Summary of our Sharp activities

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University of Maryland

December 8th, 2010

Houston

Started in September

3 topics:
Medication reconciliation
Lab tracking (missed labs)
Medication interaction *(← discussed yesterday)*

Medication Reconciliation
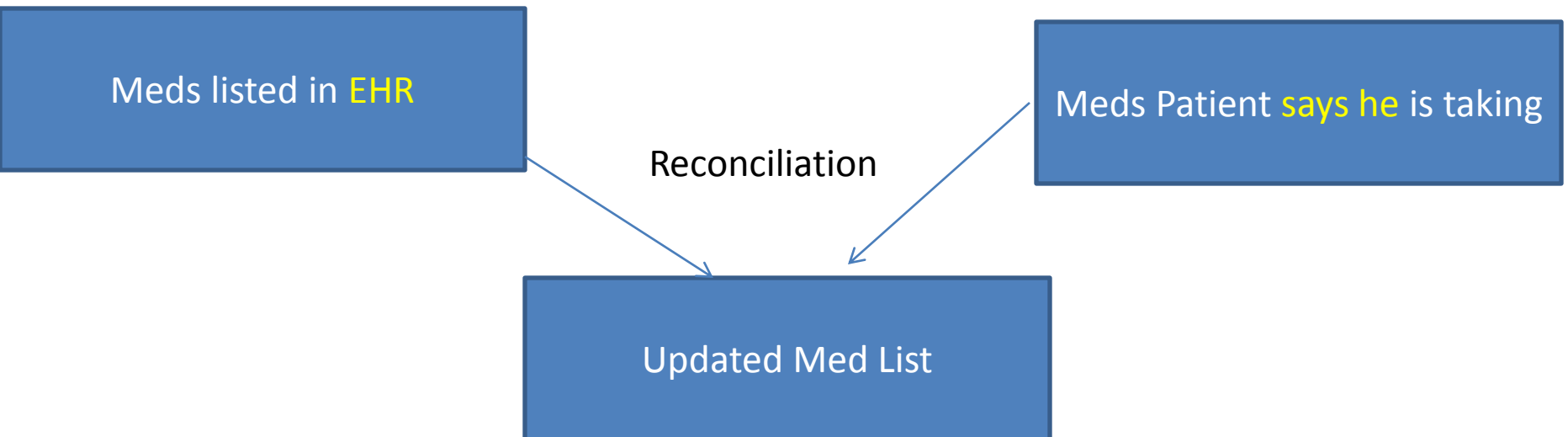
Sumit Arora

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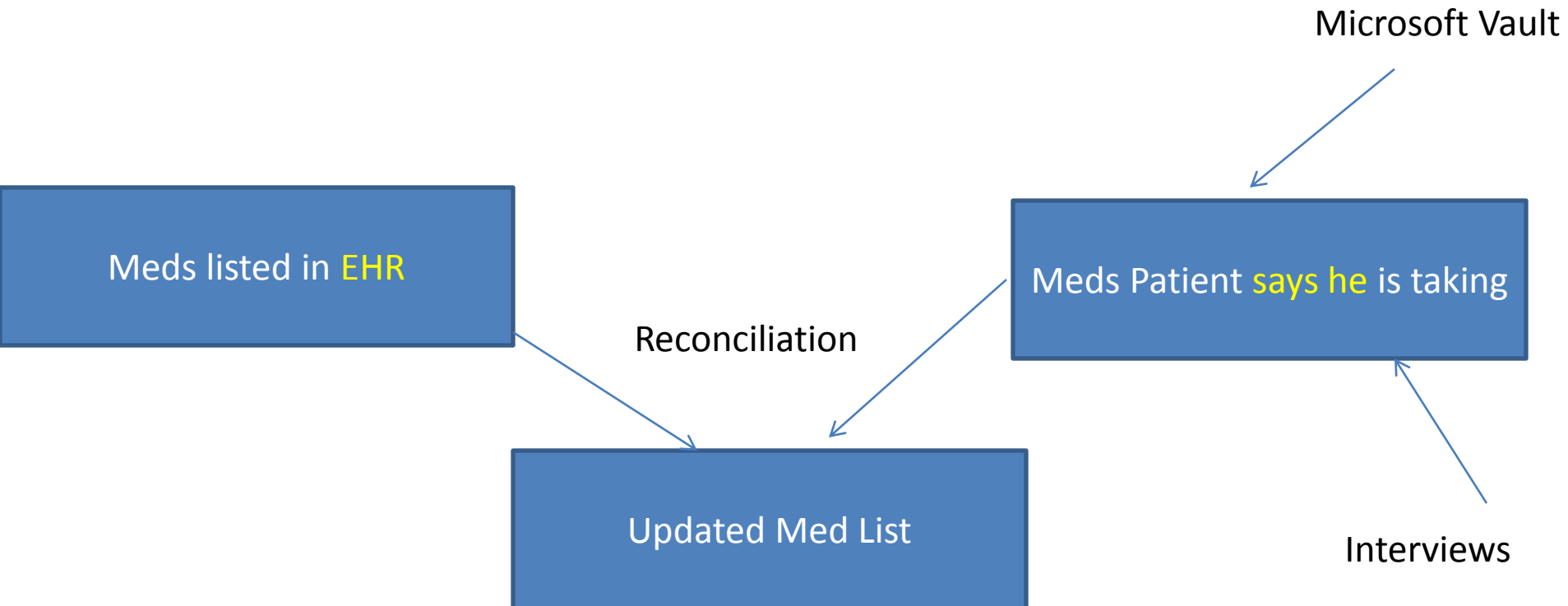
What is Medication Reconciliation?
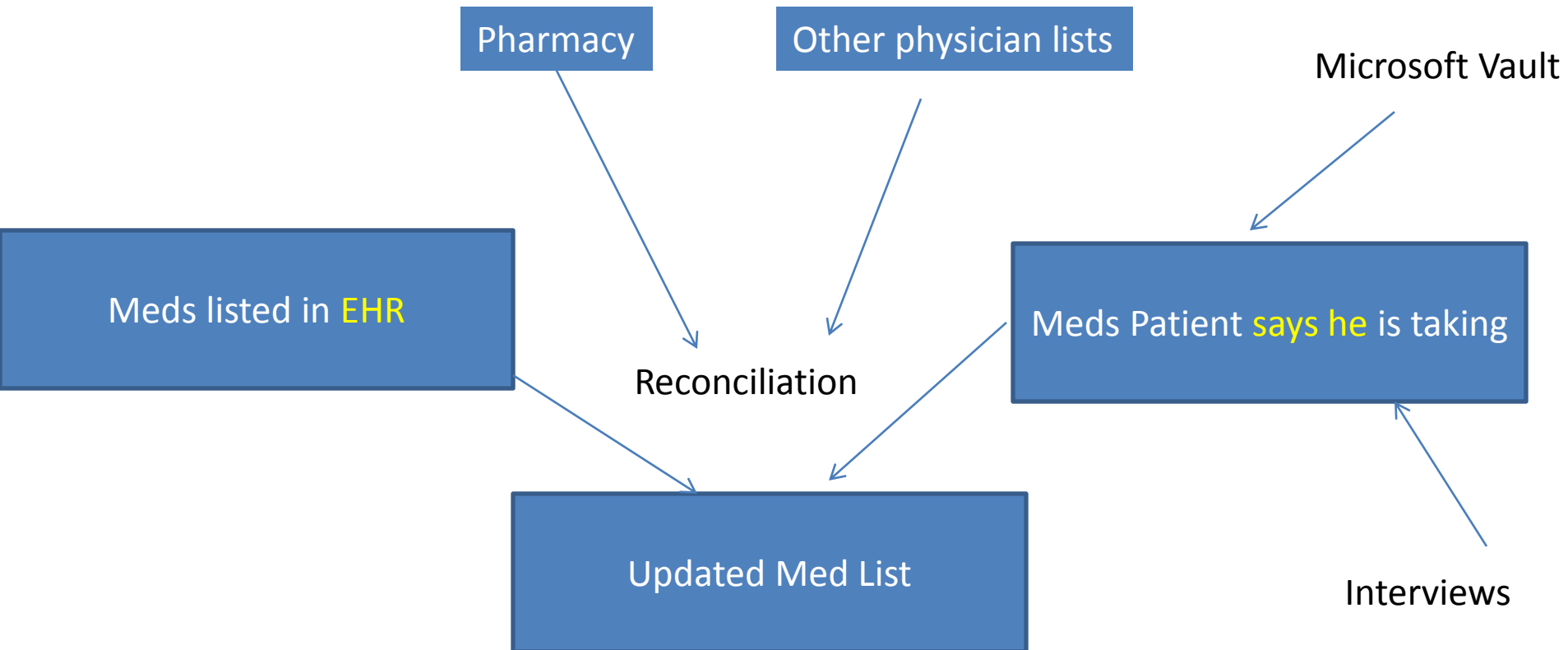
Sumit Arora

sumitar2@umd.edu

In the Physician's Office

In the Physician's Office

Meds listed in EHR

Meds Patient says he is taking

Reconciliation

Updated Med List

In the Physician's Office

Microsoft Vault

Meds listed in EHR

Meds Patient says he is taking

Reconciliation

Updated Med List

Interviews

In the Physician's Office

Pharmacy

Other physician lists

Microsoft Vault

Meds listed in EHR

Reconciliation

Meds Patient says he is taking

Updated Med List

Interviews

In the Hospital – at discharge

In the Hospital – at discharge

Meds reported by patient during Intake

Meds given at the hospital

Reconciliation

Meds patient should take after going home
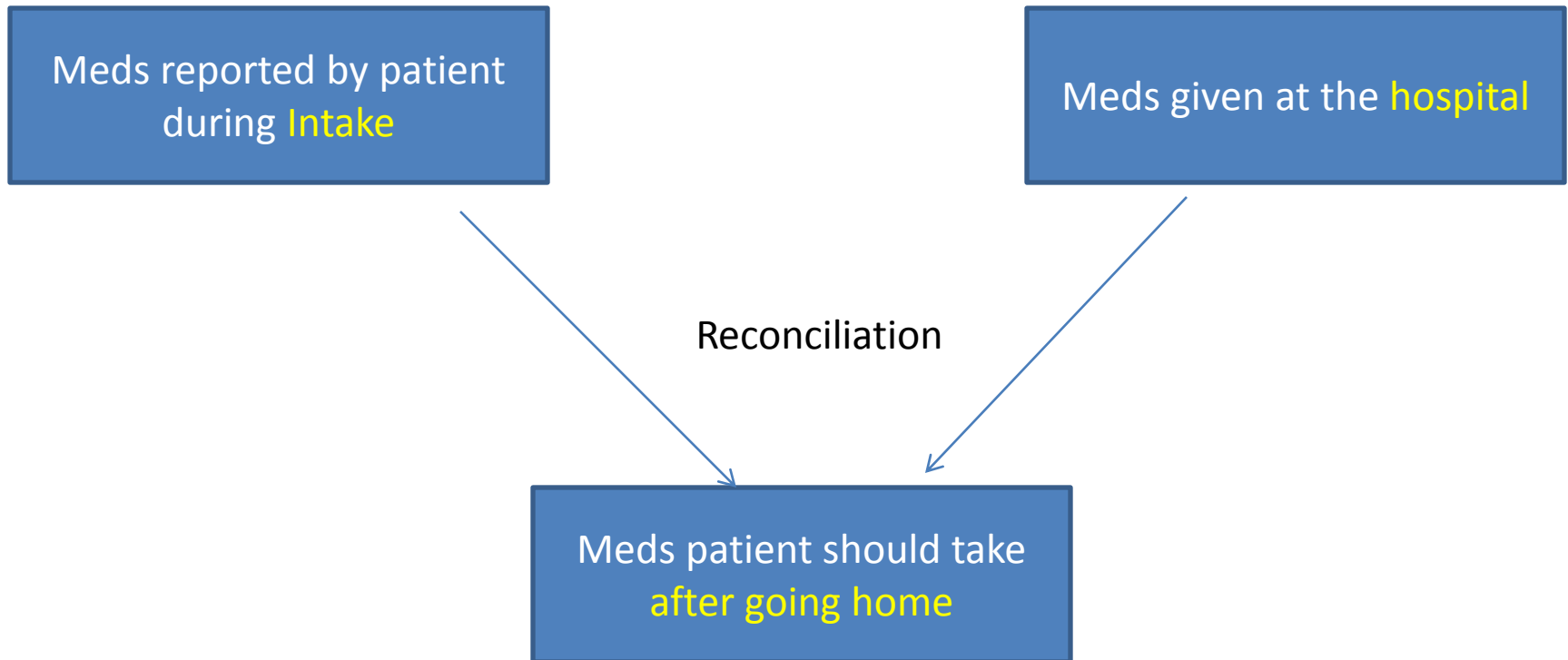
Steps Involved in Medication Reconciliation[1]

- Verification   (collection of medication history);

- Clarification (ensuring that medications and doses are appropriate);

- Reconciliation (documentation of changes in the orders).

[1]Getting Started Kit:**Prevent Adverse Drug Events(Medication Reconciliation)**
www.ihi.org

1. Develop a list of current medications;

2. Develop a list of medications to be prescribed

3. Compare the medications on the two lists

4. Make clinical decisions based on the comparison

5. Communicate the new list to appropria caregivers and to the patient

Lots of variation between settings

Data not necessarily correct/complete to start with

Current practices?

- *Note: your help needed*
- Separate lists on separate screens
  - See list A, See list B, enter final list on blank screen
  - List A and B side by side
- Combined lists
  - No meaningful grouping (e.g. use alphabetical order)
  - Lots of scrolling and searching

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EARLY PROTOTYPE

Medication Reconciliation

Consolidated Record

Source	Medication	Dosage	Start Date	End Date	Comments	Actions
Physician	Codeine	1 Pill/Day	2/4/2010	4/4/2011	Mild	Keep Edit Delete
Patient	Ibuprofen	2 Pills/Day	7/1/2009	1/1/2011	Regular Usage	Reconciled
Physician		2 Pills/Day	7/1/2009	1/1/2011	For Pain	
Patient	Oxycodone	3 Pills/Day	6/12/2010	10/12/2011	Irregular Usage	Keep Edit Delete
Patient	Paracetamol	2 Pills/Day	6/2/2010	9/29/2011	Irregular Usage	Keep Edit Delete
Patient	Tylenol	3 Pills/Day	2/2/2010	7/10/2011	Regular Usage	Reconciled
Physician		3 Pills/Day	2/2/2010	7/10/2011	For Fever	
Physician	Warfarin	1 Pill/Day	3/19/2010	12/10/2011	Important	Keep Edit Delete

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Patient's Name: **Mr. Alan Smith**

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Grouped by similarity
- today only exact match

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Actions to reconcile:
[Continue]   [Stop]

Actions in reconciled list
[Modify]?
[Add new med]?

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LOG of reconciliation decisions

Medication Reconciliation

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BETTER WAYS OF GROUPING MEDS ?

Medication Reconciliation

Patient's Name: **Mr. Alan Smith**

Consolidated Record

Issue	Source	Medication	Dosage	Start Date	End Date	Comments	Actions
Pain	Physician	Codeine	1 Pill/Day	2/4/2010	4/4/2011	Mild	Keep Edit Delete
	Patient	Ibuprofen	2 Pills/Day	7/1/2009	1/1/2011	Regular Usage	Reconciled
	Physician		2 Pills/Day	7/1/2009	1/1/2011	For Pain	
	Patient	Oxycodone	3 Pills/Day	6/12/2010	10/12/2011	Irregular Usage	Keep Edit Delete
Fever	Patient	Paracetamol	2 Pills/Day	6/2/2010	9/29/2011	Irregular Usage	Keep Edit Delete
	Patient	Tylenol	3 Pills/Day	2/2/2010	7/10/2011	Regular Usage	Reconciled
	Physician		3 Pills/Day	2/2/2010	7/10/2011	For Fever	
Blood Clots	Physician	Warfarin	1 Pill/Day	3/19/2010	12/10/2011	Important	Keep Edit Delete

Reconciled Record

Issue	Source	Medication	Dosage	Start Date	End Date	Comments	Actions
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Fever	Physician	Tylenol	3 Pills/Day	2/2/2010	7/10/2011	Continue Usage	Edit Delete

BETTER WAYS OF GROUPING MEDS ?

Missed Test Results

Sureyya Tarkan

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March 15, 2011

What are Missed Results?

○ Mishandling of abnormal test results (Wahls, 2007)

○ No follow-up

○ Physicians order many tests (29-38%) (Elder, 2009)

○ Sent to outside facilities (laboratories, hospitals, etc.)

○ The complexity of the process, separation of lab from clinic location and lack of quality control systems in outpatient setting make testing error-prone (Hickner et. al., 2007).

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Test Processing Steps
(McEwen; Hickner, 2005-8)

1   Pre-analytic
- Ordering the test
- Implementing the test

2   Analytic
- Performing the test

3   Post-analytic
- Reporting results to the clinician
- Responding to the results
- Notifying the patient of the results
- Following-up to ensure the patient took the appropriate action based on test results

Specify the test & when to do it

Lab technicians

Review results & Decide what to do

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Existing System: Partners Healthcare Results Manager

Order Tracking Prototype (and simulation)

March 15, 2011

Order Tracking Prototype (and simulation)

Tracking

Arrived Results

Late	Seen	A...	Patient	Test	Ordered By	Expected Dur...	Elapsed Time
☐	☐	☐	Lee, Justin	X-Ray	Williams, Mary	13-75 hours	63 hours
☑	☐	☐	Wilson, Robert	Blood	Johnson, Alice	17-43 hours	56 hours
☐	☑	☑	Smith, Kathy	Test	Brown, Joe	130 hours	59 hours
☐	☐	☐	Baker, Elizab...	Colonoscopy	Brown, Joe	30-119 hours	63 hours
☑	☐	☐	King, Peter	EKG	Davis, Michael	16 hours	57 hours

Pending Tests

Late	Patient	Test	Ordered By	Expected Dur...	Elapsed...	Responsible
☐	Thompson,...	Mammography	Johnson, Alice	81 hours	66 hours	Robinson, Eric
☐	Carter, Jenni...	Colonoscopy	Williams, Mary	30-119 hours	67 hours	Harris, Charles
☐	Adams, Kevin	Test	Jones, Andrew	130 hours	65 hours	Black, Sue
☑	Young, Arthur	Blood	Jones, Andrew	17-43 hours	60 hours	Young, Arthur
☑	Anderson, T...	EKG	Williams, Mary	16 hours	59 hours	Lewis, Jack
☑	Jackson, Paul	Urinalysis	Jones, Andrew	52 hours	53 hours	Bailey, Isabel
☐	Doe, John	X-Ray	Brown, Joe	13-75 hours	47 hours	Taylor, Richa...
☐	Clark, George	Test	Davis, Michael	130 hours	46 hours	Clark, George
☐	Hill, Jeffrey	Mammography	Johnson, Alice	81 hours	46 hours	Cook, Lisa
☐	Wright, Patrick	Urinalysis	Davis, Michael	52 hours	41 hours	Brooks, Caitlyn

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March 15, 2011

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March 15, 2011

Testflow Process

```xml
<process id="101" name="X-Ray">
    <actor name="Patient">
        <task id="1002" name="Schedule appointment" start="0" end="2"
         unit="days"/>
    </actor>

    <actor name="Laboratory">
        <task id="1003" name="Take X-Ray" start="1" end="2" unit="hours"/>
    </actor>

    <actor name="Radiologist">
        <task id="1004" name="Write report" start="12" end="20" unit="hours"/>
    </actor>

    <actor name="Provider">
        <task id="1005" name="Analyze result" end="5" unit="hours"/>
    </actor>
</process>
```

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☐	☑	☑	Smith, Kathy	Test	Brown, Joe	130 hours	59 hours
☐	☐	☐	Baker, Elizab...	Colonoscopy	Brown, Joe	30-119 hours	63 hours
☑	☐	☐	King, Peter	EKG	Davis, Michael	16 hours	57 hours

Pending Tests

Late	Patient	Test	Ordered By	Expected Dur...	Elapsed...	Responsible
☐	Thompson,...	Mammography	Johnson, Alice	81 hours	66 hours	Robinson, Eric
☐	Carter, Jenni...	Colonoscopy	Williams, Mary	30-119 hours	67 hours	Harris, Charles
☐	Adams, Kevin	Test	Jones, Andrew	130 hours	65 hours	Black, Sue
☑	Young, Arthur	Blood	Jones, Andrew	17-43 hours	60 hours	Young, Arthur
☑	Anderson, T...	EKG	Williams, Mary	16 hours	59 hours	Lewis, Jack
☑	Jackson, Paul	Urinalysis	Jones, Andrew	52 hours	53 hours	Bailey, Isabel
☐	Doe, John	X-Ray	Brown, Joe	13-75 hours	47 hours	Taylor, Richa...
☐	Clark, George	Test	Davis, Michael	130 hours	46 hours	Clark, George
☐	Hill, Jeffrey	Mammography	Johnson, Alice	81 hours	46 hours	Cook, Lisa
☐	Wright, Patrick	Urinalysis	Davis, Michael	52 hours	41 hours	Brooks, Caitlyn

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Actions combined with Review of Results

Act on Result

Here is more information on this test:

...

...

...

...

...

What is the next action to be taken?

Ask assistant to

☐ Inform Patient   Name: Lee, Justin Tel: 438

0   10   20   30   [days ▲▼]

☐ Schedule Visit

Order

[Medication]

0   10   20   30   [days ▲▼]

☐ Repeat Test

[New Test]

[Cancel]   [Close and Sign off]   [Close but Not done yet]

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Drug Interactions

Darya Filippova
Nov 2010
HCIL

Alerts: Drug Interactions

- Doctors prescribing meds
- Pharmacists filling the prescriptions
- Self-monitoring (MS Health Vault, Google Health)

Statistics (Buurma 06)

- 2006 study in Dutch pharmacies: 153 days, 43K prescriptions, 2.5K alerts (6%).
- 72.3% alerts – recurrent, no action was taken

Buurma et. al, Clinical Risk Management in Dutch Community Pharmacies. Drug Safety. 29 (8): 723-732. 2006

Statistics (Indermitte 07)

- 2007 study in Switzerland pharmacies
- 600 patients taking 2+ drugs
- Most pharmacies: "severe" and "moderate" alerts only
- 79% of all DDI alerts – overridden

Indermitte et. al, Management of drug-interaction alerts in community pharmacies. J. C. P. and T. 32: 1323-142. 2007

Why?

- Incorrect alert (clinical data)
- Acceptable interaction
- Irrelevant (meds not taken)
- Multiple alerting
- Patient tolerated drugs before

Surveyor Health

ePocrates

CARE Clinical Research

Drugs That May Lengthen PT		Drugs That May Shorten PT	
(higher INR; increased warfarin effect)		(lower INR; decreased warfarin effect)	
Antibiotics	**Anti-inflammatories**	Alcohol	Penicillin
Carbenicillin	Allopurinol	Antacids	Rifampin
Erythromycin	Fenoprofen	Antihistamines	Spironolactone
Fluconazole	Ibuprofen	Barbiturates	Sucralfate
Isoniazid	Indomethacin	Carbamazepine	Trazodone
Ketoconazole	Naproxen	Cholestyramine	Vitamin C (large doses)
Metronidazole	Phenylbutazone	Griseofulvin	
Moxalactam	Piroxicam	Haloperidol	
and other cephalosporins	Sulfinpyrazone	Oral contraceptives	
Trimethoprimsulfa	Zileuton		
Antiarrhythmics			
Amiodarone			
Quinidine			
Others			
Anabolic steroids	Omeprazole		
Cimetidine	Phenytoin		
Clofibrate	Tamoxifen		
Disulfiram	Thyroxine		
Lovastatin	Vitamin E (large doses)		

Desired features

- Decrease number of alerts
- Resolving alerts
  - Patient
  - User/physician
- Record DDI resolution
- Immediate OR significant harm

Ordering system

Login as: Bob Kane

Patient: Batman

Patient

Batman, 30

Current medications

warfarin
erytrhomycin
colcrys
amiodarone

New order   Renew   Cancel

Drug interactions: need resolution

warfarin interacts with **erytrhomycin**   Severity: SERIOUS
  Details:
  The pharmacological and adverse effects of phenytoin may be increased during fluconazole, itraconazole, miconazole, or voriconazole therapy. The pharmacological effects of itraconazole and voriconazole may be decreased during concurrent therapy with phenytoin

  No evidence   Low dosage   Tolerated before   No alternative   Other...

amiodarone interacts with **alcohol**   Severity: SEVERE
  Details:
  Concurrent use of diltiazem or verapamil may result in elevated levels of and toxicity from colchicine. Symptoms of colchicine toxicity include muscle weakness or pain; numbness or tingling in the fingers or toes; unusual bleeding or bruising; abdominal pain; nausea; severe diarrhea or vomiting; feeling weak or tired; increased infections; and pale or gray color of the lips, tongue, or palms of hands

  No evidence   Low dosage   Tolerated before   No alternative   Other...

Drug interactions: resolved

Drug name	Drug name	Severity	Status	Resolution
warfarin	erytrhomycin	severe	☑ Resolved	No evidence
amiodarone	alcohol	serious	☑ Resolved	Low dosage

Ordering system

Login as: Bob Kane ▾

Patient: Batman ▾

Patient

Batman, 30

Current medications

- warfarin
- erytrhomycin
- colcrys
- amiodarone

[New order] [Renew] [Cancel]

Drug interactions: need resolution

No unresolved interactions

Drug interactions: resolved

Drug name	Drug name	Severity	Status	Resolution
warfarin	alcohol	serious	☑ Resolved	Low dosage
warfarin	erytrhomycin	severe	☑ Resolved	No evidence
amiodarone	alcohol	serious	☑ Resolved	Low dosage
warfarin	amiodarone	severe	☑ Resolved	Tolerated before

Issues

- Should we allow "enabling" resolved alerts?
- How do we elevate alert's importance?
- Patients with similar profiles
  - What is similar?

Thank You

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