Electronic Health (medical) Record

Amr Jamal, *MD, SBFM, ABFM, MRCGP, GCMI*

Assistant professor and consultant

Family physician and clinical informatician

Head of medical informatics and e-learning unit

King Saud university, School of medicine

Learning Objectives

The participant will be able to:

- Define an EHR
- Explain similarities between paper record and EHR
- List 5 benefits of an EHR
- Identify truth behind perceived barriers when implementing an EHR

History and perspective of the medical record

* **Data can be organized as**
  * Physician-centered
  * Patient-centered

* **Orientations (not mutually exclusive) include**
  * Time-oriented –organized chronologically
  * Department-oriented –organized by department
  * Problem oriented organized by focus on problems

History and perspective (cont.)

* Earliest medical records were physician-oriented
* Hippocrates said over 2,500 years ago that the medical record should
  * Accurately reflect course of disease
  * Indicate possible causes of disease

* Before era of widespread medical diagnostic testing, record consisted mostly of observations

Terminology of the medical record

* Electronic health record (EHR) – subsumes:
  * Electronic medical record (EMR)
  * Computer-based patient record (CPR)
* Other terms of note:
  * Medical records system / Chart management
  * Hospital information System (HIS)
  * Practice management system (PMS)
  * Patient registry
  * Personal health record (PHR)
  * Problem-oriented medical record (POMR)

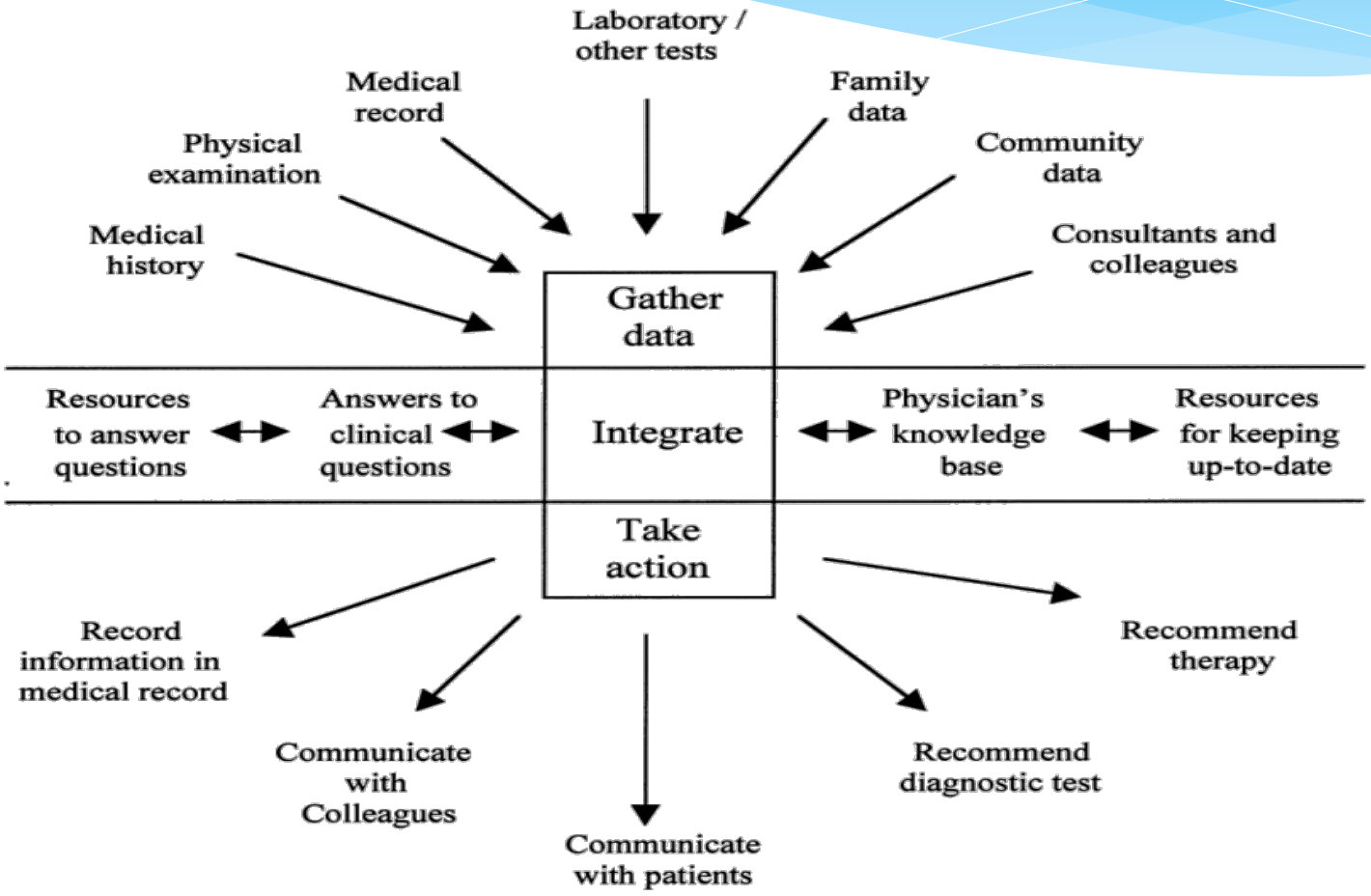
Problem-oriented medical record

* Proposed by Weed (1969)
* All entries grouped under particular problems
* An encounter for each problem is organized under four headings
  * Subjective –what patient reports
  * Objective –what clinician observes or measures
  * Assessment –what clinicians assesses
  * Plan – what clinician plans to do
* Most common usage is to have entire encounter organized by SOAP format, not individual problems

The modern-day medical record

* Mixture of patient-and problem-oriented approaches
* In general, each provider or institution maintains its own re cord
* The creator of the medical record is assumed to be its “owner”
* It is still predominantly paper-based
  * Or even worse, it is “hybrid,” with some data on paper, some electronic, and some on both media

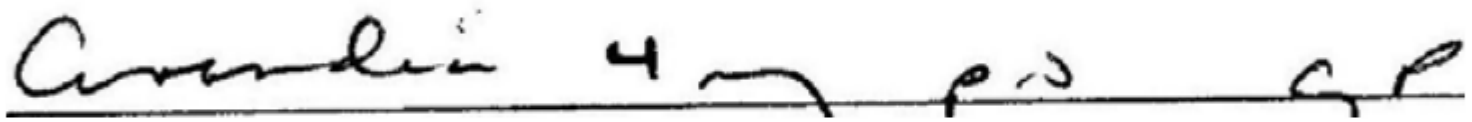
Flow of information in primary care practice (Bates, 2002)

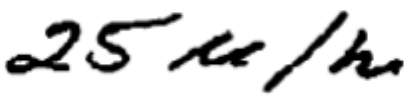


Some limitations of the paper-based record

* Single user –one person at a time
* Disorganized – especially for complex patients
* Incomplete –reports missing or lost,
  some providers not sharing their reports with the rest
* Insecure –no audit trail, easily copied or stolen
* Source of infection transmission
* Handwriting ambiguity

Can you decipher these orders?





Can you decipher these orders?

* Coumadin vs. Avandia

* 25 U/hr vs. 25 cc/hr vs. ???

KING SAUD U...
K.K.U.H.

PHC PROGRESS NOTE

08 -09 -75

Visit No: A1 447

Date: 5 | 12 | 09 / 18 | 12 | 30

Subjective:

RTA | on Tx

O.P.

Objective:

(O1) No new Co

(O2) GRG
Sleep

Temp:
Pulse: P. 71 IG
Wt.:
B.P. BP: 111/82
Nurse signature

Assessment:

1.
2.
3. (A) Doing OK on Tx
4.
5.
6.

Plan:

Test: 1. 2. 3. 4. 5. 6.

Drugs: Rx
1. Caltrate 600 mg TB
2. Sod. Bicarbonate
3. Potassium Chloride 16 mmol
4.
6.

Referral to:

Appt: —

Others:

Dr. Name: α Calcidol 1 μg

Dr. Signature

Go from Paper to Digital

Have patient information at your fingertips.

What are Electronic Medical Records?

The IOM 2003 Patient Safety Report describes an EMR as encompassing:

* "a longitudinal collection of electronic health information for and about persons
* Immediate electronic access to person- and population-level information by authorized users;
* Provision of knowledge and decision-support systems that enhance the quality, safety, and efficiency of patient care and
* Support for efficient processes for health care delivery."

HIT Functionality Measures

* EPs must report on 20 of 25 MU objectives with associated measures
  - Core set of 15
  - Menu set of 10
* An EP must successfully meet the measure for each objective in the core set and all but five in the menu set
  - Some MU objectives are not applicable to every provider's clinical practice. In this case, the EP would be excluded from having to meet that measure.
    - ✓ e.g., Dentists who do not perform immunizations and chiropractors who do not have prescribing authority

Meaningful Use: Core Set Objectives

15 Core Objectives

- Record demographics
- Record and chart changes in vital signs
- Computerized physician order entry (CPOE)
- E-Prescribing (eRx)
- Report ambulatory clinical quality measures
- Implement one clinical decision support rule
- Provide patients with an electronic copy of their health information, upon request
- Provide clinical summaries for patients for each office visit
- Drug-drug and drug-allergy interaction checks
- Maintain an up-to-date problem list of current and active diagnoses
- Maintain active medication list
- Maintain active medication allergy list
- Record smoking status for patients 13 years or older
- Capability to exchange key clinical information among providers of care and patient-authorized entities electronically
- Protect electronic health information

Meaningful Use: Menu Set Objectives

10 Menu Objectives

* Drug-formulary checks
* Incorporate clinical lab test results as structured data
* Generate lists of patients by specific conditions
* Send reminders to patients per patient preference for preventive/follow up care
* Provide patients with timely electronic access to their health information
* Use certified EHR technology to identify patient-specific education resources and provide to patient, if appropriate
* Medication reconciliation
* Summary of care record for each transition of care/referrals
* Capability to submit electronic data to immunization registries/systems*
* Capability to provide electronic syndromic surveillance data to public health agencies*

US EMR Adoption Model℠

Stage	Cumulative Capabilities	2012 Q1	2012 Q2
Stage 7	Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP	1.2%	1.7%
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS	6.2%	6.5%
Stage 5	Closed loop medication administration	9.4%	11.5%
Stage 4	CPOE, Clinical Decision Support (clinical protocols)	13.2%	13.3%
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	43.9%	42.4%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable	12.1%	11.7%
Stage 1	Ancillaries - Lab, Rad, Pharmacy - All Installed	5.5%	5.1%
Stage 0	All Three Ancillaries Not Installed	8.4%	7.9%

Data from HIMSS Analytics™ Database © 2012 N = 5,318 N = 5,303

* **CDR:** Clinical Data Repository
* **CMV:** Controlled Medical Vocabulary (e.g. MeSH)
* **CDO:** Care Delivery Organizations;
* **SEHR:** Shared EHR (= EMR)
* **ICEHR:** Integrated Care EHR (= EHR)
* **LIS:** Laboratory Information System
* **RIS:** Radiology I S
* **PIS:** Pharmacy I S
* **PACS:** Picture Archiving and Communication System
* **CDSS:** Clinical Decision Support System
* **CPOE:** Computerized Physician Order Entry
* **MAR:** Medication Administration Record
* **HCO:** Health Care Organization
* **eMAR:** Electronic Medication Administration Record

Stages of EMR complexity

EMR Adoption Model, 2006 Trends

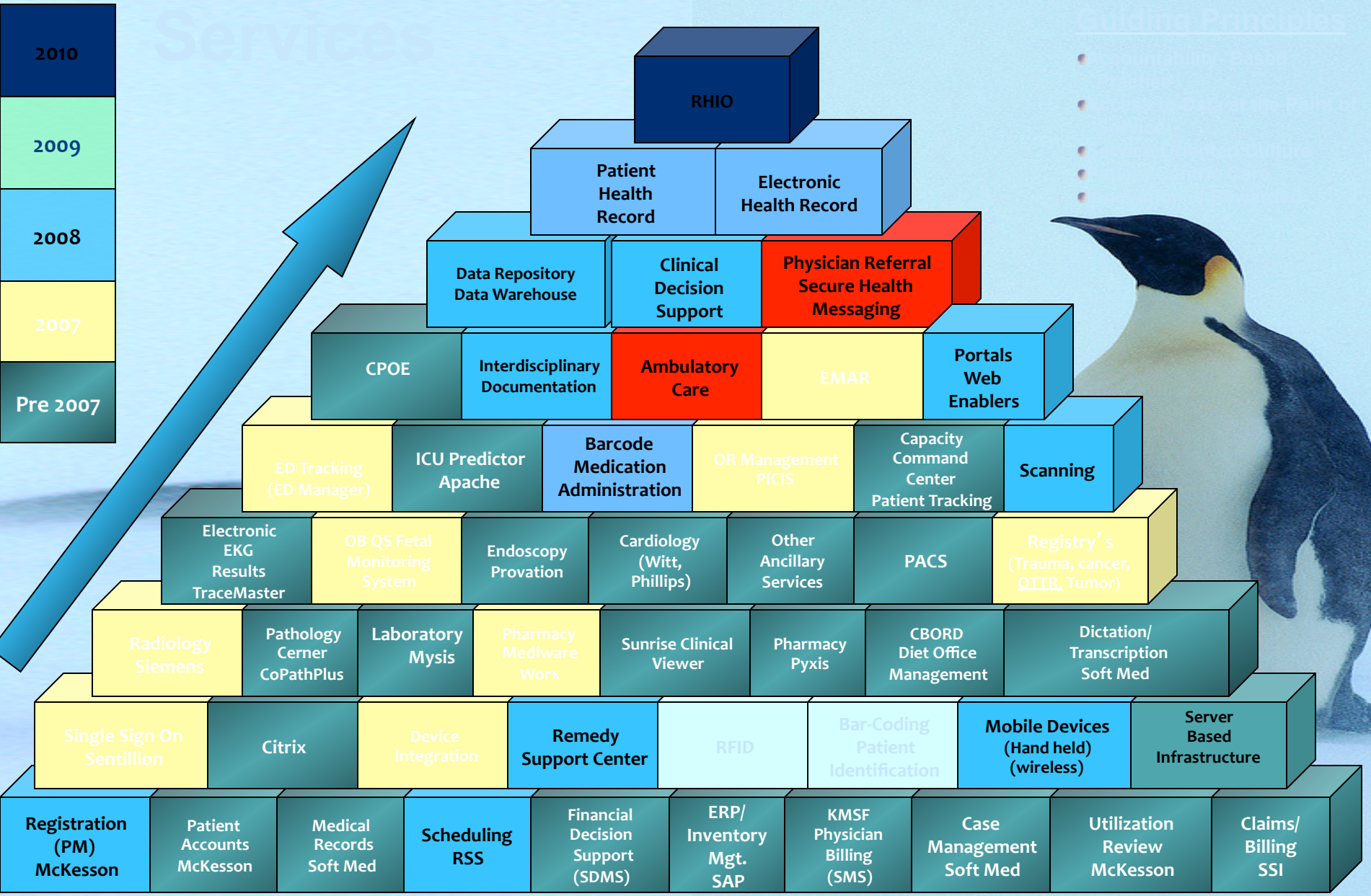
CDR is the central pivot

		2006 Data Sets Final	3rd Q	1st Q
Stage 7	Medical record fully electronic; CDO able to contribute to ICEHR as byproduct of SEHR	0.0%	0.0%	0.0%
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full PACS	0.1%	0.1%	0.1%
Stage 5	Closed loop medication administration	0.5%	0.5%	0.6%
Stage 4	CPOE, CDSS (clinical protocols)	3.0%	2.7%	2.5%
Stage 3	eMAR Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	18.0%	14.2%	11.2%
Stage 2	CDR, CMV, CDSS inference engine, may have Document Imaging	38.8%	42.9%	46.7%
Stage 1	Ancillaries – Lab, Rad, Pharmacy	18.9%	21.8%	19.8%
Stage 0	All Three Ancillaries Not Installed	20.7%	17.9%	19.0%

Data from 2006 HIMSS Analytics™ Database (derived from the Dorenfest IHDS+ Database™)

Canada EMR Adoption Model℠

Stage	Cumulative Capabilities	2012 Q1	2012 Q2
Stage 7	Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP	0.0%	0.0%
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS	0.5%	0.5%
Stage 5	Closed loop medication administration	0.3%	0.3%
Stage 4	CPOE, Clinical Decision Support (clinical protocols)	2.5%	2.5%
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	36.2%	34.1%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable	21.9%	24.6%
Stage 1	Ancillaries - Lab, Rad, Pharmacy - All Installed	15.2%	15.0%
Stage 0	All Three Ancillaries Not Installed	23.5%	23.0%
Data from HIMSS Analytics™ Database © 2012		N = 639	N = 639


2010
2009
2008
2007
Pre 2007
RHIO
Patient Health Record
Electronic Health Record
Data Repository Data Warehouse
Clinical Decision Support
Physician Referral Secure Health Messaging
CPOE
Interdisciplinary Documentation
Ambulatory Care
EMAR
Portals Web Enablers
ED Tracking (ED Manager)
ICU Predictor Apache
Barcode Medication Administration
OR Management PICIS
Capacity Command Center Patient Tracking
Scanning
Electronic EKG Results TraceMaster
OB QS Fetal Monitoring System
Endoscopy Provation
Cardiology (Witt, Phillips)
Other Ancillary Services
PACS
Registry's (Trauma, cancer, OTTR, Tumor)
Radiology Siemens
Pathology Cerner CoPathPlus
Laboratory Mysis
Pharmacy Mediware Worx
Sunrise Clinical Viewer
Pharmacy Pyxis
CBORD Diet Office Management
Dictation/ Transcription Soft Med
Single Sign On Sentillion
Citrix
Device Integration
Remedy Support Center
RFID
Bar-Coding Patient Identification
Mobile Devices (Hand held) (wireless)
Server Based Infrastructure
Registration (PM) McKesson
Patient Accounts McKesson
Medical Records Soft Med
Scheduling RSS
Financial Decision Support (SDMS)
ERP/ Inventory Mgt. SAP
KMSF Physician Billing (SMS)
Case Management Soft Med
Utilization Review McKesson
Claims/ Billing SSI

Why the reluctance by clinicians to adopt IT systems

* Main reason, they were not involved in the decision of implementation
* May partially be a generational issue
* Main reason may be that so far EMR has not delivered time savings for physicians and nurses, in fact, in many circumstances when not fully deployed, costs time
* Main justification may be in addressing cost, quality and safety issues

Conclusion

EMR is ultimately geared towards reducing errors, improving safety and care and cutting costs of healthcare

Conclusion

* *"We can't solve problems by using the same kind of thinking we used when we created them."*

-Albert Einstein