Electronic Health Records

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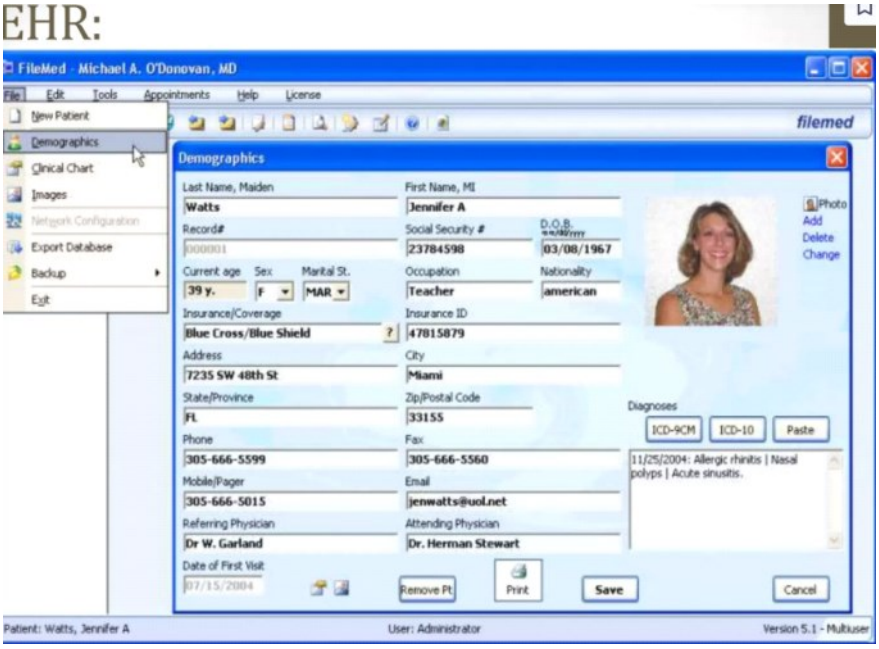
Electronic Health Records(EHR), Components of EHR, Benefits of EHR, Barriers to Adopting EHR, Challenges of using EHR data, Phenotyping Algorithms

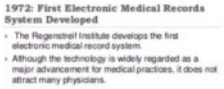
ELECTRONIC HEALTH RECORD (EHR)

- **Electronic health record**, is the electronic version of the client data found in the traditional paper record.
- EHRs are defined as "a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting.

EHR:



Records system started in



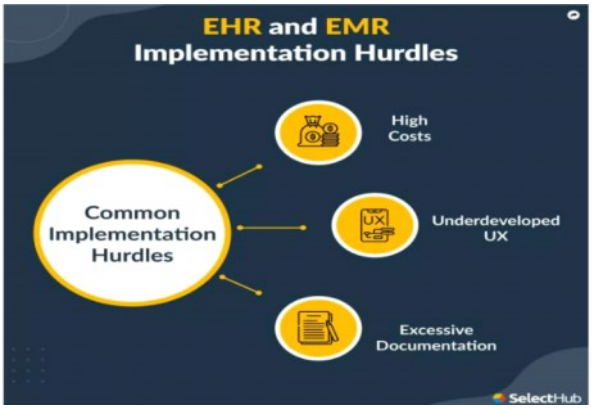
EHRs developed between **1971 and 1992** were developed with hierarchical or relational databases, around or added to hospital billing and scheduling systems while others such as COSTAR, PROMIS, TMR, and HELP were developed as clinical systems to help improve medical care and for use in medical research

Who is created EHR first ?

- In the 1960s, **Larry Weed**, an American physician, researcher, educator, and entrepreneur, developed the Problem Oriented Medical Record. With this, Weed introduced the idea of electronically recording and maintaining patient data. Weed may be identified as the person who invented electronic health records themselves.

Roles of EHR

- Represents patient's health history
- Medium of Communication among health care practitioners
- Legal document for health care
- Source for clinical outcomes and health services research
- Resource for practitioner education
- Alerts, reminders, quality improvement



Data components documented in EHR

An electronic health record should contain important data such as;

- Patient profile and demographics
- Medical history
  - includes information about allergies, illness, immunization, disorder and diseases.
- Medicine taken and its compatibility with drug interaction
- Records of appointment

Data components documented in EHRs:

- admission nursing note,
- daily charting,
- physical assessment,
- present complaints (e.g. symptoms),
- diagnoses, tests, procedures, treatment,
- nursing care plan,
- medication administration, progress notes
- laboratory data, and radiology reports
- referral,
- Discharge history,
- Billing records

Components of EHR

- Clinical decision support system (CDSS),
- Computerized physician order entry (CPOE) systems, and
- Health information exchange (HIE).

CLINICAL DECISION SUPPORT SYSTEM (CDSS)

- A CDS system is a software that assists the provider in making decisions with regard to patient care.
- CDSS provides physicians and nurses with real-time diagnostic and treatment recommendations.

Functions of CDSS

- Managing clinical complexities
- Monitoring medication errors
- Avoiding duplicate and unnecessary tests
- Supporting clinical diagnosis &Treatment plan processes
- Promoting use of best practices & condition specific guidelines &
- Population based management.
- providing the latest information about a drug,
- cross-referencing a patient allergy to a medication, and
- alerts for drug interactions and other potential patient issues

Patient safety with EHR

Researchers found that computerized physician reminders increased the use of influenza and pneumococcal vaccinations from practically 0% to 35% and 50%, respectively, for hospitalized patients.

Prevention of complication with EHR

Willson et al, found a significant association between computerized reminders and pressure ulcer prevention in hospitalized patients.

They found a 5% decrease in the development of pressure ulcers 6 months after the implementation of computerized reminders that targeted hospital nurses.

Decreased cost of care with EHR

- Tierney et al found a 14.3% decrease in the number of diagnostic tests ordered per visit and a 12.9% decrease in diagnostic test costs per visit when using an EHR with CDS and CPOE components.

Computerized physician order entry(CPOE)

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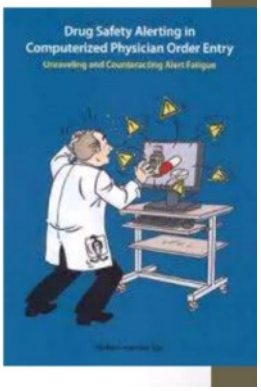
- CPOE is a software that allow physicians to enter orders directly into the computer rather than doing so on paper.

Example

- drugs,
- laboratory tests,
- radiology,
- physical therapy

Benefits of CPOE

- Eliminates potentially dangerous medical errors caused by poor penmanship of physicians.
- Eliminate errors caused by unclear telephone orders
- It also makes the ordering process more efficient because nursing and pharmacy staffs do not need to seek clarification or to solicit missing information from illegible or incomplete orders.
- Enhances patient safety



Health information exchange

HIE is the process of sharing patient's electronic health information between different organizations and can create many efficiencies in the delivery of health care.

Once health data are available electronically to providers, EHRs facilitate the sharing of patient information through HIE.

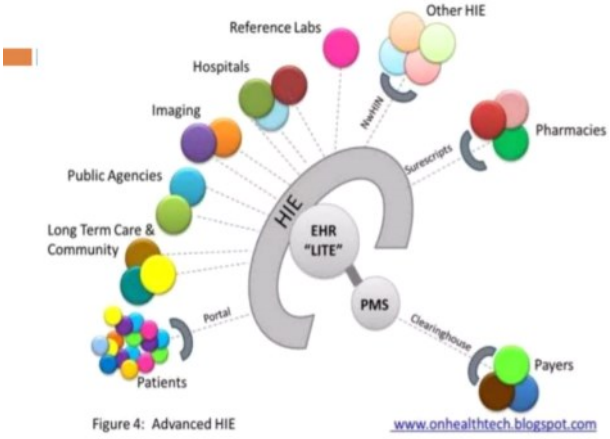


Figure 4: Advanced HIE

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HIE Benefit

Health information exchange-Benefits

- Allows for the secure and potentially real-time sharing of patient information,
- HIE can reduce costly redundant tests
- HIE facilitates the exchange of this information via EHRs, which can result in much more cost-effective and higher-quality care.

Technologies involved in EHR

- Picture archiving and communications system
- Bar coding
- Radio frequency identification
- Automated dispensing medicines
- Electronic medication administration records

PICTURE ARCHIVING AND COMMUNICATIONS SYSTEM

This technology captures and integrates diagnostic and radiological images from various devices, stores them, and disseminates them to a medical record, a clinical data repository, or other points of care.

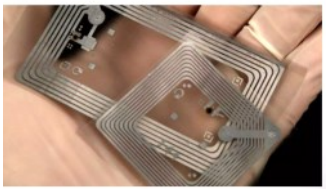
e.g., x-ray, MRI, computed tomography scan

Bar coding

An optical scanner is used to electronically capture information encoded on a product. Initially, it is used for medication.

- It consist of bar code readers , a portable computers with wireless connection.
- The nurse can verify patients as well as drugs.

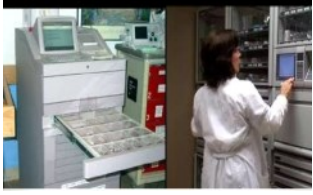
Radio frequency identification



This technology tracks patients throughout the hospital, and links lab and medication tracking through a wireless communications system.

It is neither mature nor widely available, but may be an alternative to bar coding.

AUTOMATED DISPENSING MEDICINES



Automated dispensing medicines are computerized drug storage devices which allow medications to be stored and dispensed near the point of care while controlling and tracking the drug distribution.

Benefits of EHR

- *Improved access to the medical record.*
- *Decreased time spent in documentation.*
- *Increased time for client care.*
- *Improved quality care.*
- *Facilitation of data collection for research.*
- *Improved communication and decreased potential for error.*
- *Creation of a lifetime clinical record facilitated by information systems.*

The benefits of EHRs

clinical outcomes:

- improved quality,
- reduced medical errors,

organizational outcomes:

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clinical outcomes:

- improved quality,
- reduced medical errors,

organizational outcomes:

- financial and
- operational benefits,

societal outcomes

- improved ability to conduct research,
- improved population health,
- reduced costs

Drawbacks

- Financial issues,
- changes in workflow,
- temporary loss of productivity associated with EHR adoption,
- privacy and security concerns,