

## **Electronic Medical Records**

**Milisa K Rizer, MD, MPH**

Clinical Director, Integrated Healthcare  
Information System

Associate Professor, Clinical Family Medicine

## **The Ohio State University Medical Center**

- 2011
  - Epic Outpatient electronic record
  - Epic Inpatient electronic record, including ED, L&D, & ICU
  - Epic Hospital revenue and scheduling
  - GE Physician Revenue cycle

## **The Ohio State University Medical Center**

- 2005
  - Outpatient paper medical record
  - Inpatient paper medical record
  - Computer Physician Order Entry
  - GE Physician Revenue Cycle
  - Siemens Hospital Revenue Cycle

## **Goals in Implementation**

- Help create a foundation for personalized medicine.
- To increase patient safety.
- Promote continuity of care.
- Improved patient satisfaction.
- Establish a foundation of information for research, education and patient care.

## **Health Information Technology for Economic and Clinical Health Act (HITECH)**

- **This act makes available to doctors and hospitals federal incentive payments when they adopt electronic health records and demonstrate use in ways that can improve quality, safety, and effectiveness of care.**

## **Payments for Meaningful Use**

- **Participation can begin as early as 2011**
- **For maximum incentive payment, must begin by 2012**
- **For 2015 and later, those who do not demonstrate meaningful use will have a payment adjustment in their Medicare reimbursement.**

## **Meaningful Use**

- **An Incentive Program**
  - **“The Medicare and Medicaid EHR Incentive Programs will provide incentive payments to eligible professionals, eligible hospitals, and critical access hospitals as they adopt, implement, upgrade, or demonstrate meaningful use of certified EHR technology.”**

**[www.cms.gov/EHRIncentivePrograms](http://www.cms.gov/EHRIncentivePrograms)**

## **Stage 1 Objectives**

- **Improving quality, safety, efficiency, and reducing health disparities.**
  - **Record and chart vital signs: bp, ht, wt, bmi, etc**
  - **Record smoking status for patients 13 and older**

Tarheel, Trudy		22 y.o. female (4/29/1988)		Allergies		PCP		Alerts	
		420000137		Pcn, Erythromycin, Sulfia Drugs		None		HM	
11/28/2010 visit with Melissa K Rizer, M.D., MPH for Office Visit									
Snapshot	Images SmartSets Open Orders Care Teams Print AJS Media Manager								
Chart Review	% Allergies: <b>Pcn, Erythromycin, Sulfia Drugs</b> Reviewed on 11/28/2010: (44861)								
FlowSheets	Last Vitals BP: 120/80 P: 80 T: 98.7 F (36.7 C) T Svc: Temporal Resp: 16 W: 135 lb (61.236 kg) H: 5'8" (1.676 m)								
Results Review	SpO2 PF: BMI: 21.79 kg/m <sup>2</sup> BSA: 1.69 m <sup>2</sup> LMP: 11/11/2010 Smoking Status: <b>Never Smoker</b> Smokeless Tobacco Status: <b>Never Used</b>								
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History	Recent Labs								
Allegies	Chief Complaint								
Problem List	Headache								
Medications	Vital Signs								
Immunizations	New Set of Vitals								
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**Tarheel, Trudy** 22 y.a. female (4/29/1988) Allergies: Pcp, Erythromycin, Sulfis Drugs PCP Alerts: None HM

11/20/2010 visit with Melissa K Rizer, M.D., MPH for Office Visit

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Recent Labs

Chief Complaint: Headache

Vital Signs

11/20/2010 12:35 PM		Other Vitals	
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SpO2		Packs/Day	0
Weight	135 lb (61.236 kg)	Years	0
Height	5' 8" (1.676 m)	Smokeless Status	Never Used
Peak Flow		Reviewed	8/26/2010

## Stage 1 Objectives

- Improving quality, safety, efficiency, and reducing health disparities.
  - Use of Computer Physician Order Entry (CPOE)
  - Drug-drug and drug-allergy interaction checking
  - Generate and transmit permissible prescriptions electronically

## Stage 1 Objectives

- Improving quality, safety, efficiency, and reducing health disparities.
  - Record demographics: gender, race, ethnicity, etc
  - Active medication list
  - Active medication allergy list
  - Up-to-date problem list

**Tarheel, Trudy** 22 y.a. female (4/29/1988) Allergies: Pcp, Erythromycin, Sulfis Drugs PCP Alerts: None HM

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Peak Flow		Reviewed	8/26/2010

Recent Medication Dispensations

Medication	Reaction	Severity	Type	Noted	Valid LMB	Updated
Pcp (Pcp/Amox)	Branchiopneumonia	High	Anaphylactic	8/26/2010		Post Update...
Erythromycin	Nausea and vomiting	Medium	Hypersensitivity	8/26/2010		Post Update...
Sulfis Drugs	Rash	Low	Allergic	8/26/2010		Post Update...

Last Reviewed by Melissa K Rizer, M.D., MPH on 11/20/2010 at 12:37 PM

[illegible][illegible]

[illegible]

<div> <div>Snapshot</div> <div>SnapShot</div> <div>Flash sheets</div> <div>Flash sheets</div> <div>Results Review</div> <div>Results Review</div> <div>Synopsis</div> <div>Synopsis</div> <div>History</div> <div>History</div> <div>Alerts</div> <div>Alerts</div> <div>Problem List</div> <div>Problem List</div> <div>Medications</div> <div>Medications</div> <div>Immunizations</div> <div>Immunizations</div> </div>	<b>Tarheel, Trudy</b> 22 y.o. female (4/29/1988)      Allergies 420000137      Pcn, Erythromycin, Sulfu Drugs	
	Place orders (Enc Date: 8/18/2010) - Wt: 135 lb (61.236 kg) Ht: 5' 5" (1.651 m) BMI: 22.47 kg/m <sup>2</sup> BSA: 1	
	<div> <div>PresList</div> <div>Interactions</div> <div>Pharmacy</div> <div>Providers</div> <div>CC Results</div> <div>Open Orders</div> <div>Pend Orders</div> <div>Sign Orders</div> <div>SignNa</div> </div>	
	New order: <input type="text"/> Search <input checked="" type="radio"/> Both <input type="radio"/> Medication <input type="radio"/> Procedure	
	New order defaults: <b>Not using defaults</b>	
	<b>Medications (1 Order)</b>	
	<b>erythromycin base 333 MG PO tab DR</b>	
	<b>Allergy/Contraindication:</b> Erythromycin <b>Reactions:</b> Nausea And Vomiting	
	EVERY 6 HOURS NON-STAT STARTING 11/28/2010, 333 mg, Oral • Normal • R-D	
	Product: <b>ERYTHROMYCIN BASE 333 MG PO TAB DR</b> Dose: <input type="text" value="333"/> mg <input type="text" value="As Instructed"/> <input type="text" value="333 mg"/>	
<b>Prescribed Dose: 333 mg</b> <b>Prescribed Amount: 1 Tab</b>		

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Snapshot Chart Review Flowcharts Results Review Synopsis History Allergies Problem List Medications Immunizations

New order:  Search ☒ Both ☐ Medication ☐ Procedure

New order defaults: **Not using defaults**

**Medications (1 Order)**

**erythromycin base 333 MG PO tab DR**

Allergy/Contraindication: Erythromycin Reactions: Nausea And Vomiting

EVERY 6 HOURS NON-STANDARD starting 11/28/2010, 333 mg, Oral • Normal • R-0

Product: ERYTHROMYCIN BASE 333 MG PO TAB DR

Dose: 333 mg  As Instructed  333 mg

Prescribed Dose: 333 mg

Prescribed Amount: 1 Tab

**Medications Warnings**

Current Warnings Report ☐ Importance ☐ Type ☐ Ordering Collapse All Show Summary Show Legend

Type/Significance	Description	Override Reason/Comment
<b>Very High</b>	<b>Allergy/Coat</b> Drug Class Match PENICILLINS (High Severity) Anaphylaxis Bronchospasms amoxicillin-clavulanate (AUGMENTIN) 500-125 MG PO tablet	<input type="text"/> New (1)
<b>High</b>	<b>Drug-Drug</b> Major Penicillins / Oral Contraceptives Pharmacologic effects of Oral Contraceptives may be decreased by Penicillins in a small undersettable subpopulation of patients. Menstrual irregularities (spotting, breakthrough bleeding) and pregnancy have been reported. amoxicillin-clavulanate (AUGMENTIN) 500-125 MG PO tablet levonorgestrel-ethinyl estradiol 0.1-0.02 MG-MCG PO TABS	<input type="text"/> New (1)

Override Reason  Override Warnings Cancel

Immediately override and accept all warnings with this reason:

☐ Benefit Outweighs Risk ☐ Medical Necessity ☐ Tolerated in Past ☐ Physician Approved ☐ Allergy cross-reactivity minimal ☐ See Comments

**Tarheel, Trudy** 22 y.o. female (4/29/1988) Allergies  
420000137 Pcn, Erythromycin, Sulfu Drugs

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Snapshot Chart Review Flowcharts Results Review Synopsis History Allergies Problem List Medications Immunizations

New order:  Search ☒ Both ☐ Medication ☐ Procedure

New order defaults: **Not using defaults**

**Medications (1 Order)**

**erythromycin base 333 MG PO tab DR**

Allergy/Contraindication: Erythromycin Reactions: Nausea And Vomiting

EVERY 6 HOURS NON-STANDARD starting 11/28/2010, 333 mg, Oral • Normal • R-0

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Dose: 333 mg  As Instructed  333 mg

Prescribed Dose: 333 mg

Prescribed Amount: 1 Tab

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**Pharmacy Selection**

Selected Pharmacy: **TRANSITION PHARMACY 2607** Destination:

Preferred Pharmacy List \* Patient Preferences

Name	Type	Phone Number
*TRANSITION PHARMACY 2607-B INTERPLEX DR; SUIT...	External	609-320-9616
*WALGREENS DRUG STORE 09093 5195 N. HAMILTON R...	External	614-476-0988

**Medical Center**

**Patient After Visit Summary**

**Trudy Tardiff**  
11/26/2018 Office Visit  
0001 42000127

Description: Female 5'00; 4.25/1500  
Provider: **Milica A. Rios, M.D., MPH**  
Department: **OSD Family Practice at Radin**

Office Location: **OSD Family Practice at Radin**  
Address: 2231 N. High St.  
Columbus OH 43201  
Phone: 614-293-2700  
Fax: 614-293-2720

Reason for Visit: **Headache**

History: **Headache**  
Abdominal pain 11/26/2018  
Free of medication  
Caffeine  
No drugs

Examination: **Headache**  
No response  
No response  
No response

Diagnosis: **Headache**  
No response  
No response  
No response

Recommendation: **Headache**  
No response  
No response  
No response

Medication: **Headache**  
No response  
No response  
No response

Test Results: **Headache**  
No response  
No response  
No response

Thank you for coming to see me today. I appreciate your confidence in choosing The Ohio State University Medical Center for your medical care. If you have any questions about your visit today, please feel free to contact our office. We will respond to your call as soon as possible.

**Milica A. Rios, M.D., MPH**  
OSD Family Practice at Radin  
2231 N. High St.  
Columbus OH 43201  
Phone: 614-293-2700  
Fax: 614-293-2720

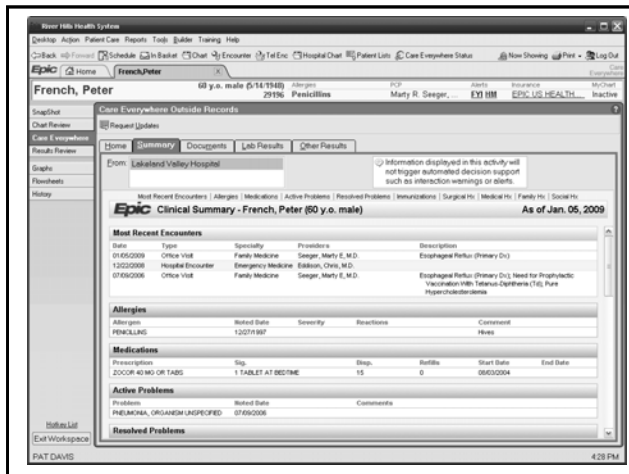
## Stage 1 Objectives

- Engage patients and families in their healthcare.
  - Provide patients with an electronic copy of their health information
  - Provide patients with an electronic copy of their discharge instructions
  - Provide a clinical summary of each office visit
  - Provide patients with timely electronic access to their health information, within 4 business days

## Stage 1 Objectives

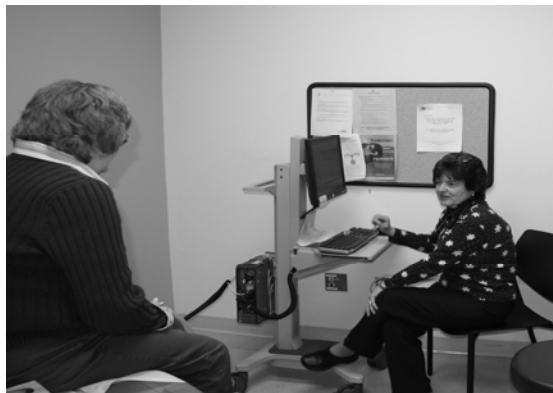
- Improve care coordination
  - Exchange key clinical information among providers of care and patient authorized entities electronically.
- Ensure adequate privacy and security protections for personal health information





## Lessons Learned

- A well planned implementation can result in less productivity lost and better satisfied users.
- Role based practice helps ease the anxiety of the go live by all users.
- Patients expect this level of communication and connectivity from their healthcare providers.



## Electronic Medical Records

**Neeraj H. Tayal MD**

**Assistant Professor**

**Division of General Internal Medicine**

***“I do not fear computers.  
I fear the lack of them.”***

Isaac Asimov

## Meaningful Use

- Record clinical information as structured data
- Utilize drug-drug & drug-allergy alerts
- Generate lists of patients by conditions to use for quality improvement
- Provide patients electronic copy of their health information

- ***“All sorts of computer errors are now turning up. You'd be surprised to know the number of doctors who claim they are treating pregnant men.”***

Isaac Asimov

## Data

- **Unstructured data**
  - Data that can assume any value
  - Hand written notes, dictated notes, typed notes
  - Static medium for recording information

## Data

- **Structured data**
  - Data that can assume only specified values
  - Selected from a category list
  - Facilitates computational processes

## Scanning Paper Records



## Scanning Paper Records



## Scanning Paper Records

- Scanning is labor and cost intensive
- Scanned documents can be difficult to find
- Solutions include:
  - Selective scanning of paper record
    - Patient signed forms (consent, advanced directives, etc)
    - Imaging, procedure, pathology reports
  - Maintain read only access to legacy systems
  - Maintain access to paper records for 6-12 months

## Abstraction

- Transfer of data in paper chart to structured data elements in the electronic chart

High

▷ DM w/o Complication Type II, Uncontrolled	250.02
▷ HTN (hypertension)	401.9AF
▷ Hyperlipidemia	272.4S

Medium

▷ Osteoarthritis	715.90AN
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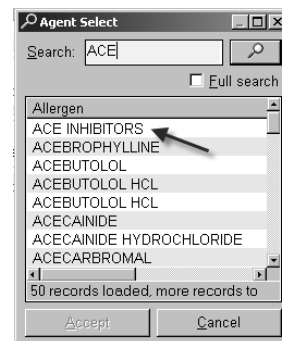
## Abstraction (keys to success)

- Coordinate the necessary resources
  - Physicians
  - Staff
  - Outside resources
- Plan for which patient charts will be abstracted and when.

## Abstraction (keys to success)

- Focus on high value data to make chart effective
  - Current medications and allergies
  - Problem list, medical ,and surgical history
  - Immunizations

## Allergy (Structured Data)



**ACE INHIBITORS**

Agent: ACE INHIBITORS

Type:

Reactions:

**Reaction Type Select**

Search:

Title
Adverse Drug Reaction
Allergy
Anaphylaxis
Contraindication
Intolerance

5 categories loaded.

Accept Cancel

## Drug-Drug Alert

**Medication Warnings**

Current Warnings Report

Group by: ☒ Importance ☐ Type ☐

Type/Significance	Description
<b>Drug-Drug</b>	Statins / Macrolides
Major	Pharmacologic and toxic effects of Statins may be increased by Macrolides. Coadministration of Macrolides and Ketolides and Statins may increase the risk of liver dysfunction and rhabdomyolysis.

## Medication List

Prescription Summary for This Visit (11/18/2010)		
Medication	Dose	Sig
simvastatin 20 MG PO TABS	60 mg	take 3 Tabs by mouth daily.
pioglitazone (ACTOS) 30 MG PO	30 mg	take 1 Tab by mouth daily.
furosemide (LASIX) 40 MG PO	40 mg	take 1 Tab by mouth daily.
acarbose (PRECOSE) 25 MG PO	25 mg	take 1 Tab by mouth daily.
potassium chloride SA (K-DUR) 10 MEQ PO tab ER	10 mEq	take 1 Tab by mouth 3 times daily.

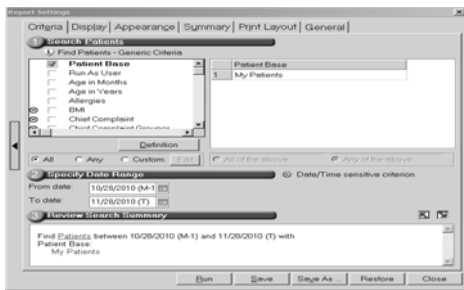
## Best Practice Alert

Best Practice Advisories

This patient is 65 years of age or above. It is recommended that a Pneumococcal 23-Valent Vaccine be administered.

☒ Open [SmartSet: Pneumococcal Vaccine 23-Valent BPA](#) preview

## Generate lists of patients by condition to use for quality improvement



## EMR Generates Patient List

<u>Name</u>	<u>DOB</u>	<u>Gender</u>	<u>BP</u>	<u>HbA1c</u>	<u>LDL</u>
Patient # 1	DOB	Gender	130/80	6.2	105
Patient # 2	DOB	Gender	138/86	7.1	78
Patient # 3	DOB	Gender	160/92	9.2	142

## Generate lists of patients by condition to use for quality improvement

- Find Patients
- Between 8/28/10 (M-3) and 11/28/10 (T)
- Patient Base – My Patients
- Problem List
  - Diabetes type II, controlled (250.00)
  - Diabetes type II, uncontrolled (250.02)

## Electronic Patient Portal (E-Health, Web 2.0)



## Features of Electronic Patient Portals

- View key components of the record
- Interact with Medical Staff
- Test results
- Proxy access to family member records
- Access patient educational materials

## Interact with Medical Staff Online

- Medical advice
- Prescription refills
- Appointment requests

## View Key Components of the Chart

- Active problem list
- Medical and surgical history
- Medications
- Allergies
- Immunizations
- Test results
- NO ACCESS TO PHYSICIAN NOTES

## Electronic Patient Portal (E-Health, Web 2.0)

- Harris Interactive Poll (2002)
- Over 66% of US adults are online
- 90% of these adults would like to communicate with their physicians online
- >70% would like to
  - Ask medical questions
  - Fix appointments
  - Receive test results

Patient/physician online communication: many patients want it, would pay for it, and it would influence their choice of doctors and health plans. Health Care News 2002 Apr 10 [cited 2010, August 5th] at [www.harrisinteractive.com](http://www.harrisinteractive.com)

## Electronic Patient Portal (E-Health, Web 2.0)

- Harris Interactive 2010
- 8% have the ability to:
  - Email to communicate with your doctor
  - Schedule an appointment via the internet
  - Receive test results online

Harris Interactive, Health Day - from June 8-10 among 2,035 U.S. adults.

## Summary

- EMRs enable improvements in health care by storing data in a structured fashion
- Physician, staff, and patient remain key to the successful deployment and usage of this powerful tool

## Stats on Message Volume and Content

- Physicians received 2 – 12 messages per day
- Average response time was 3.5 minutes
- 63% required clinical assessment & decision

Improved Quality at Kaiser Permanente through E-Mail Between Physicians and Patients, Health Affairs July 2010