

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

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

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**

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.**

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

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.**

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, Sulfa Drugs

None

HM



11/28/2010 visit with Milisa K Rizer, M.D., MPH for Office Visit

Snapshot

Chart Review

Allergies: **Pcn, Erythromycin, Sulfa Drugs** Reviewed on 11/28/2010: (44861)

Last Vitals: BP: 120/80 P: 80 T: 98 F (36.7 C) T Src: Temporal Resp: 16 W: 135 lb (61.236 kg) H: 5' 6" (1.676 m)

Flowsheets

SpO2: PF: BMI: 21.79 kg/m² BSA: 1.69 m² LMP: 11/11/2010 Smoking Status: **Never Smoker** Smokeless Tobacco Status: **Never Used**

Results Review

Results

Recent Labs...

Synopsis

Recent Labs

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History

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Reconcile Dispos...

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Immunizations

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History

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Doc Flowsheets

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H&P Notes

Dx and Orders

Procedure Notes

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Images SmartSets Open Orders Care Teams Print AYS Media Manager

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Images

SmartSets

Open Orders

Care Teams

Print AYS

Media Manager

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Peak Flow

Reviewed:

8/26/2010

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

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

Hyperspace - FAMILY MED RARDIN - OSU POC Environment - MILISA RIZER

Results My Open Charts My Open Encounters Overdue Results

Home Schedule In Basket Chat Encounter Telephone Call Refill Medication My Reports My SmartPhrases Change Department Secure Print Log Out

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Reconcile Medication Dispenses

To run the dispense history query please verify the patient's pharmacy benefits.

Allergies/Contraindications

Reaction	Severity	Type	Noted	Valid Until	Updated
PCN (Penicillins)	High	Anaphylaxis	8/26/2010		Past Updates...
Erythromycin	Medium	Intolerance	8/26/2010		Past Updates...
Sulfa Drugs	Low	Allergy	8/26/2010		Past Updates...

Mark As Reviewed

Last Reviewed by Milisa K Rizer, M.D., MPH on 11/28/2010 at 12:27 PM

Hyperspace - FAMILY MED RARDIN - OSU POC Environment - MILISA RIZER

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Hyperspace - FAMILY MED RARDIN - OSU PDC Environment - MILISA RIZER

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LOS & Follow-up
PI Instructions
Close Encounter
Charge Capture
Communication
Referring Provider

Reaction Severity Type Noted Valid Unit Uploaded

Pcn (Penicillins) Bronchospasms High Anaphylaxis 8/26/2010 Past Updates
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Mark As Reviewed Last Reviewed by Milisa K Rizer, M.D., MPH on 8/26/2010 at 5:42 PM

Medication Documentation

Patient Reported Meds Taking? Start Date End Date LT

Levonorgestrel ethinyl estradiol 0.1-20 MG-MC6 PO TABS
take 1 Tab by mouth daily Provider: Historical Provider
Calcium Citrate-Vitamin D 500-400 MG-UNIT PO CHEW
take 1 Tab by mouth 2 times daily Provider: Historical Provider

Mark As Reviewed Last Reviewed by Milisa K Rizer, M.D., MPH on 11/28/2010 at 12:11 PM

History

Last Update: History

Name	Date and Time
RIZER, MILISA K	Thu Aug 26, 2010 1:37 PM

Medical History

Past Medical History	Date	Comments
PRECLAMPSIA, SEVERE [642.50E]	2002	

Medical History - Pertinent Negatives

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Place orders (Enc Date: 8/18/2010) . Wt: 135 lb (61.236 kg) Ht: 5' 5" (1.651 m) BMI: 22.47 kg/m² BSA: 1.67 m²

Pref List Interactions Pharmacy Providers CC Results Open Orders Pending Orders Sign Orders SignNav Verify Pharmacy Benefits

New order: Search ☐ Both ☐ Medication ☐ Procedure

New order default: Not using defaults

Procedures (3 Orders)

CBC/PLATELETS
Routine, Lab Collect, Expected-11/28/2010, Expires-11/28/2011

CHEM 6 (LYTES, BUN CREA)
Routine, Lab Collect, Expected-11/28/2010, Expires-11/28/2011

LIPID PANEL
Routine, Lab Collect, Expected-11/28/2010, Expires-11/28/2011

F7- Prev Order F8- Next Order

Previously Signed Orders (2)

Diagnoses Associate Associate All Level of service: Edit

Add Diagnosis Edit Remove

P Diagnosis No encounter diagnoses present Code

New Problem ☐ Show Resolved Edit Resolve

Link	Problem	Code	Noted
	Preeclampsia, severe	642.50E	

Preference List Browser - Tarheel, Trudy

Search Browse (F4) Preference List (F5) Database Lookup (F7) Clear Selected

Only Favorites (★)

Selected Orders and Diagnoses

Procedures

☒ AMYLASE

Accept Cancel

Labs

Orders (Labs)

Body Fluids (Labs : Orders)

☐ CREATININE RANDOM URINE ☐ URINALYSIS

☐ MICROALBUMIN RANDOM URINE ☐ URINE CULTURE

☐ PROTEIN RANDOM URINE ☐ URINE SCREEN

☐ TOXICOLOGY SCREEN URINE ☐ URINE SCREEN W/ REFLEX MICROSCOPIC

Chemistry (Labs : Orders)

☐ ALBUMIN ☐ ELECTROLYTES C02

☐ ALKALINE PHOSPHATASE ☐ GGT

☐ ALP ALT AST ☐ GLUCOSE

☐ ALT ☐ HEPATIC FUNCTION PANEL

☒ AMYLASE ☐ LIPASE

☐ AST ☐ LIPID PANEL

☐ BILIRUBIN DIRECT ☐ MAGNESIUM

☐ BILIRUBIN TOTAL ☐ PHOSPHATE, INORGANIC

☐ BUN ☐ POTASSIUM

☐ CHEM 6 (LYTES, BUN, CREA) ☐ PSA

☐ CHEM 7 (LYTES, BUN, CREA, GLUC) ☐ PSA MEDICARE SCREENING

☐ CK ☐ TROPONIN

☐ COCAINE/METABOLITES, URINE ☐ URIC ACID

☐ COMPREHENSIVE METABOLIC PANEL ☐ VITAMIN B12

☐ CREATININE SERUM

Drug/tox (Labs : Orders)

☐ ALCOHOL, URINE ☐ NICOTINE SCREEN URINE

☐ CYCLOSPORIN ☐ RAMPAMYCIN

☐ DRUG ABUSE PANEL 10 ☐ THC (CANNABINOIDS), URINE

☐ DRUG ABUSE PANEL 6

Endocrinology (Labs : Orders)

☐ ANTI MICROSMAL ANTIBODY ☐ T3 FBFF

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SnapShot Pref List Interactions Pharmacy Providers CC Results Open Orders Pend Orders Sign Orders Sign/Na

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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

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

Place orders (Enc Date: 8/18/2010) - Wt: 135 lb (61.236 kg) Ht: 5' 5" (1.651 m) BMI: 22.47 kg/m² BSA: 1.8

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

Pref List Interactions Pharmacy Providers CC Results Open Orders Pend Orders Sign Orders Sign/Na

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: mg

Prescribed Dose: 333 mg
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Product: **ERYTHROMYCIN BASE 333 MG PO TAB DR**

Dose: mg

Prescribed Dose: 333 mg
Prescribed Amount: 1 Tab

Medication Warnings

Current Warnings

Report

Group by:

Importance

Type

Orders

Collapse All

Show Summary

Show Legend

Type/Significance	Description	Override Reason/Comment
Very High Allergy/Cont Drug Class Match	PENICILLINS (High Severity). Anaphylaxis. Bronchospasms. amoxicillin-clavulanate (AUGMENTIN) 500-125 MG PO tablet Remove	New (1)
High Drug-Drug Major	Penicillins / Oral Contraceptives Pharmacologic effects of Oral Contraceptives may be decreased by Penicillins in a small unidentifiable subpopulation of patients. Menstrual irregularities (spotting, breakthrough bleeding) and pregnancy have been reported. amoxicillin-clavulanate (AUGMENTIN) 500-125 MG PO tablet Remove levonorgestrel-ethinyl estradiol 0.1-20 MG-MCG PO TABS Discontinue	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

Medication Warnings

Current Warnings

Report

Group by:

Importance

Type

Orders

Collapse All

Show Summary

Show Legend

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Tolerated in Past

Physician Approved

Allergy cross-reactivity minimal

See Comments

Pharmacy Selection

Selected Pharmacy: TRANSITION PHARMACY 2607-B Destination: [Dropdown]

Add to Preferred List Pharmacy Detail

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

Remove from Preferred List Accept Cancel

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**



Patient After Visit Summary

Trudy Tarheel

11/28/2010 Office Visit

MRN : 420600137

Description: Female DOB: 4/29/1988

Provider: Milica K Rizer, M.D., MPH

Department: OSU Family Practice at Rardin

Office Location

Name:	Address:	Phone:	Fax:
OSU Family Practice at Rardin	2231 N High St Columbus OH 43201	614-293-2700	614-293-2720

Reason for Visit

Headache

Diagnoses

Headache - Primary

Allergies as of 11/28/2010

Pen (Penicillins)	Bronchospasms
Erythromycin	Nausea and Vomiting
Sulfa Drugs	Rash

Goals

Reduce alcohol intake to 1 servings per day	6/10/10	Yes	No
---	---------	-----	----

Order Summary

MRN BHAIN [MRN2 Custom] Order #: 40569178

administered on date of encounter - 11/28/2010

No immunizations administered on this encounter date.

Your Current Medications Are

Levonorgestrel etonogestrel 0.1/0.02 MG MCG PO TABS	take 1 Tab by mouth daily
Calcium Citrate-Vitamin D 500/400 MG/LIMIT PO CHEW	take 1 Tab by mouth 2 times daily
amoxicillin-clavulanate (AUGMENTIN) 500/125 MG PO tablet	take 1 Tab by mouth every 8 hours.

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 K Rizer, M.D., MPH
OSU Family Practice at Rardin
2231 N High St
Columbus OH 43201
Phone: 614-293-2700
Fax: 614-293-2720

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

River Hills Health System

Desktop Action Patient Care Reports Tools Builder Training Help

Back Forward Schedule In Basket Chart Encounter Tel Enc Hospital Chart Patient Lists Care Everywhere Status Now Showing Print Log Out

French, Peter 60 y.o. male (5/14/1948) Allergies PCP Alerts Insurance MyChart
29196 Penicillins Marty R. Seeger, ... FYI HM EPIC US HEALTH... Inactive

Care Everywhere Outside Records

Request Updates

Home Summary Documents Lab Results Other Results

From: Lakeland Valley Hospital

Information displayed in this activity will not trigger automated decision support such as interaction warnings or alerts.

Most Recent Encounters | Allergies | Medications | Active Problems | Resolved Problems | Immunizations | Surgical Hx | Medical Hx | Family Hx | Social Hx

EPIC Clinical Summary - French, Peter (60 y.o. male) As of Jan. 05, 2009

Most Recent Encounters

Date	Type	Specialty	Providers	Description
01/05/2009	Office Visit	Family Medicine	Seeger, Marty E, M.D.	Esophageal Reflux (Primary Dx)
12/22/2008	Hospital Encounter	Emergency Medicine	Eddison, Chris, M.D.	
07/09/2006	Office Visit	Family Medicine	Seeger, Marty E, M.D.	Esophageal Reflux (Primary Dx); Need for Prophylactic Vaccination VwH Tetanus-Diphtheria (Td); Pure Hypercholesterolemia

Allergies

Allergen	Noted Date	Severity	Reactions	Comment
PENICILLINS	12/27/1997			Hives

Medications

Prescription	Sig.	Disp.	Refills	Start Date	End Date
ZOCOR 40 MG OR TABS	1 TABLET AT BEDTIME	15	0	08/03/2004	

Active Problems

Problem	Noted Date	Comments
PNEUMONIA, ORGANISM UNSPECIFIED	07/09/2006	

Resolved Problems

Hotkey List Exit Workspace

PAT DAVIS 4:28 PM



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

- ***“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

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

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
------------------	----------

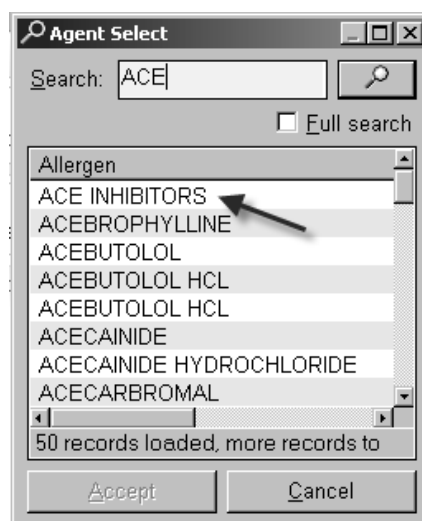
Abstraction (keys to success)

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

Abstraction (keys to success)

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

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

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.

Drug-Drug Alert

Medication Warnings	
Current Warnings	Report
Group by: ☒ Importance ☐ Type ☐ C	
Type/Significance	Description
 ☐ Very High	
Drug-Drug Major	Statins / Macrolides 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 <u>rhabdomyolysis</u> .

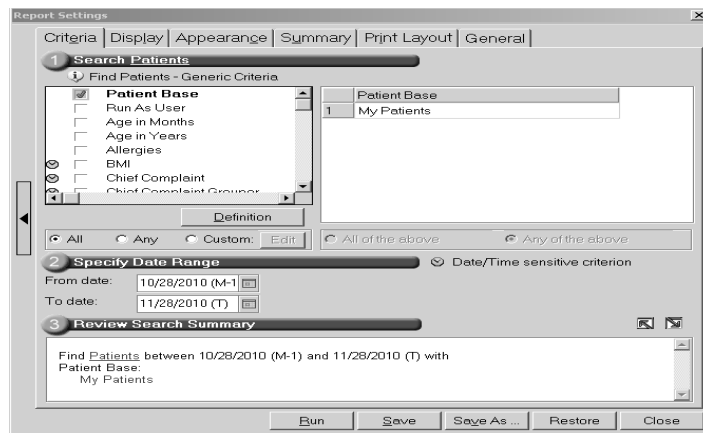
Best Practice Alert

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



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)

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

Electronic Patient Portal (E-Health, Web 2.0)



Welcome to **OSUMyChart**

OSUMyChart-Secure, online connection to your health

Your health is important to you around the clock-not just during office hours. That's why the OSU Medical Center offers OSUMyChart. With this on-line connection to your health care provider's office you can request appointments, renew prescriptions, review your health history and more. It's another way OSU Medical Center is working to personalize your health care.



OSUMyChart ID

[Forgot your OSUMyChart ID?](#)

Password

[Forgot Password?](#)

Sign In

MyChart © Epic Systems Corporation

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**

View Key Components of the Chart

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

Interact with Medical Staff Online

- **Medical advice**
- **Prescription refills**
- **Appointment requests**

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

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.

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

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**