

Information Systems in Healthcare

HINF1100
Fall 2007/08

Information System in Healthcare Lifecycle

© Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)

Healthcare Information Systems (HIS)

© Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)

Healthcare Information Systems: Purpose

Healthcare Information System can be defined as

- ❖ The use of computer hardware and software to capture, process and manage healthcare data and information within a healthcare setting—eg. hospital, clinical department/specialty or clinic

© Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)

Healthcare Information Systems: Purpose

- ❖ **A healthcare information system entails the following:**
 - ❖ Model of healthcare delivery processes within the healthcare setting
 - ❖ Protocols, Practice Guidelines
 - ❖ A database to store the patient's health and healthcare data
 - ❖ Access to an EHR
 - ❖ User interfaces to collect health and healthcare data
 - ❖ PC based, Web-based, PDA based user interfaces
 - ❖ Data standards and terminologies to record the data
 - ❖ ICD9, LOINC, SNOMED, etc
 - ❖ Services targeted to different care providers
 - ❖ Physicians: Order tests, Make referrals, Decision support, etc
 - ❖ Nurses: Book appointments, Get test results, Follow care recommendations
 - ❖ Controlled access to the stored healthcare data and information

5 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



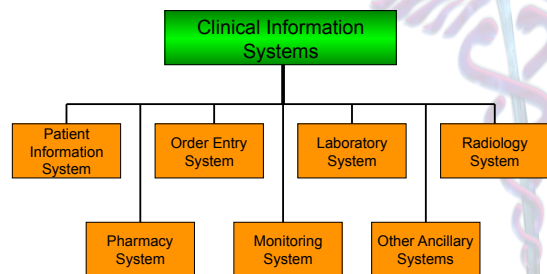
Healthcare Information Systems: Types

- ❖ **Healthcare Information Systems can be divided into:**
 - ❖ **Clinical Information Systems**
 - ❖ Support healthcare delivery activities performed by care providers
 - Order entry, information documentation, result retrieval, patient registration
 - ❖ **Patient Information Systems**
 - ❖ Support health maintenance and health related education for patients
 - Home based patient monitoring, patient education systems/websites
 - ❖ **Administrative Information Systems**
 - ❖ Support organizational level healthcare delivery issues for administrators
 - Finances, resource management, quality assurance

6 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Clinical Information Systems



7 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Clinical Information Systems: Patient Information System

- ❖ **Patient Information System's Functionality**
 - ❖ Assist providers to discharge better and informed healthcare
 - ❖ Care providers can record the care delivery activities
 - ❖ Manage the patient's medical record
 - ❖ Store and retrieve patient information
 - Demographics, medical history (diseases, treatments, test results), care provider names, care provider's notes, allergies, etc
 - ❖ Schedule appointments with patients
 - ❖ Communicate with patients
- ❖ **Patient Information System's Availability**
 - ❖ Clinic, ward, office OR bed-side
 - ❖ Centralized, Distributed, Mobile (access over the Internet)

8 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Clinical Information Systems: Order Entry System

- ❖ **Order Entry System's Functionality**
 - ❖ Computerized Physician Order Entry (CPOE)
 - ❖ Physicians can electronically order
 - ❖ Diagnostic investigations to the laboratory (blood work) or radiology (X-ray); Treatments to nurses, community workers; Medications to pharmacy
 - ❖ Alert and remind physicians to select the best appropriate diagnostic tests and medications (even suggest correct dosage and form)
- ❖ **Order Entry System's Availability**
 - ❖ Inpatient and Outpatient

9 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Clinical Information Systems: Order Entry System

- ❖ **Order Entry System's Advantages**
 - ❖ Avoidance of errors largely due to illegible handwriting
 - ❖ Avoidance of transcription errors
 - ❖ Alerts testing lab (and other departments) about the physicians order
 - ❖ Registering the order, reporting back the results, scheduling the test times and resources, preparing the patient
 - ❖ Prompting the physician to give correct and complete information
 - ❖ Duplicate order checking
 - ❖ Provides current status of the order

10 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



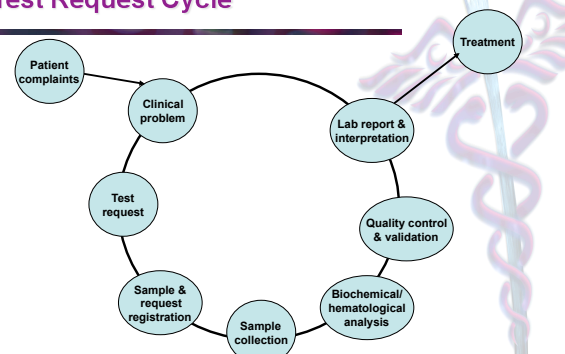
Clinical Information Systems: Laboratory System

- ❖ **Laboratory System's Functionality**
 - ❖ Collect and store the results of laboratory tests (for a patient)
 - ❖ Send the laboratory results to relevant systems (eg. patient information system) and even to the physicians
 - ❖ Integrate results from multiple tests to generate an integrated (single) report.
- ❖ **Laboratory System's Availability**
 - ❖ Results are automatically entered by the laboratory instruments
- ❖ **Laboratory System's Advantages**
 - ❖ Avoidance of human errors in recording results
 - ❖ Avoidance of patient identification errors (results go the right patient)
 - ❖ Printing patient labels or barcodes
 - ❖ Alerting abnormal test results
 - ❖ According to the patient's details or hospital standards
 - ❖ Alerting physicians about critical values
 - ❖ Suggesting treatment options for reported values based on approved

11 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Test Request Cycle



12 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Clinical Information Systems: Radiology System

- ❖ **Radiology System's Functionality**
 - ❖ Scheduling of diagnostic tests
 - ❖ Generation of instructions for patients
 - ❖ Transcription and recording of test results into a *Radiology Report*
 - ❖ Storage of digital radiology images
 - ❖ PACS: Picture Archiving and Communication System
 - ❖ Communicate test results to relevant systems (eg. patient information system) and even to the physicians
- ❖ **Radiology System's Availability**
 - ❖ Radiology department
- ❖ **Radiology System's Advantages**
 - ❖ Digital (filmless) images
 - ❖ Easy to transfer to other care providers
 - Rural hospitals sending images to specialists in city hospitals
 - ❖ Easy viewing by care providers
 - ❖ Easy retrieval of previous images (results) for a given patient

13 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Clinical Information Systems: Pharmacy System

- ❖ **Pharmacy System's Functionality**
 - ❖ Receiving medication orders from physicians
 - ❖ Dispensing medications to patients at pharmacies (E-Prescribing)
 - ❖ Administration of medications by nurses
 - ❖ Integrate patient information from different sources to dispense the right drug dosage and format
 - ❖ Access to drug information
 - ❖ Online drug reference information
- ❖ **Pharmacy System's Availability**
 - ❖ For use by pharmacists
- ❖ **Pharmacy System's Advantages**
 - ❖ Tracking of medication use by a patient helps to avoid
 - ❖ Medication errors
 - ❖ Drug-Drug reactions
 - ❖ Drug-Food reactions
 - ❖ Drug-Allergy reactions
 - ❖ Automatic alerts for medication errors (at time of prescribing) Drug prescription duplication
 - ❖ Prescription based on drug formulary

14 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Clinical Information Systems: Monitoring System

- ❖ **Monitoring System's Functionality**
 - ❖ Automatically monitor biometric measurements in critical care and specialty units (cardiology)
- ❖ **Monitoring System's Availability**
 - ❖ At bed-side in critical care and specialty units
- ❖ **Monitoring System's Advantages**
 - ❖ Direct capture of biometric measurements within the patient's medical record
 - ❖ Send alerts when critical values are observed
 - ❖ Send reminders to care providers to perform a specific tasks

15 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Understanding Healthcare Information Systems

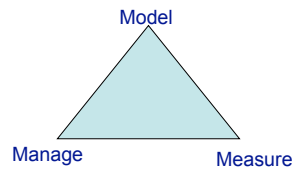
- ❖ **Why do we need them?**
 - ❖ To manage healthcare activities
- ❖ **Activity management steps**
 - ❖ Define the activity management goals
 - ❖ Construct a model of the activity
 - ❖ Gather measurement data
 - ❖ Assess the state of the thing being managed
 - ❖ Take actions to alter that state based on the measurement goals

16 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Understanding Healthcare Information Systems

❖ Decision Control Loop



17 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)



Clinical Information System

- ❖ What do we need to create a clinical information system from multiple sub-systems?
- ❖ What issues do we need to consider when integrating multiple sub-systems?

18 © Dr. Syed Sibt-e-Raza Abidi, (www.cs.dal.ca/~sraza)

