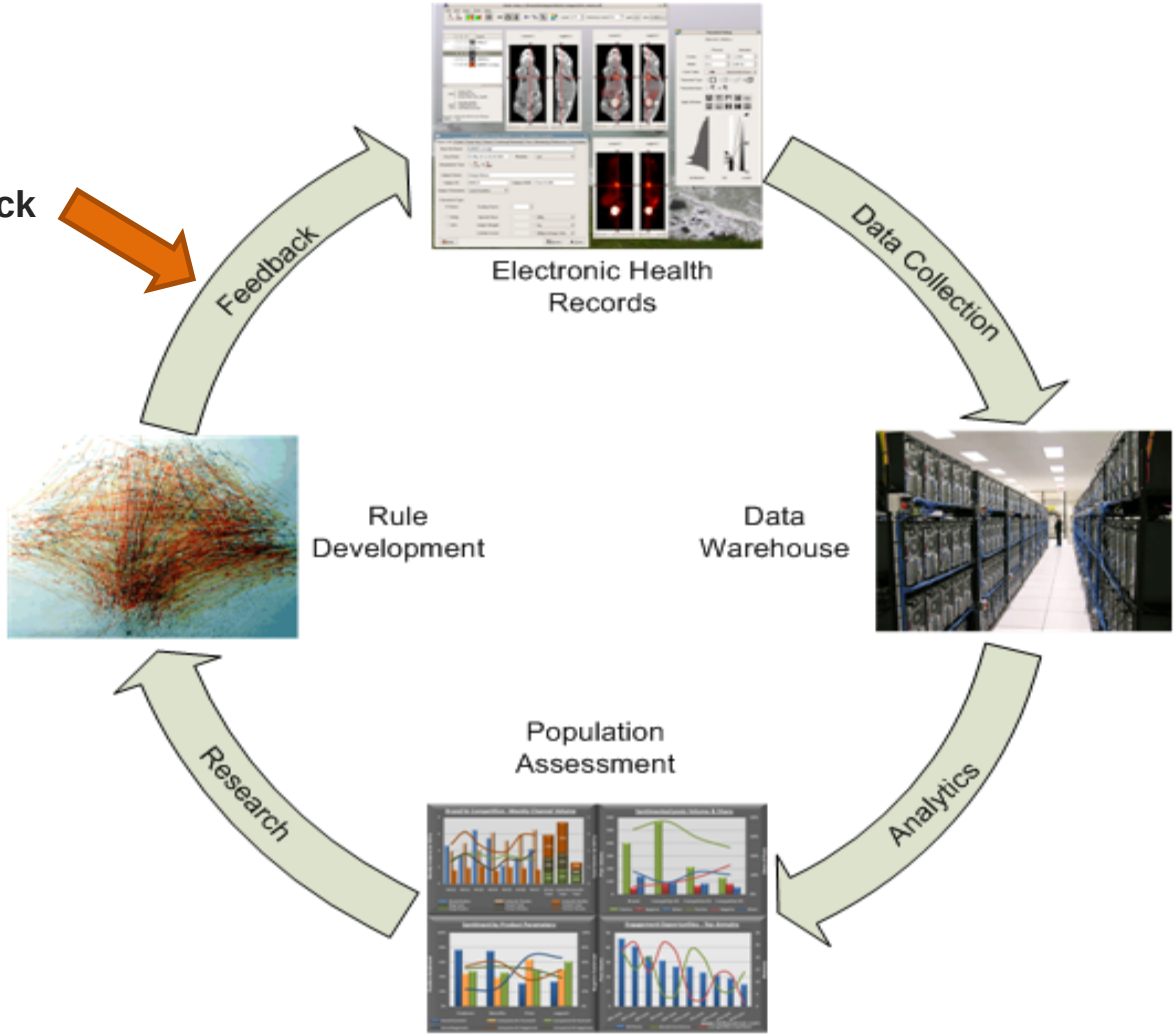
Galanter WL, Hier DB, Jao C, Sarne D.
Int J Med Inform. 2010 May;79(5):332-8.

Complete Automation?

What if “the system” knew a patient had a problem? Could we simply add the problem automatically and prompt for lower levels of confidence?

Using the EDW to augment workflow

How do we seamlessly close feedback loop?



Pilot Algorithm

Automatically Detecting Problem List Omissions of Type 2 Diabetes Cases Using Electronic Medical Records

Jennifer A. Pacheco[1], Will Thompson, PhD[1], Abel Kho, MD[1]
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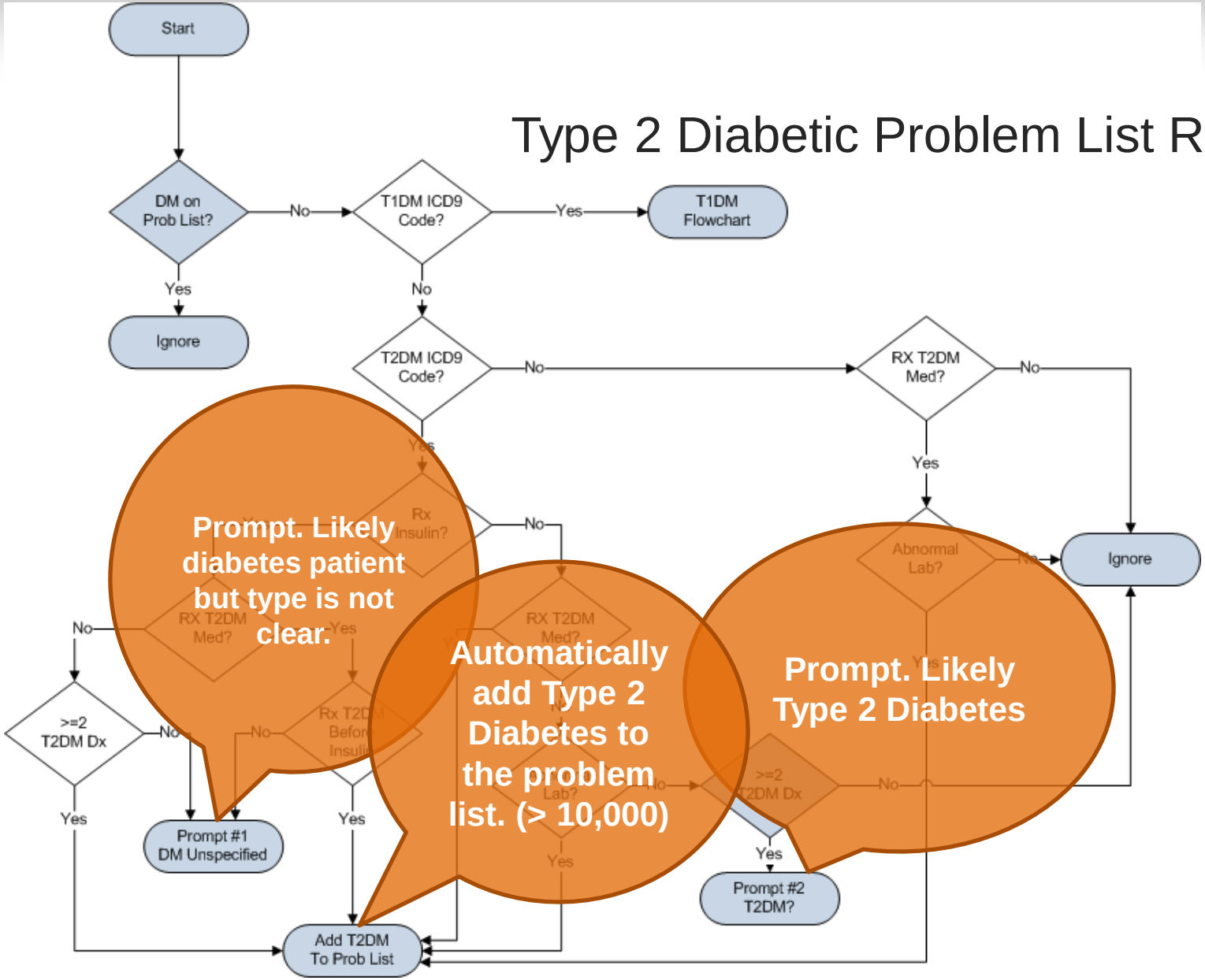
Abstract

As part of a large-scale project to use DNA biorepositories linked with electronic medical record (EMR) data for research, we developed and validated an algorithm to identify type 2 diabetes cases in the EMR. Though the algorithm was originally created to support clinical research, we have subsequently re-applied it to determine if it could also be used to identify problem list gaps. We examined the problem lists of the cases that the algorithm identified in order to determine if a structured code for diabetes was present. We found that only just over half of patients identified by the algorithm had a corresponding structured code entered in their problem list. We analyze characteristics of this patient population and identify possible reasons for the problem list omissions. We conclude that application of such algorithms to the EMR can improve the quality of the problem list, thereby supporting satisfaction of Meaningful Use guidelines.

AMIA Annu Symp Proc. 2011;2011:1062-9.

Type 2 Diabetic Problem List Rule



The past predicts the future…

- **Make past diagnoses easily available.**
- **Collapse related terms if possible.**
- **Incorporate into workflow for easy additions.**

Problem List Tool

Northwestern Medical Faculty Foundation

Home

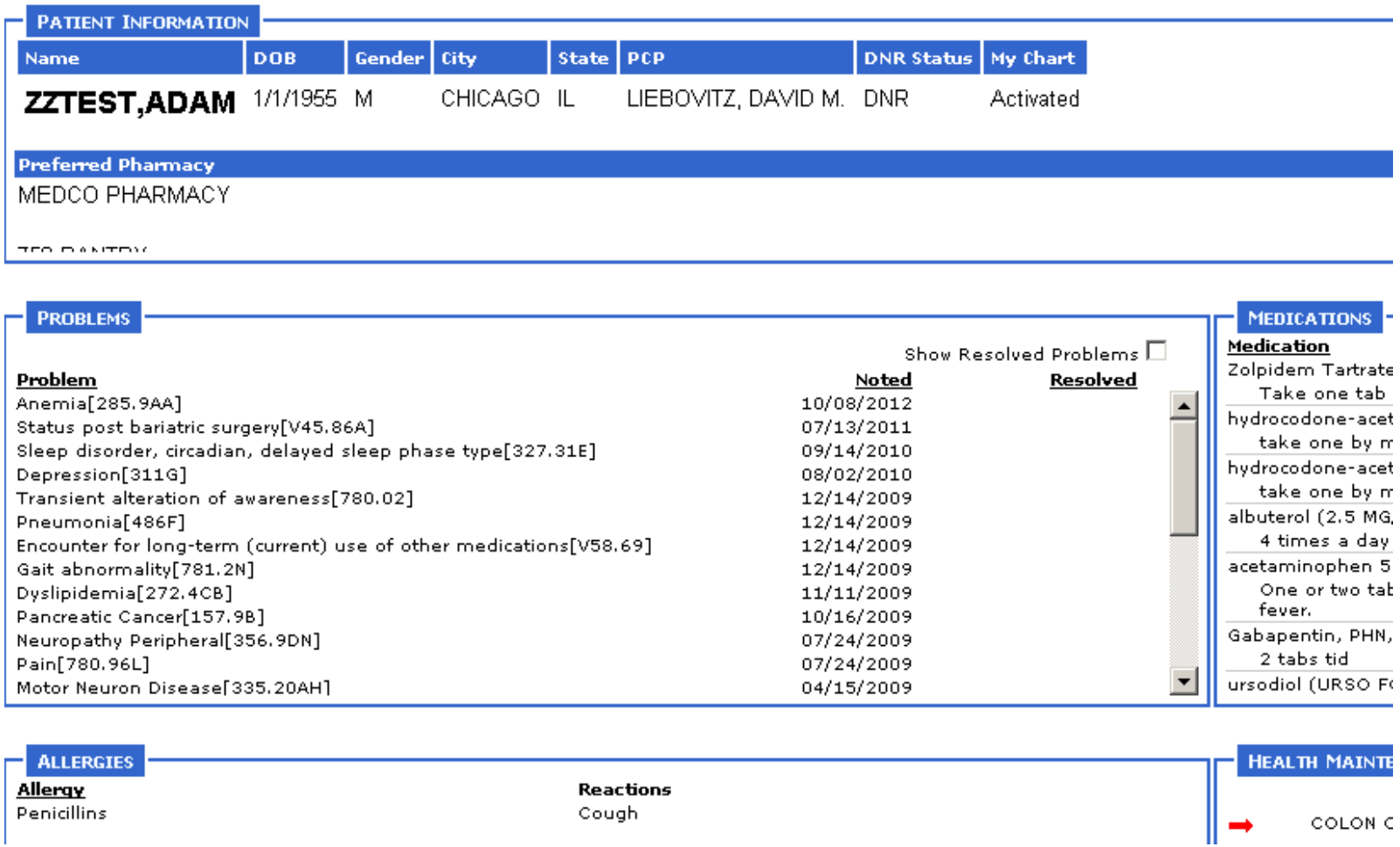
Add Diagnosis to the Problem List

	Patient Name	ICD9 Code	Diagnosis	Comment
☐		V77.0	Screening for thyroid disorder	
☐		782.1	Rash	
☐		478.79	LPRD (laryngopharyngeal reflux disease)	
☐		780.2	Syncope	
☐		784.2	Tonsillar mass	
☐		530.81	GERD (gastroesophageal reflux disease)	
☐		622.8	Other specified noninflammatory disorder of cervix	
☐		599.0	UTI (lower urinary tract infection)	
☐		788.1	Dysuria	
☐		569.49	Anal irritation	
☐		709.9	Skin lesion	
☐		278.00	Obesity	

Get Current Problem List | Promote Problem

Current Problem List

To Synchronize? Or not…



PATIENT INFORMATION

Name	DOB	Gender	City	State	PCP	DNR Status	My Chart
ZZTEST,ADAM	1/1/1955	M	CHICAGO	IL	LIEBOVITZ, DAVID M.	DNR	Activated

Preferred Pharmacy

MEDCO PHARMACY

PROBLEMS

Show Resolved Problems ☐

Problem	Noted	Resolved
Anemia[285.9AA]	10/08/2012	
Status post bariatric surgery[V45.86A]	07/13/2011	
Sleep disorder, circadian, delayed sleep phase type[327.31E]	09/14/2010	
Depression[311G]	08/02/2010	
Transient alteration of awareness[780.02]	12/14/2009	
Pneumonia[486F]	12/14/2009	
Encounter for long-term (current) use of other medications[V58.69]	12/14/2009	
Gait abnormality[781.2N]	12/14/2009	
Dyslipidemia[272.4CB]	11/11/2009	
Pancreatic Cancer[157.9B]	10/16/2009	
Neuropathy Peripheral[356.9DN]	07/24/2009	
Pain[780.96L]	07/24/2009	
Motor Neuron Disease[335.20AH]	04/15/2009	

MEDICATIONS

Medication
Zolpidem Tartrate Take one tab
hydrocodone-acet take one by m
hydrocodone-acet take one by m
albuterol (2.5 MG, 4 times a day
acetaminophen 5 One or two tab fever.
Gabapentin, PHN, 2 tabs tid
ursodiol (URSO F

ALLERGIES

Allergy	Reactions
Penicillins	Cough

HEALTH MAINTE

COLON C

Mobile devices may help.

- **2004 study by orthopedic service found use of handheld devices increased number of diagnoses over paper chart. (80 patients; 4 versus 9 diagnoses)**

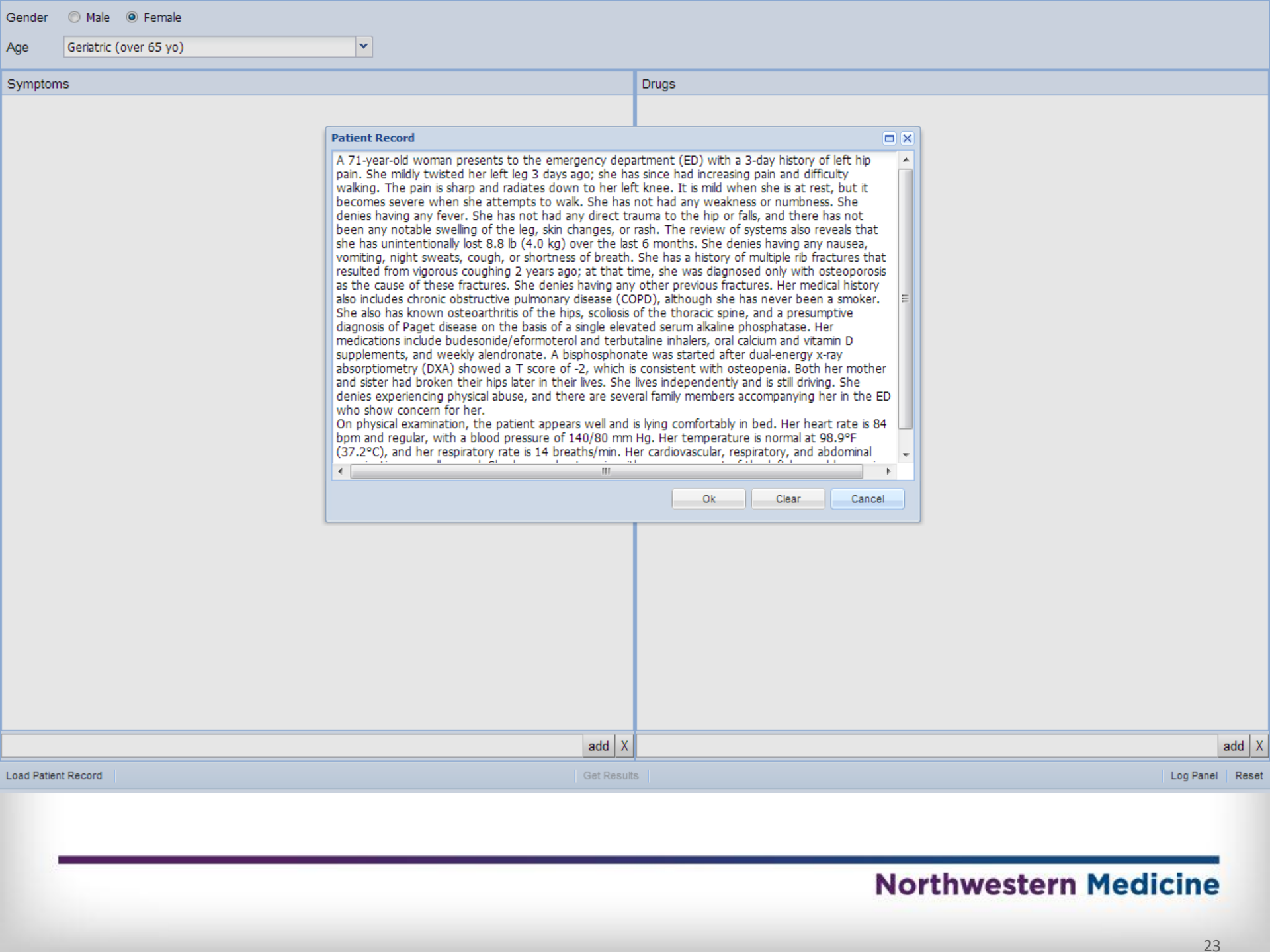
- **Specialty focused “diagnoses” may be irrelevant for longterm care. Uncertain application to problem lists or for general care – hierarchy questions.**

- **Raises question of cross specialty views**

THE JOURNAL OF BONE & JOINTSURGERY
VOLUME 86-A · NUMBER3 · MARCH2004

Optimize workflow – same screen!

- **What if…**
  - **Free text or voice recognition was captured and mapped either concurrently or when saving notes?**



Northwestern Medicine

Gender ○ Male ◉ Female

Age Geriatric (over 65 yo)

Symptoms
✖ elevated levels of parathyroid hormone
✖ femoral neck fracture
✖ elevated hepatic enzymes
✖ sprain of lower extremity - left lower leg
✖ increased serum alkaline phosphatase levels
✖ hypophosphatemia
✖ sharp pain
✖ sprain of lower extremity - left lower extremity
✖ radiating pains
✖ decreased bone density
✖ difficulty walking
✖ hip pain - left hip joint
✖ calf/leg pain during walking
✖ tenderness to palpation
✖ spondylarthritis - HISTORY
✖ thoracogenic scoliosis - HISTORY
✖ hip osteoarthritides - HISTORY
✖ chronic obstructive pulmonary disease - HISTORY
✖ multiple rib fractures - HISTORY

add X

Drugs
✖ Vitamin D (ergocalciferol)
✖ Electrolyte (electrolyte replacement solutions, oral)
✖ terbutaline
✖ budesonide
✖ alendronate

add X

Load Patient Record | Get Results | Log Panel | Reset

Possible Diagnoses

Diagnosis	SNOMED	ICD-9
Rickets	4598005	268.2
Osteoporosis	64859006	733.00
Renal Osteodystrophy	16726004	588.0
Antiphospholipid Syndrome	26843008	289.81
Lung Neoplasms	126713003	239.1
Giant Cell Arteritis	414341000	446.5
Osteoarthritis	396275006	715.90
Discoid Lateral Meniscus	202099003	717.5
Osteitis Fibrosa Cystica	84727000	252.01
Renal Failure	42399005	586
Pulmonary Thromboembolism	233935004	416.2
Adioposis Dolorosa	71404003	272.8
Vit C Deficiency	76169001	267
Malignant Bone Tumors	126537000	170.9
Sarcoidosis	31541009	135
Degenerative Spinal Disorders	202788007	336.9
Polymyalgia Rheumatica	65323003	725
Hand and Wrist Ligament Injuries	314883003	728.9
Nephrogenic Systemic Fibrosis	424114000	701.8
Paget's Disease	301027009	731.0
Protein C and S Deficiencies	105604006	289.81
Ankle Sprains	44465007	845.00
Deep Vein Thrombosis	128053003	453.40
Heart Failure / CHF	42343007	428.9
Liver Neoplasms	126851005	239.0
Diabetic Neuropathy	230572002	250.60
Aortic Aneurysm / Dissection	67362008	441.9
Neoplasms of the Kidney	126880001	
Acute Appendicitis	85189001	540.9
Polyneuropathy Disorders	42345000	356.9
Pseudohypoparathyroidism	58976002	275.49

Possible Drug Side Effects

Summary of Symptoms

Arthritis of the back	**Budesonide** **Alendronate**
Chronic obstructive pulmonary disease	**Alendronate**
Decreased bone density	**Alendronate** **Vitamin D** **Budesonide**
Difficulty walking	**Vitamin D** **Budesonide** **Alendronate**
Hip pain	**Alendronate** **Budesonide** **Terbutaline**
Hypophosphatemia	**Alendronate**
Sciatica	**Alendronate** **Budesonide** **Terbutaline**

Expand All | Collapse All

Arthritis (inflammation) of the back

Budesonide may cause the following symptoms that are **related** to **arthritis of the back:**

- Arthritis
- Back pain

SOURCE +

Alendronate may cause the following symptoms that are **related** to **arthritis of the back:**

- Joint swelling
- Stevens-Johnson syndrome

SOURCE +

Show raw XML | Return to Input Page | Log Panel

Future thoughts…

Family history cross-linking (family history of colon cancer – a problem?)

Lead level example of confidentiality issues?

Genetic results and predisposition entries?

Summary

- Several factors to consider in clinical practice:
  - Increase downstream value perception/reality
  - Workflow integration
  - Automation/synchronization (with clinical hierarchy)
  - Identification of “gaps”
  - Clinical granularity available (academic center, at least)

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