# Electronic Health (medical) Record

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Credit to Prof. William Hersh for most of the slides in this presentation

# 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 <u>observations</u>

# 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 record
* 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. ???

**Visit No.**

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

...jective:  Aa 44+

· RTA / on Tx
O.D.

...jective:

② no new Cx
→
② GIT Cx

...essment:   Scnuey

1.                    4.

2.                    5.

3. Ⓐ  Drug OK on Tx   6.

...n:

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

**Temp:**
**Pulse:**  77/5
**Wt.:**
**B.P.**  BP. 11/82
Nurse signature

Drugs:  R₂
        1.— Caltide 600 mg T8
        2.
        3.— Sod. Bicarbonate
        4.
        6.— Potassium Chloride
                                Referral to.
                                /6 mr nve
Appt:
Others:                         Dr Signature
Dr. Name: _____ α Calcidel / ...

# Go from Paper to Digital





Have patient information at your fingertips.

# What are Electronic Health Records?

The IOM 2003 Patient Safety Report describes an EHR 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

* Eligible Professionals (EPs) must report on 20 of 25 Meaningful Use (MU) objectives with associated measures
  o Core set of 15
  o 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
  o 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*

# HIT Resources

http://www.healthit.gov/providers-professionals/how-attain-meaningful-use

https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/downloads/EP-MU-TOC.pdf

# US EMR Adoption Model<sup>SM</sup>

| 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% |

* **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 **3** | 0.1% | 0.1% | 0.1% |
| Stage 5 | Closed loop medication administration | 0.5% | 0.5% | 0.6% |
| Stage 4 | CPOE, CDSS (clinical protocols) **2** | 3.0% | 2.7% | 2.5% |
| Stage 3 | **eMAR** Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology **1** | 18.0% | 14.2% | 11.2% |
| Stage 2 | CDR, CMV, CDSS inference **0** 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% |

# Canada EMR Adoption Model<sup>SM</sup>

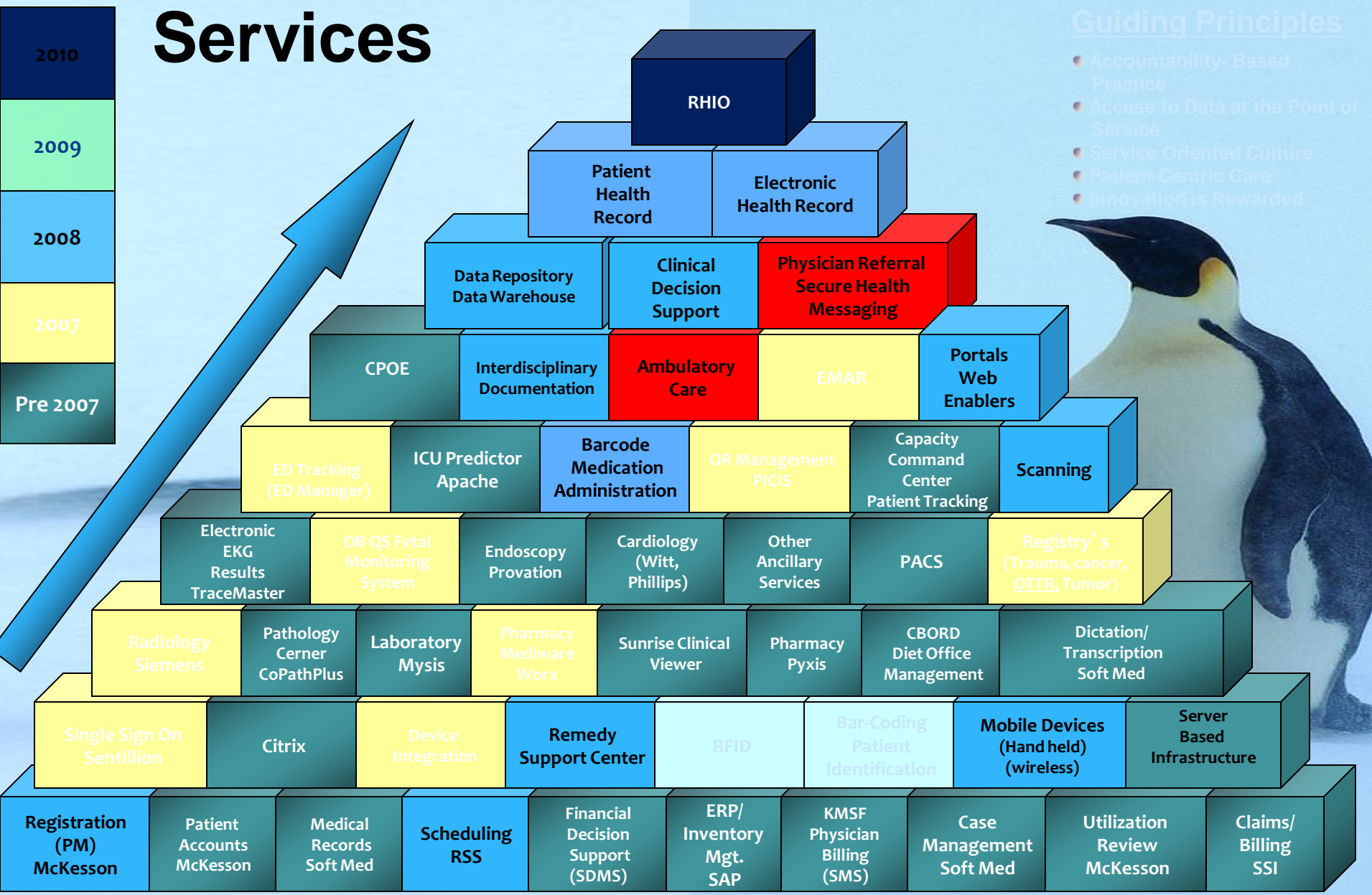| Stage | Cumulative Capabilities | 2012 Q1 | 2012 Q2 |
|---|---|---|---|
| Stage 7 | Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP | 0.0% | 0.0% |
| Stage 6 | Physician documentation (structured templates), full CDSS (variance & compliance), 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% |

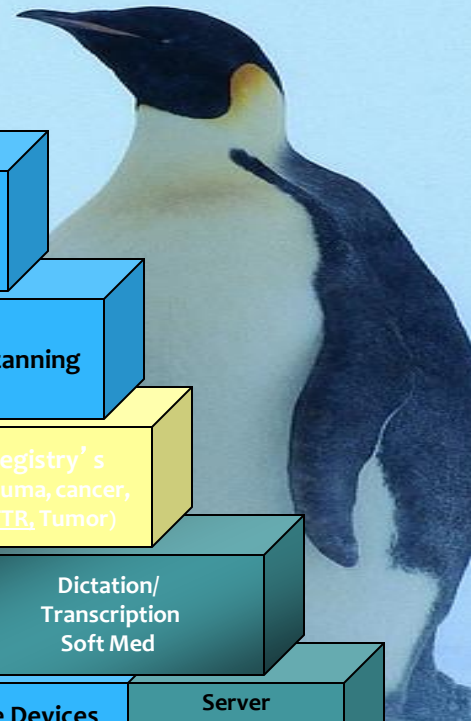Data from HIMSS Analytics<sup>TM</sup> Database © 2012        N = 639    N = 639

# UK HealthCare Information Technology Services

**Legend (by year):**
- 2010
- 2009
- 2008
- 2007
- Pre 2007

**Pyramid tiers (top to bottom):**

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