Slide 1

Installation and Maintenance
of Health IT Systems

Unit 1
Elements of a Typical EHR
System

Component 8/Unit 1   Health IT Workforce Curriculum   1
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

_____

Slide 2

What We'll Cover…

- The IOM's Healthcare Improvement Initiative and Technology's Role
- EHR Systems
  - Defined
  - Then and Now
  - Advantages to EHR Systems
- EHR Software Elements
  - Client - Server Model
  - Server Applications vs Client Applications
  - EHR Model and Components
- EHR Hardware Components
  - Server
    - Internal vs External
  - Clients
    - Workstations
    - Laptops and Tablets
  - Miscellaneous Hardware
    - PDAs
    - Scanning and Medical Equipment
- Network Elements
  - WAN, LAN
  - Remote Access
  - Assessing Network needs

Component 8/Unit 1   Health IT Workforce Curriculum   2
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 3

"Information technology…holds
enormous potential for transforming
the health care delivery system…"

"Crossing the Quality Chasm," Institute of Medicine 2001

Component 8/Unit 1   Health IT Workforce Curriculum   3
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 4

A New Health System for the 21st Century

Six Aims for Improving
Health Care Quality
1. Safe
2. Effective
3. Patient-centered
4. Timely
5. Efficient
6. Equitable

Component 8/Unit 1   Health IT Workforce Curriculum   4
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 5

A Patient Record System

• Any patient record system includes:
– People
– Data
– Rules and Procedures
– Processing and Storage Devices

Component 8/Unit 1   Health IT Workforce Curriculum   5
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 6

A Complete EMR System

• Computerized orders for prescriptions
• Computerized orders for tests
• Reporting of test results
• Physician notes.

Component 8/Unit 1   Health IT Workforce Curriculum   6
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 7

The EHR System

- Key Components
  - Provides "longitudinal health data" on individuals
  - Provides immediate, yet secure, electronic access
  - Enhances quality, safety and efficiency of patient care
  - Makes health care more efficient

Component 8/Unit 1   Health IT Workforce Curriculum   7
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 8

EHR Systems…Then and Now

Then…
- Earlier EHR systems required extremely expensive computer hardware
- Core components usually ran on UNIX and often incurred expensive training costs
- Rapid progression of technology meant technology was outdated almost as soon as it was installed

Component 8/Unit 1   Health IT Workforce Curriculum   8
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 9

EHR Systems…Then and Now

Now…
- Fast, low cost PC systems permeate the workplace often less than $500 each.
- Improved Network protocols make updating and Maintenance easier and more cost effective.
- Windows compatible systems reduced training costs.

Component 8/Unit 1   Health IT Workforce Curriculum   9
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 10

Advantages to EHR Systems

- Better and more accurate documentation
- More efficient storage/ retrieval of records
- Higher quality of care and fewer errors
- Lower insurance premiums and operating costs

Component 8/Unit 1   Health IT Workforce Curriculum   10
                            Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 11

Software Elements – Prior
(Source: National Institutes of Health- Electronic Health Records Overview)

Component 8/Unit 1   Health IT Workforce Curriculum   11
                            Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 12

Software Elements with EHR
(Source: National Institutes of Health- Electronic Health Records Overview)

Component 8/Unit 1   Health IT Workforce Curriculum   12
                            Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 13

The Client- Server Model

- Most of today's EHR systems are based on the client –server model
- **Software** - The collection of computer programs and related data that provide the instructions telling a computer what to do.
- **Servers** – Service Providers
  - Run "server application" software designed to meet client requests
- **Clients** – Service Requesters
  - Client software is designed to "request" information from a server and then present that data to the requestor in an efficient manner.
- A server and client may reside on the same "box"

Component 8/Unit 1   Health IT Workforce Curriculum   13
Version 1.0 Fall 2010

Slide 14

Typical Server Elements

Types of servers:
- Application server: computer on which the EMR/PM application resides
- Database server: computer on which the database software resides
- Citrix or terminal server: computer that supports thin client network
- Application, database, and terminal services may reside on the same computer for small installations (less than 10 users)

Component 8/Unit 1   Health IT Workforce Curriculum   14
Version 1.0 Fall 2010

Slide 15

Server Software Elements of the EHR

- 8 Core Components (IOM)
  - Health Information and Data
  - Results Management
  - Order Entry/ Management
  - Decision Support
  - Electronic Communication/ Connectivity
  - Patient Support
  - Admin Processes
  - Reporting/ Pop. Health Management

Component 8/Unit 1   Health IT Workforce Curriculum   15
Version 1.0 Fall 2010

Slide 16

EHR Clients

- EHR systems make medical records available to multiple simultaneous users. Tablets, laptops and PCs allow instantaneous access for the healthcare staff who move around in the health centers.
- Clients use application software to securely connect to and poll the EHR server to fulfill user requests

Component 8/Unit 1   Health IT Workforce Curriculum   16
                            Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 17

EHR Hardware - Defined

Hardware consist of the physical components that make up a computer system.

These objects are needed to make the computer work and run properly.

Component 8/Unit 1   Health IT Workforce Curriculum   17
                            Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 18

EHR Hardware - Defined

Types of hardware most often affiliated with EHR systems include…

- Servers
- Workstations
- Laptops
- Tablets
- PDAs / Smartphones

- Flat Panel Monitors
- Scanners
- Printers
- Storage and Backup
- Shredders
- Medical Diagnostic and Treatment Items

Component 8/Unit 1   Health IT Workforce Curriculum   18
                            Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 19

EHR Hardware - Servers

The server(s) are the "Home base" of the
core EHR system components Including:
- Storing the Patient Database (Index)
- Real-time, dynamic compilation of patient
  information from varied sources
- Parsing user requests
- User Management tools
- Customization tools

Component 8/Unit 1   Health IT Workforce Curriculum   19
                                Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 20

EHR Hardware - Servers

Picking the right server is extremely important!
- You should consult your Information Systems
  staff, hardware vendor, and/or consultant to
  determine the hardware specs required for your
  organization. Consult with your EHR vendor as
  well.
- Important items to consider include:
  – Reliability
  – Performance
  – Scalability

Component 8/Unit 1   Health IT Workforce Curriculum   20
                                Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 21

EHR Hardware - Servers

- Storage requirements dependent on
  EHR/PM application, volume of scanned
  documents
- Rule of Thumb: 5 GB per year per provider
  (check with your EHR vendor)

Component 8/Unit 1   Health IT Workforce Curriculum   21
                                Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

_____

Slide 22

EHR Hardware - Servers

- Brand (i.e. Dell vs. "white box")

- Operating system (i.e. Windows 2003)

- Processors (e.g. 2.4 Hz Xeon)

Component 8/Unit 1   Health IT Workforce Curriculum   22
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 23

EHR Hardware - Servers

- RAM (i.e. 1 GB)

- Hard drive configuration (i.e. RAID 5)

- Network Card (e.g. 1 GB per second)

- Requires: monitor, keyboard, CD/DVD drive, UPS (un-interrupted power supply)

Component 8/Unit 1   Health IT Workforce Curriculum   23
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 24

EHR Hardware - Servers

Internal vs External (hosted) Solutions

- Cost
  - Internal - Higher initial costs
  - External - Monthly fees
- Management
  - Internal - Staff needed to implement and manage the server(s) and perform software and hardware maintenance and backup duties
  - External - The customer is at the mercy of the vendor for scheduled maintenance
- Power
  - Internal - Your organization is capable of utilizing the full power of the server
  - External – Hosted solutions often share resources
- Connectivity
  - Internal – You control the speed and connectivity to the server(s)
  - External - All locations are remote, and connectivity means may be shared with other customers, reducing the speed available to you

Component 8/Unit 1   Health IT Workforce Curriculum   24
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 25

EHR Hardware - Clients

- Workstations
  - Connected to your server via a wired network
  - Strategically positioned throughout the work environment to facilitate convenient access
  - Most commonly used and often already in place
  - Economical

_____

_____

_____

_____

_____

_____

_____

_____

Slide 26

EHR Hardware - Clients

Tablets / Laptops
- Laptops – portable computers
- A Tablet PC is a computer system that enables data entry and navigation with a stylus or electronic pen.
  - Booklets
  - Slate
  - Convertible
- Can connect Wirelessly to the server
- Uses rechargeable Batteries

_____

_____

_____

_____

_____

_____

_____

_____

Slide 27

EHR Hardware - Clients

Tablets / Laptops
- Advantages
  - Allow additional mobility compared to workstations
  - Saves time
  - Can be cheaper if additional infrastructure such as ports are needed
- Disadvantages
  - Typically more expensive than PCs
  - Subject to theft
  - Easily broken
  - Require additional support, cleaning, and maintenance

_____

_____

_____

_____

_____

_____

_____

_____

Slide 28

EHR Hardware - PDAs

Personal Digital Assistants (PDAs) are devices that combine computing, telephone/fax, and networking features

- Like Tablets, most PDAs begin as pen-based, using a stylus rather than a keyboard for input.
- Allow users to remotely access patient data from any location with connectivity
- Similar advantages/ disadvantages to Tablets/ Laptops
- May require additional hardware/ infrastructure recourses to adapt

Component 8/Unit 1   Health IT Workforce Curriculum   28
                            Version 1.0 Fall 2010

Slide 29

The Network

A network is a collection of computers and devices connected by communications channels that facilitates communications among users and allows users to share resources with other users.

- Important Terms
  - Ethernet
  - LAN (Local Area Network)
  - WLAN (Wireless Local Area Network)
  - WAN (Wide Area Network)
  - Bandwidth
  - VPN

Component 8/Unit 1   Health IT Workforce Curriculum   29
                            Version 1.0 Fall 2010

Slide 30

The Network - Assessing Usage

- Your network must be able to support the data requirements of your EHR application.

- Insufficient network capabilities will degrade application performance and increase the risk of user rejection.

Component 8/Unit 1   Health IT Workforce Curriculum   30
                            Version 1.0 Fall 2010

Slide 31

The Network - Assessing Usage

- How many users will need simultaneous access to the network?

- What are the bandwidth requirements of the EHR system (vendor)?

- Special bandwidth needs of scanning equipment or other medical equipment

- Sufficient connectivity between the internal resources and remote resources such as satellite facilities

Component 8/Unit 1   Health IT Workforce Curriculum   31
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____

Slide 32

The Network - Assessing Usage

- Conduct a wireless connectivity Survey

- Explore remote connectivity options including VPN (Virtual Private Networks)

Component 8/Unit 1   Health IT Workforce Curriculum   32
Version 1.0 Fall 2010

_____

_____

_____

_____

_____

_____

_____

_____