

Healthcare Information Systems (Part I)

Prepared by Dr. Hesham Mousli

MHA621
Healthcare Informatics

Lecture 4



Intended Objectives

1. Understand the Definition and Scope of Healthcare Information Systems (HIS).
2. Differentiate Between Clinical and Administrative Information Systems.
3. Explore Key Components and Applications of HIS.
4. Evaluate the Benefits and Challenges of HIS Implementation.
5. Recognize the Role of Integration in HIS.

Information Systems Overview

- **Definition:** An information system is a combination of computer hardware and software designed to process data into information.
- **Goal:** Solve problems and improve decision-making in healthcare.

Healthcare Information Systems (HIS)



Healthcare Information Systems (HIS)

- **HIS:** Information systems used in healthcare enterprises.
- **Scope:** Usually in acute-care hospitals, but can also be a group of healthcare settings.



Benefits of HIS

- **Cost vs. Benefit:** While costly to implement, the benefits of HIS outweigh the costs.
- **Key Benefits of HIS:**
 - A. Improved Efficiency:** Reduces administrative burden and streamlines clinical workflows.
 - B. Enhanced Patient Safety:** Minimizes errors and ensures accurate, up-to-date patient information.

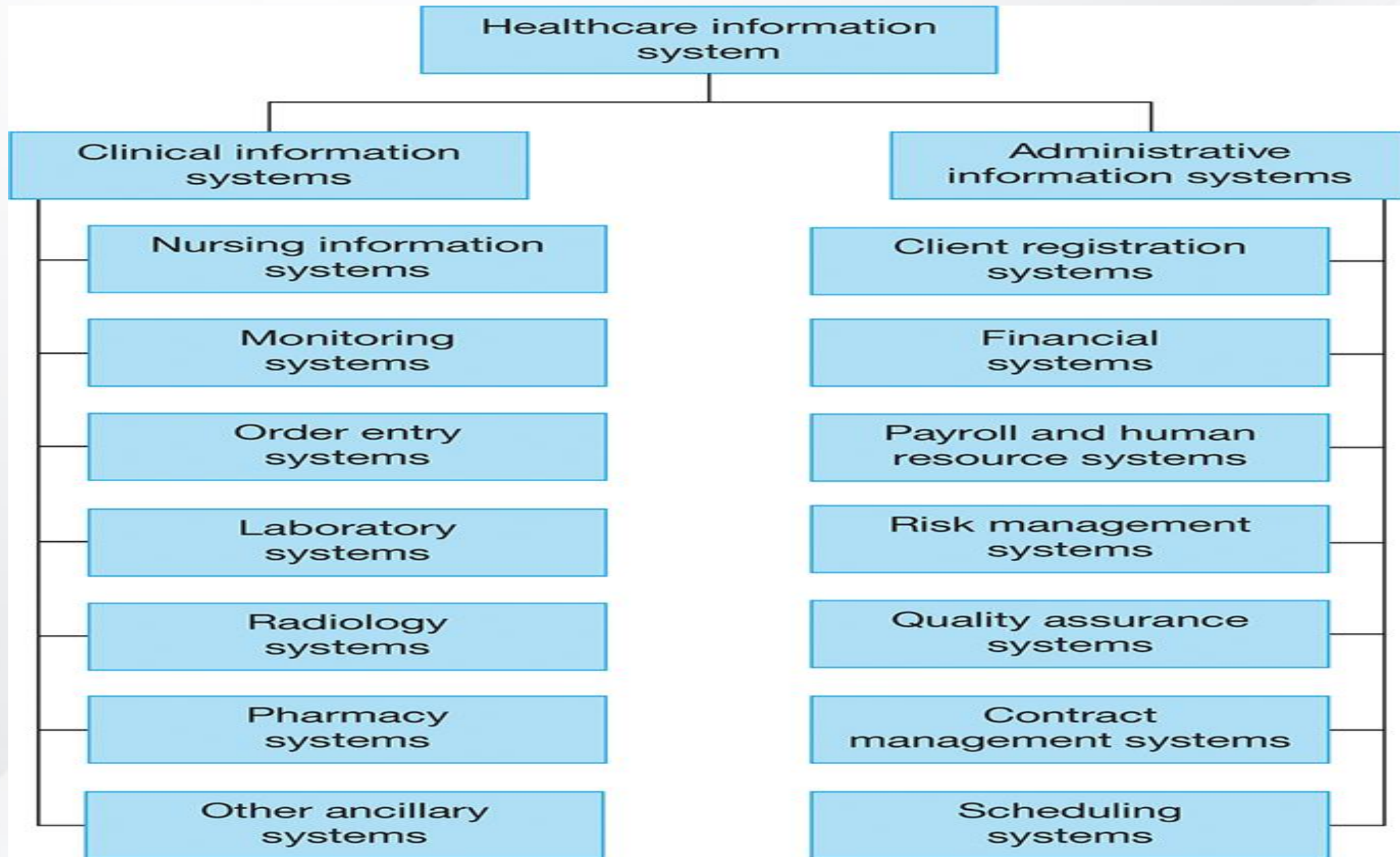
Benefits of HIS

➤ Key Benefits of HIS:

- C. Better Outcomes:** Supports evidence-based care and personalized treatment plans.
- D. Cost Savings:** Reduces redundant tests and improves resource utilization.

Types of Information Systems in HIS

- **Clinical Information Systems (CIS):** Support healthcare activities like order entry, results retrieval, and decision support.
- **Administrative Information Systems (AIS):** Support client care with financial and demographic data.



Clinical Information Systems (CIS)



Clinical Information Systems (CIS)

Overview

Chapter

04

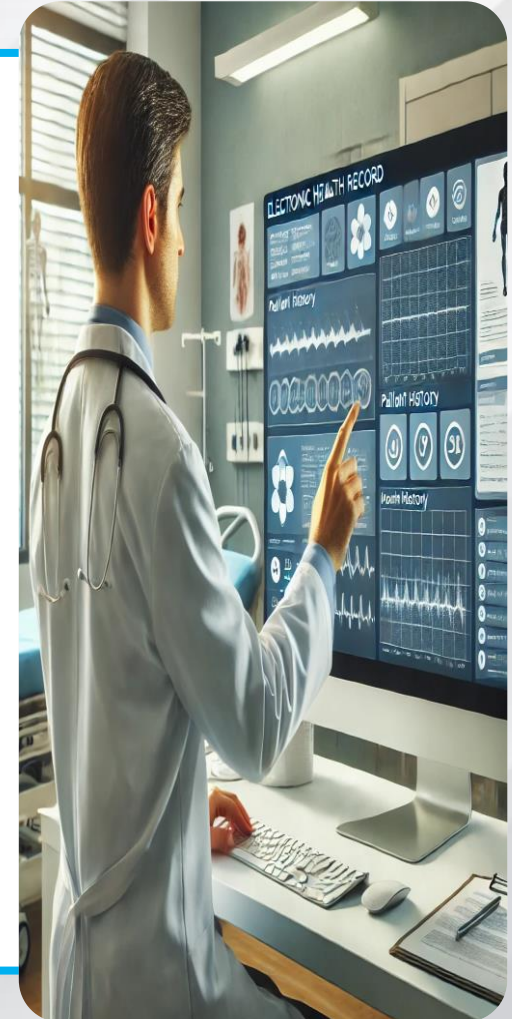
- **Clinical Information Systems (CIS)** are specialized software platforms designed to manage and streamline clinical (patient) data within healthcare settings.
- **These systems play a critical role** in modern healthcare by improving the efficiency, accuracy, and accessibility of patient information, ultimately enhancing patient care and outcomes.

Clinical Information Systems (CIS) Overview

Chapter

04

- **Purpose:** Focus on Managing Clinical (Patient) Data.
- **The primary purpose** of a CIS is to centralize and manage clinical data related to patient care.



Examples of CIS Applications



1. Computerized Provider Order Entry (CPOE)

Chapter

04

➤ Definition:

- **A digital system** for entering medical orders (e.g., prescriptions, lab tests, imaging) into an Electronic Health Record (EHR).
- **Replaces paper-based** or verbal orders to improve accuracy and safety.

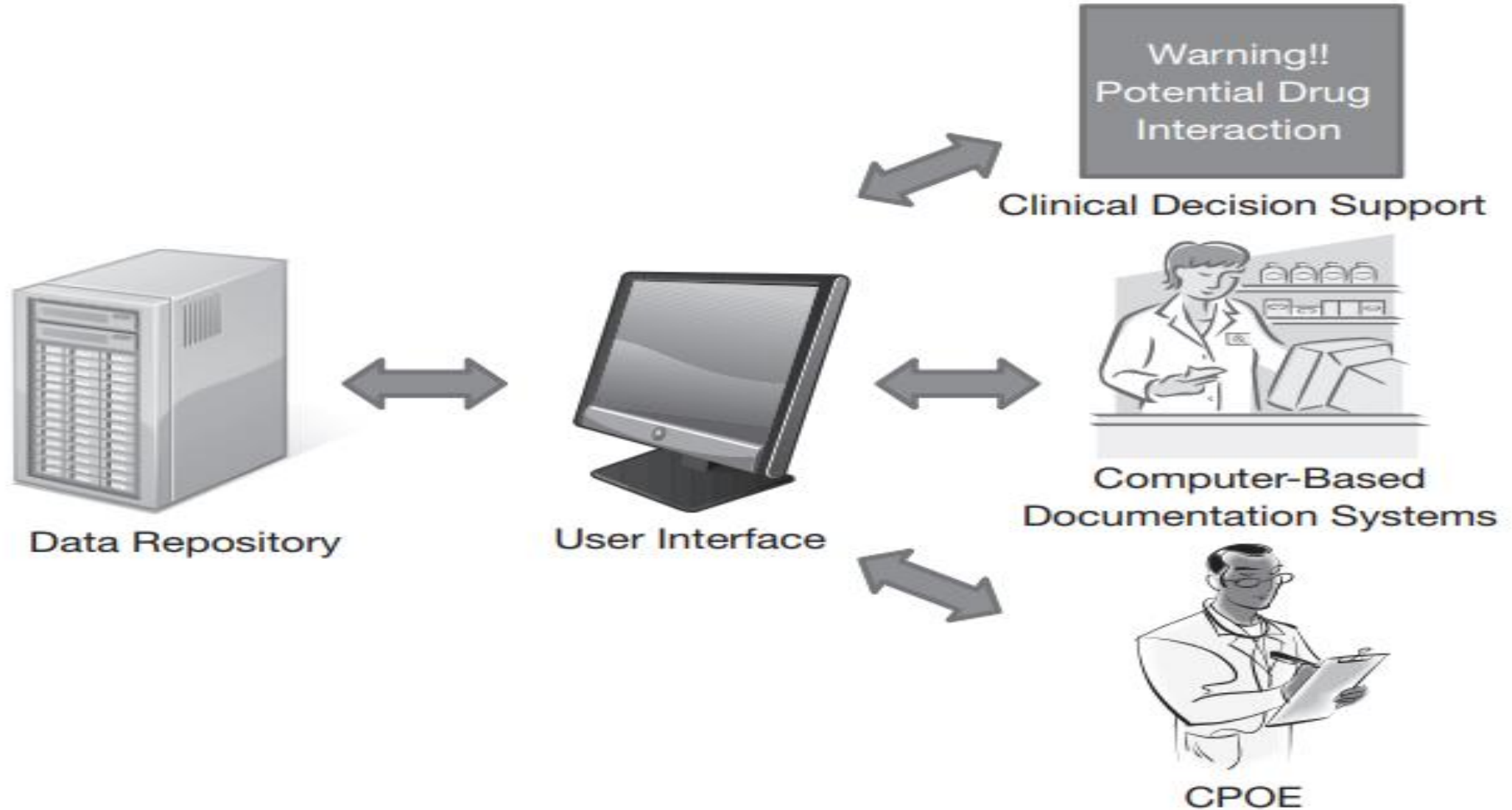
1. Computerized Provider Order Entry (CPOE)

Chapter

04

➤ Key Features:

- **Order Entry & Management:** Allows healthcare providers to electronically enter, modify, and review orders.
- **Decision Support:** Provides guidelines, dosage recommendations, and alerts for drug interactions or allergies.



1. Computerized Provider Order Entry (CPOE)

Chapter

04

➤ Key Features:

- **Eliminates Missing Details:** Prompts users to fill in all required fields (e.g., dosage, frequency).
- **Integration:** Works with EHRs, pharmacy systems, lab systems, and radiology systems for seamless coordination.
- **Interdisciplinary Collaboration:** Facilitates teamwork among doctors, pharmacists, nurses, and lab technicians.

1. Computerized Provider Order Entry (CPOE)

➤ Key Features:

- **Real-Time Alerts:** Flags issues like drug interactions, duplicate orders, or contraindications.
- **Customization & Scalability:** Adaptable to different healthcare settings (hospitals, clinics) and scalable for growth.
- **Audit Trails:** Maintains logs of all orders for accountability and compliance.

1. Computerized Provider Order Entry (CPOE)

➤ Benefits:

- Improves patient safety by reducing errors.
- Enhances efficiency in clinical workflows.
- Supports better decision-making with evidence-based tools.
- Reduces costs by minimizing errors and duplicate tests.
- Ensures all orders are documented in the EHR for easy access.

1. Computerized Provider Order Entry (CPOE)

➤ Challenges:

- High implementation costs.
- Requires training and adaptation by healthcare staff.
- Potential downtime or technical issues.
- Needs customization for specific workflows.

1. Computerized Provider Order Entry (CPOE)

Chapter

04

➤ Future Trends:

- Integration of AI for advanced decision support.
- Improved interoperability with other healthcare systems.
- Increased use of mobile devices for order entry.

2. Results-Reporting Applications

➤ Purpose:

1. Share Laboratory and Diagnostic Test Results:

- These applications are designed to securely transmit and display test results from laboratories or diagnostic centers to healthcare providers and patients.
- They ensure timely access to critical health information, enabling faster decision-making.

2. Improve Communication:

- Facilitate seamless communication between laboratories, doctors, and patients.
- Reduce delays in receiving results, which can be crucial for urgent medical conditions.

2. Results-Reporting Applications

➤ Key Features:

1. Reference Ranges for Interpretation:

- Include **normal or expected ranges** for each test result, helping users understand whether their results are within healthy limits.
- **Example:** A cholesterol test might show a result of 200 mg/dL with a reference range of 125–200 mg/dL, indicating borderline high levels.

2. Results-Reporting Applications

➤ Key Features:

2. Secure Access:

- Ensure data privacy and security through encryption and authentication methods (e.g., login credentials, two-factor authentication).
- Comply with healthcare regulations like HIPAA (Health Insurance Portability and Accountability Act) or GDPR (General Data Protection Regulation).

2. Results-Reporting Applications

➤ Key Features:

3. Customizable Alerts and Notifications:

- Notify patients or doctors when results are available or if any critical values are detected.
- Example: A notification for abnormally high blood sugar levels.

4. User-Friendly Interface:

- Display results in an easy-to-read format, often with visual aids like graphs or color-coded indicators (e.g., green for normal, red for abnormal).

2. Results-Reporting Applications

Chapter

04

➤ Key Features:

5. Integration with Electronic Health Records (EHR):

- Allow results to be directly uploaded into a patient's EHR for easy access by healthcare providers.
- Ensure continuity of care by maintaining a centralized record of all test results.

 Your Company Name Here



Quick search requires a minimum of 3 characters.



LIMITLIS.cloud

Quick Links

Laboratory

-  New Requisition
-  Find Requisitions
-  Find Samples
-  Enter Test Results
-  Release Test Report 34

Microbiology

-  Manage Cultures
-  Manage Plates
-  Enter Sensitivities

Sample Storage

-  Checkin Samples 100
-  Checkout Samples

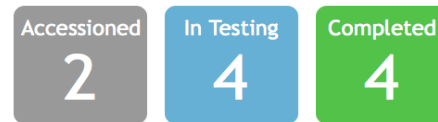
Explorer

Search Queries

REQUISITIONS



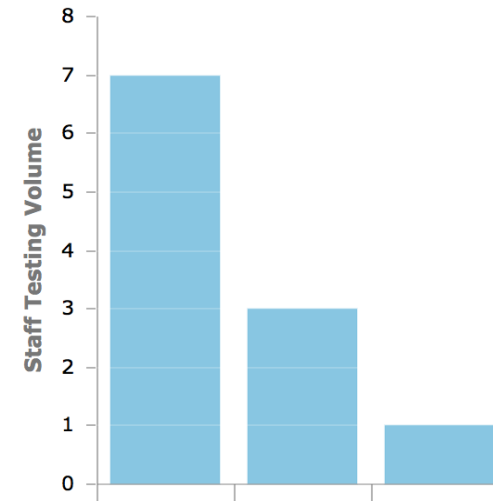
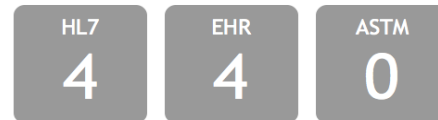
SAMPLES



ANALYTES



DATA LOGS

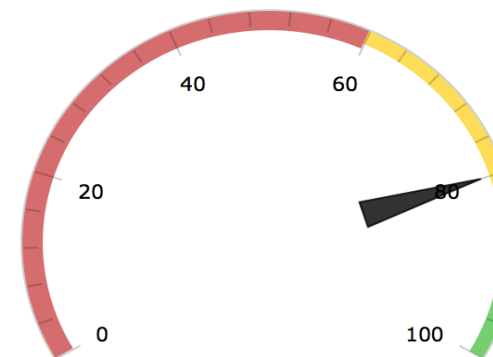
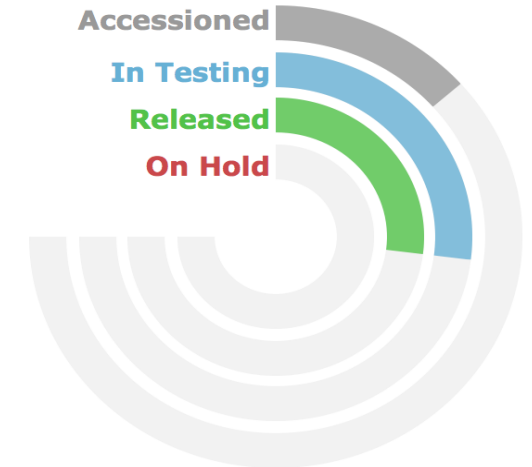


Accessioned

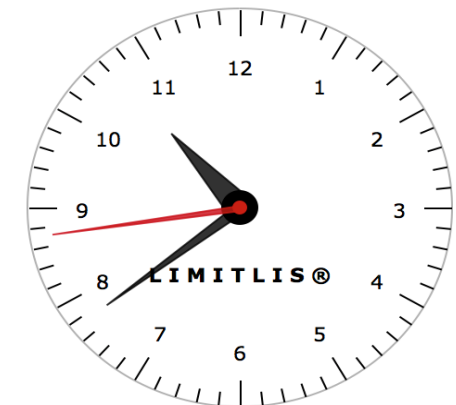
In Testing

Released

On Hold



Laboratory Performance



QUALITYCONNECT, LINDSEY
List
Recent

QUALITYCONNECT, LINDSEY
 DOB:02/20/81 Age:36 years Dose Wt:65.000 kg (08/09/2017) Sex:Female MRN:64001137 Attending:OkoloTEST MD, Emmanuel ...
 Allergies: Latex, Saccharin, Aspartame... Isolation: Inpatient FIN: 1200290070 [Admit Dt: 06/12/2017 10:42 Di... **Loc:3S PostOp Sura: 35...**

Menu

- Results Review
- Interactive View and I&O
- Orders
- Medication List + Add
- Notes
- Diagnosis & Problems
- Allergies
- Histories
- Patient Information
- Immunization Schedule
- MAR Summary
- Documentation + Add
- Growth Chart
- HPF Viewer

Results Review
Full screen Print 0 minutes ago

Recent Results Lab - Recent **Lab - Extended** Pathology Microbiology Imaging Vitals - Recent Vitals - Extended Assessments View

Flowsheet: Lab View Level: Lab View Table Group List

September 12, 2016 01:00 CDT - October 13, 2017 00:59 CDT [Clinical Range]

Navigator

- ☒ CBC and Differential
- ☒ Coagulation/Thrombosis
- ☒ UA Macroscopic
- ☒ Routine Chemistry
- ☒ Therapeutic Drug Monitoring
- ☒ Serum Toxicology
- ☒ Viral Hepatitis
- ☒ Retroviruses
- ☒ Body Fluids
- ☒ Transfusion Summary
- ☒ Blood ABO Group and Rh Type
- ☒ Antibody Screening and Identification

Showing results from (03/10/17 - 08/23/17) Show more results

Lab View	08/23/17 00:00 - 23:59 CDT	08/11/17 00:00 - 23:59 CDT	08/09/17 00:00 - 23:59 CDT	06/07/17 00:00 - 23:59 CDT	05/11/17 00:00 - 23:59 CDT
Phenobarb Lvl	2.1 (L)		1.5 (L)		
Phenytoin Lvl Total					
Vanc Lvl					20.0
Serum Toxicology					
Acetaminoph Lvl					23.0 *
Viral Hepatitis					
Hep Bc Ab Interp	Positive (A)		Positive (A)		
Hep Bs Ab Interp	Positive (A)		Positive (A)		
Hep Bs Ag Interp	Confirmed Positive		Repeatedly Positive [2]		
Hep C Ab Interp			Negative [2]		
Retroviruses					
HIV 1/2 Ag/Ab Interp			HIV1-2 AgAb Neg		
Body Fluids					
pH BF Type					Left Pleural
BF pH					7.370 *
Transfusion Summary					
TRANSFUSED		TRANSFUSED [3]			
Blood ABO Group and Rh Type					
ABO/Rh Type		O NEG	O NEG		
Antibody Screening and Identification					
Blood Bank ID			n/a		
Antibody Screen			Positive		
Panel Method			PeG [2]		
Antibody ID			Anti-D		

3. Radiology Information Systems (RIS)

Chapter

04

➤ Definition:

- A specialized software system used in radiology departments to manage patient data, imaging workflows, and reporting.

➤ Primary Functions:

1. Patient Scheduling :

- Schedule imaging appointments (e.g., X-rays, MRIs, CT scans).
- Manage patient demographics and appointment details.

3. Radiology Information Systems (RIS)

Chapter

04

➤ Primary Functions:

2. Workflow Management:

- Track the status of imaging procedures (e.g., pending, in progress, completed).
- Assign tasks to radiologists and technicians.

3. Reporting and Documentation:

- Store radiologist interpretations (e.g., diagnostic reports).
- Generate and distribute reports to referring physicians.

4. Billing and Compliance:

- Automate billing processes for imaging services.
- Ensure compliance with healthcare regulations (e.g., HIPAA).

3. Radiology Information Systems (RIS)

Chapter

04

➤ Integration:

- Often integrated with **Hospital Information Systems (HIS)** and **Electronic Health Records (EHR)** for seamless data sharing.
- Works closely with **Picture Archiving and Communication Systems (PACS)** for image storage and retrieval.

4. Picture Archiving and Communication Systems (PACS)

➤ Definition:

- A medical imaging technology used to store, retrieve, manage, and distribute digital medical images.

➤ Primary Functions:

1. Image Storage:

- Stores digital images (e.g., X-rays, CT scans, MRIs) in a centralized database.
- Supports long-term archiving of medical images.

4. Picture Archiving and Communication Systems (PACS)

➤ Primary Functions:

2. Image Retrieval:

- Allows quick access to patient images from any connected workstation.

3. Image Viewing and Manipulation:

- Provides tools for radiologists to view, zoom, rotate, and enhance images for better diagnosis.

4. Image Sharing:

- Enables sharing of images with other healthcare providers or specialists for consultations.

4. Picture Archiving and Communication Systems (PACS)

➤ Key Features:

1. DICOM Compatibility:

- Uses the DICOM (**D**igital **I**maging and **C**ommunications in **M**edicine) standard for image formatting and transfer.

2. Cloud Integration:

- Modern PACS systems may use cloud storage for scalability and remote access.

3. Security:

- Ensures secure storage and transmission of sensitive patient data.

4. Picture Archiving and Communication Systems (PACS)

➤ Integration:

- Integrated with ***Radiology Information Systems (RIS)*** for seamless workflow management.
- Often linked with ***Electronic Health Record systems (HERS)*** for comprehensive patient records.

How RIS and PACS Work Together

➤ Workflow Example:

- A patient is scheduled for a Magnetic Resonance Imaging (**MRI**) via the RIS.
- After the scan, the images are stored in the PACS.
- The radiologist accesses the images via PACS, interprets them, and creates a report in the RIS.
- The report is then shared with the referring physician through the RIS.

How RIS and PACS Work Together

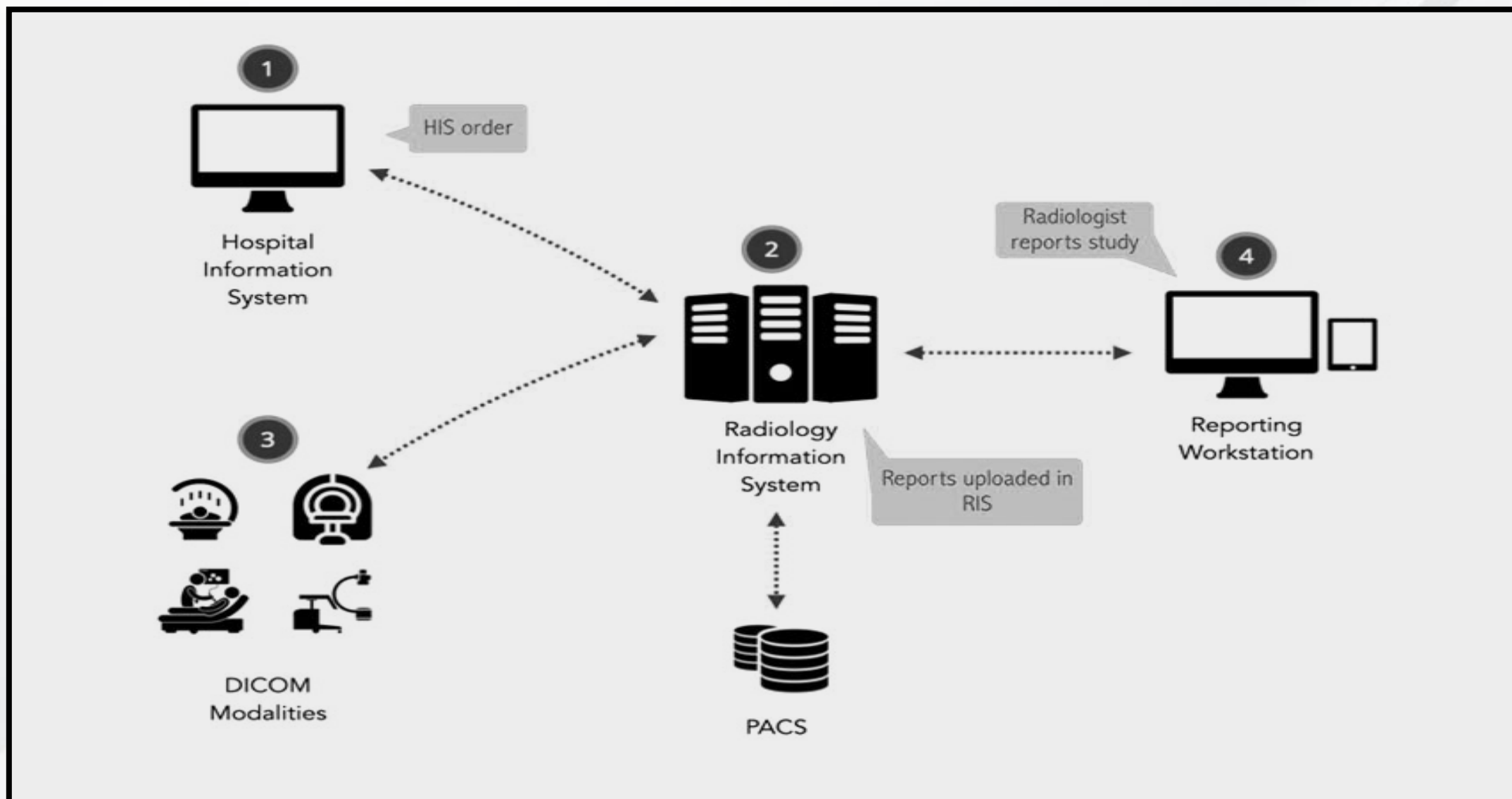
➤ Synergy:

- **RIS** handles administrative and textual data (e.g., scheduling, reporting).
- **PACS** manages the imaging data (e.g., storage, retrieval, viewing).



Key Differences Between RIS and PACS

Aspect	RIS	PACS
Primary Focus	Administrative and textual data	Image storage and management
Main Functions	Scheduling, reporting, billing	Image storage, retrieval, viewing
Data Type	Text-based (e.g., reports, schedules)	Image-based (e.g., X-rays, MRIs)
Integration	Integrates with HIS and EHR	Integrates with RIS and EHR



PACS / RIS



Wrap Up

1. **HIS combines hardware and software** to process data into actionable information, enhancing healthcare decision-making.
2. **HIS is categorized into CIS and AIS**, serving clinical and administrative roles, respectively.
3. **CIS manages patient data**, integrating applications to support healthcare delivery.
4. **Key CIS applications** include CPOE, EHRS, LIS, and RIS, streamlining clinical processes.

Wrap Up

5. **AIS handles non-clinical functions**, like financial and demographic data management.
6. **Integration in HIS enables seamless data sharing**, reducing errors and improving efficiency.
7. **Benefits of HIS:** Improved quality, efficiency, guideline adherence, and reduced errors.
8. **HIS implementation is costly but worthwhile**, offering long-term patient and operational benefits.



Thank You