

COMP2322: Introduction to Health Informatics

Health Informatics: Health Information Systems

Time: Tues+ Thur: 13:00-13:50

Location: Masri406

Section: 1

HiCure

Excellence in Health Informatics Integrated Curricula

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Information Systems: Types (General)

Strategic Information Systems:

support strategic functions of the organisation to help define its long term strategies drawing summaries and knowledge from ISs at tactical and operational levels

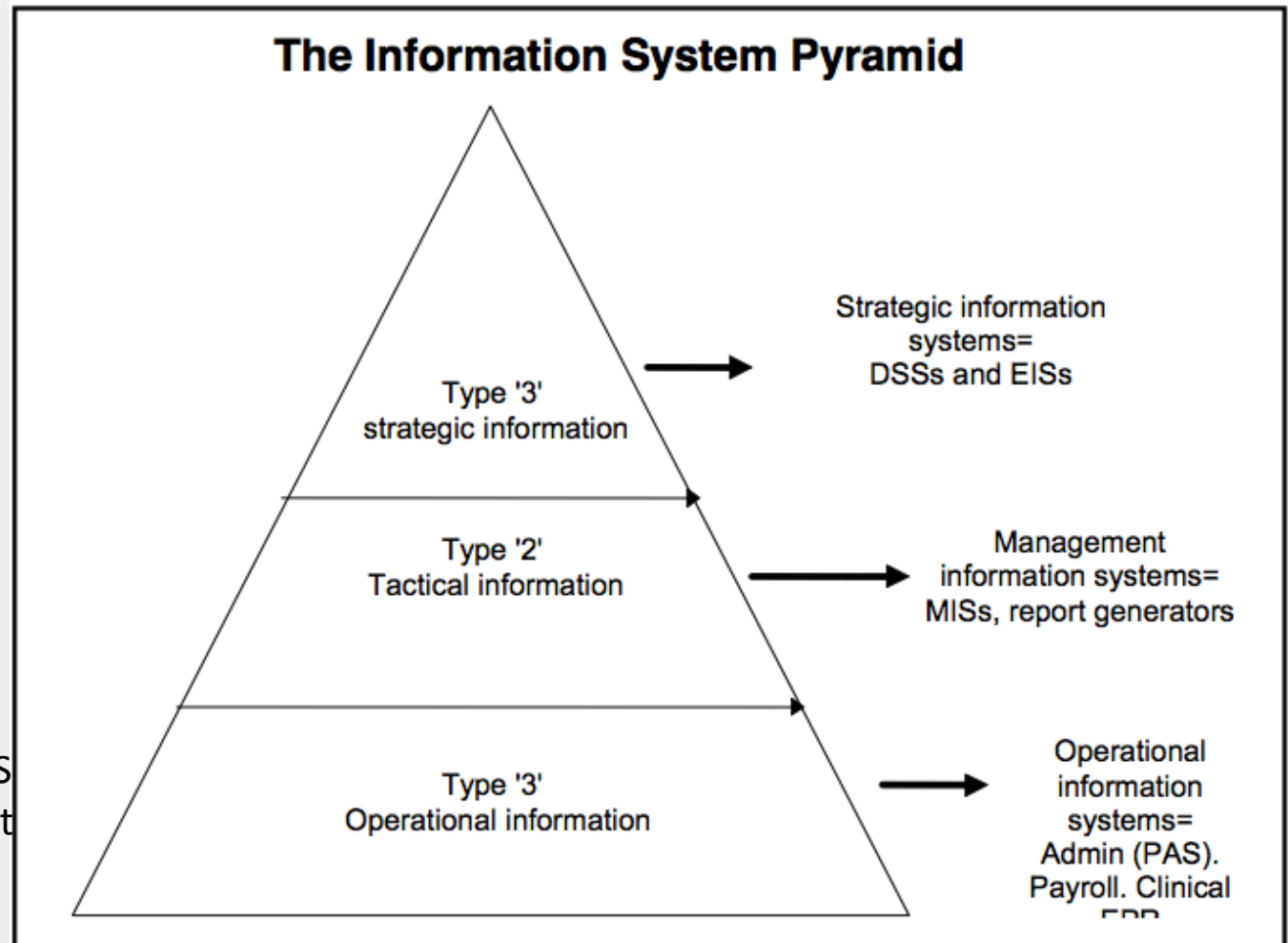
e.g. DSS (Decision Support system), EIS (Enterprise Information System),

Tactical Information Systems:

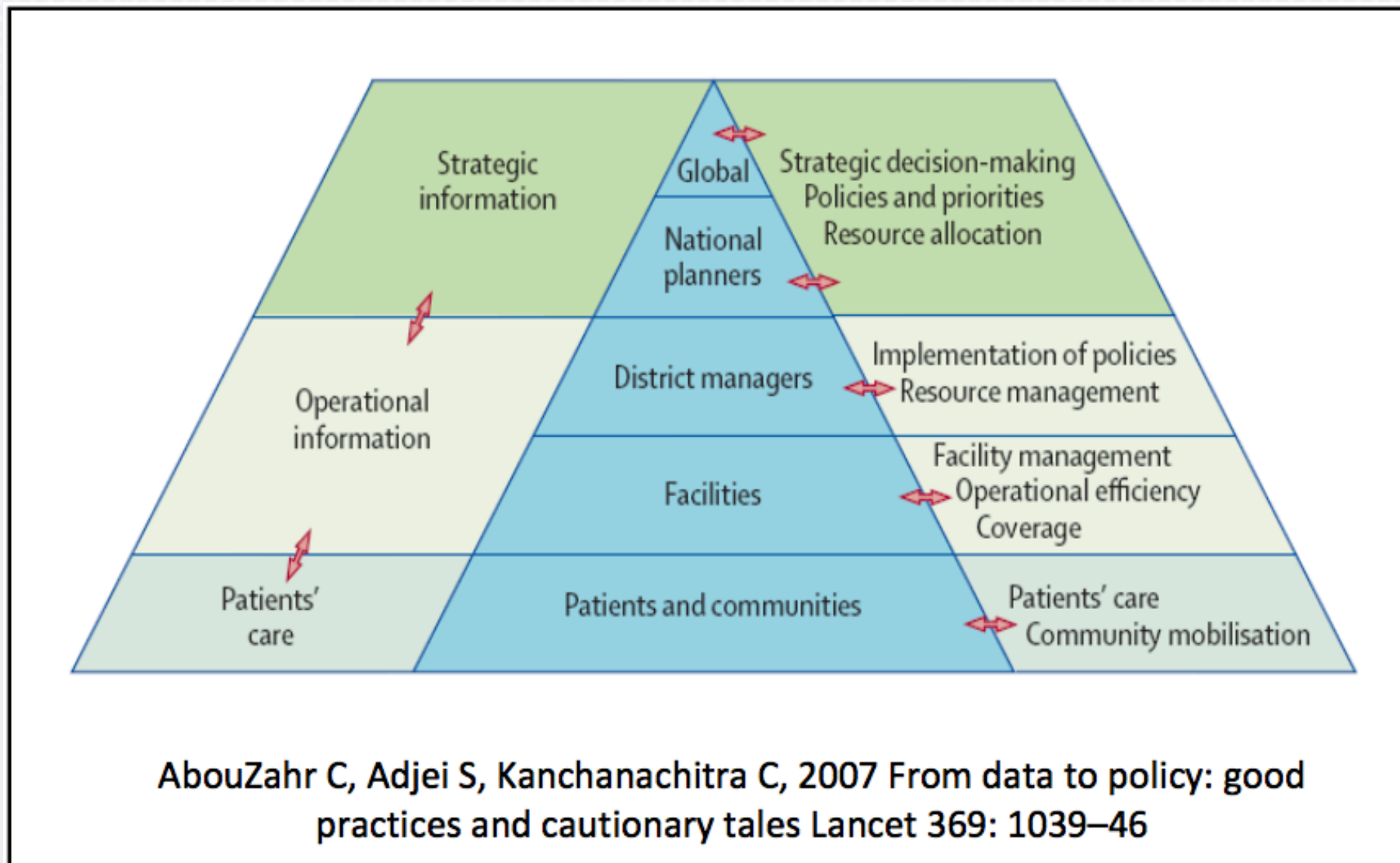
support the (often middle) management functions of the organisation, drawing information from ISs at operational level, e.g. MIS (Management Information System), Report generators etc.

Operational Information Systems:

support operational functions and the daily running of the organisation, collecting or providing detailed information to execute operations.

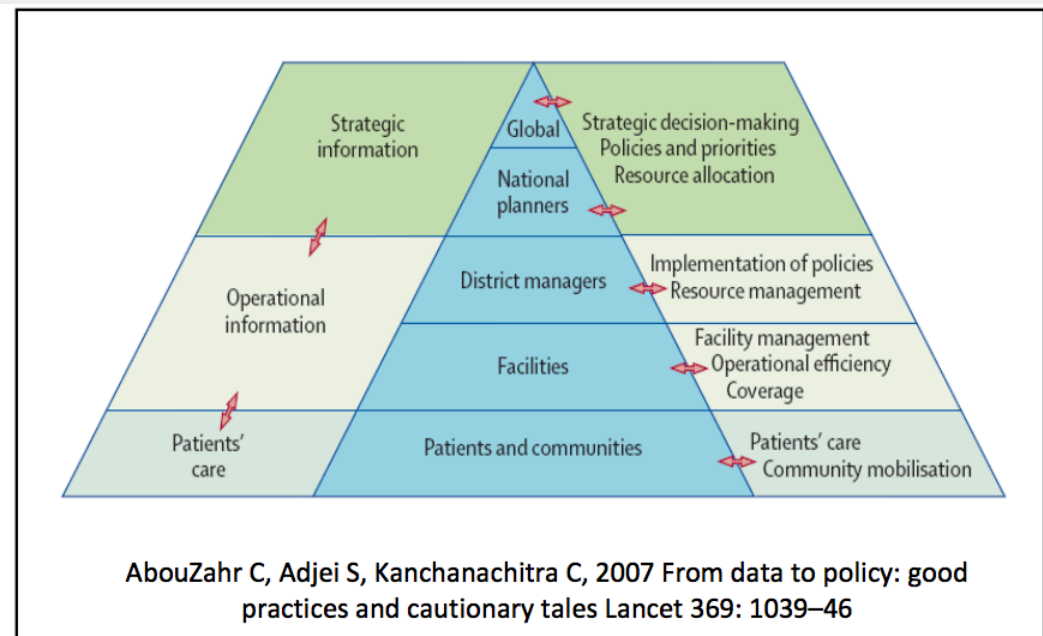
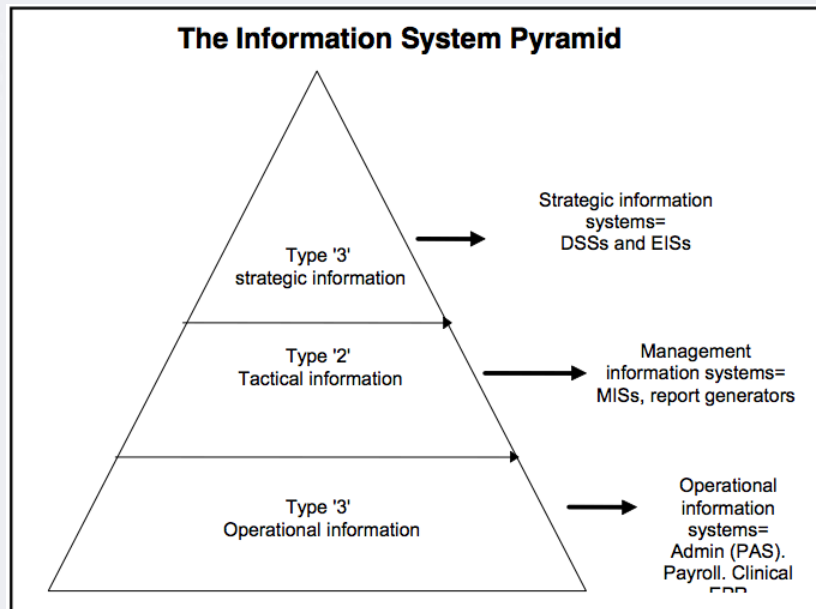


Health Information Systems: Types (General)



Health Information Systems

Operational <-> Tactical <-> Strategic
Health Information Systems



Health Informatics

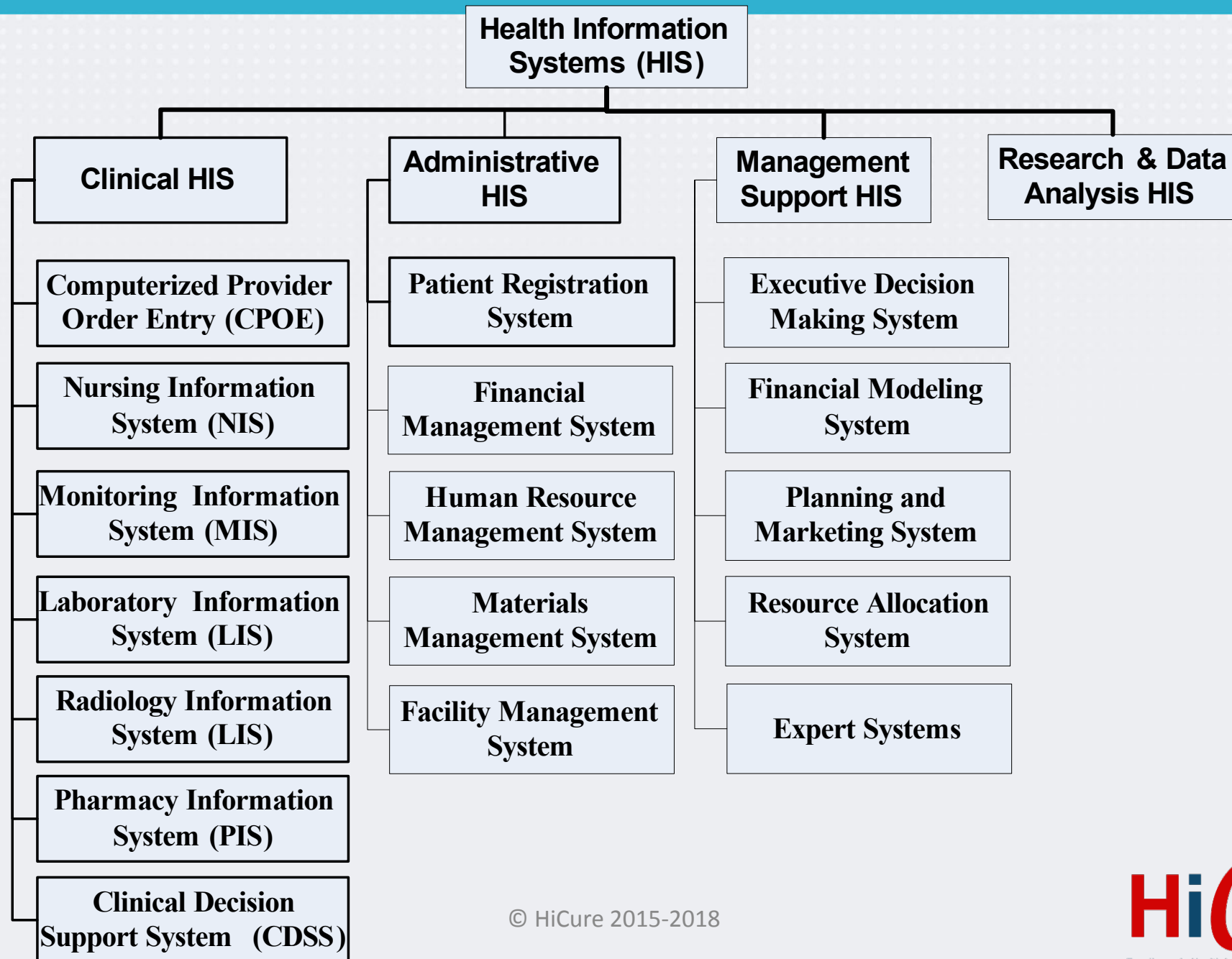
Information Systems in Health Care

How to support various functions of healthcare?

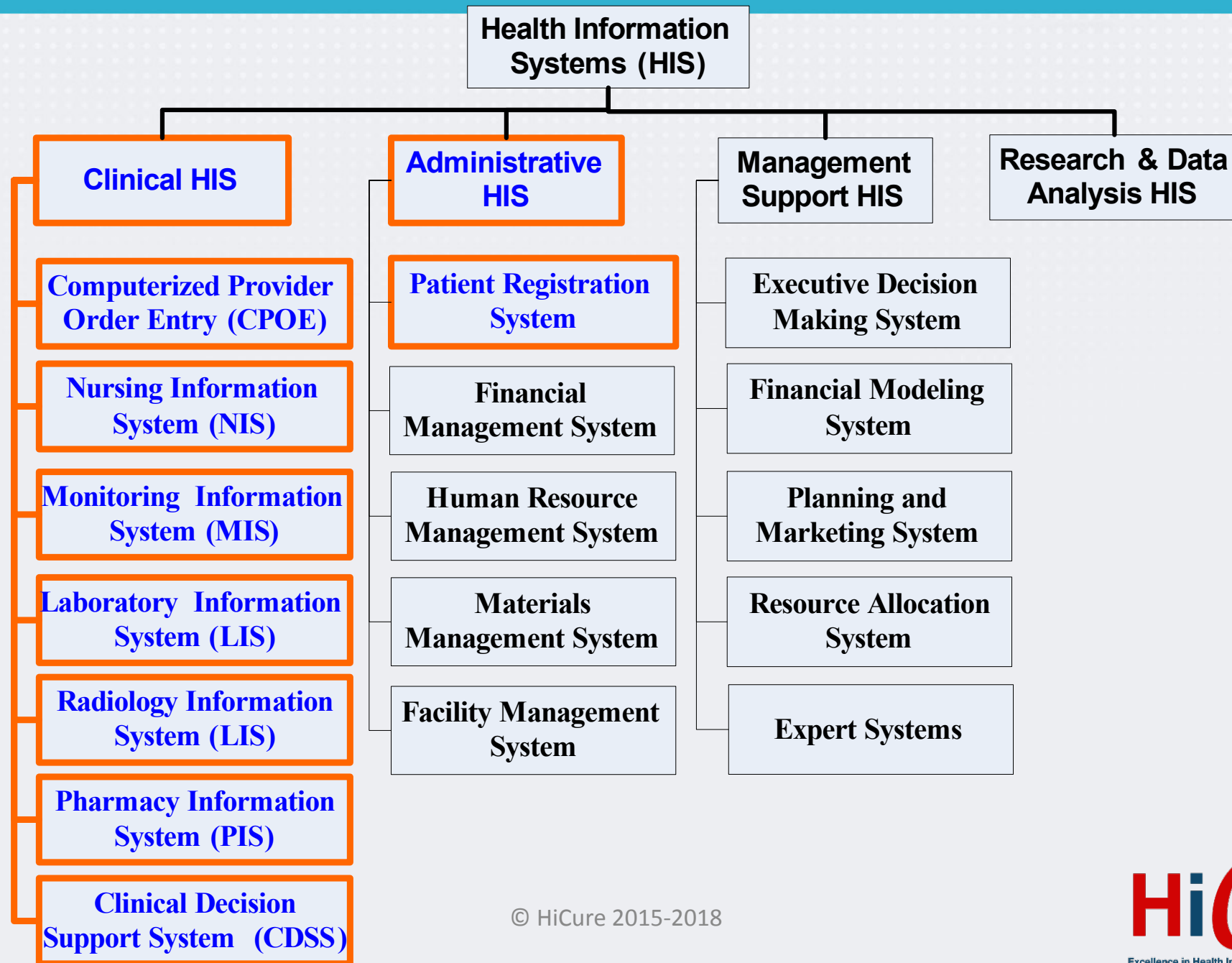
Information Systems in Health Care

- Health Information Systems (HIS) are developed, originally for hospitals, to support different types of health care institutions.
- HISs are used to support various healthcare business functions:
 - *Clinical Information Systems*
 - *Administrative Information Systems*
 - *Management Support Information Systems*
 - *Research and Data Analysis Information Systems*
 -
 - Personnel management systems.
 - Setting-Specific Systems

Health Information Systems (HIS)



Patient Oriented HISs



Clinical Information Systems (CIS)

- Contains Clinical and health related information-used by providers in diagnosing and treating a patient and monitoring a patient's care.
- A clinical information system can cover:
 - Single scope area of clinical information: e.g. Departmental systems, such as radiology, pharmacy or laboratory
 - Specific function: e.g. Clinical Decision Support: such as medication administration, computerized provider order entry
 - Multiple clinical aspects of patient care: e.g. Electronic medical record systems

Computerised provider order entry (CPOE) systems

- Enable clinicians (e.g., physicians, nurses, therapists, pharmacists) to **enter orders** for tests, medications, services, or other clinical processes directly into the healthcare information system.
- Most CPOE systems provide **decision-support** capabilities at the point of ordering.
- Using CPOE **reduces medication errors and adverse drug events**, and supports patient safety (shown by several research studies).

Computerized Physician Order Entry (CPOE)

Pharmacy Dispensary : Medical's Order Sheet .

Doctor's order: []

Original: [] F12

Dose: [] Unit: [] Route: [] Site: [] Freq: [] Method: []

Sig: [] PRN: []

Special Direction: []

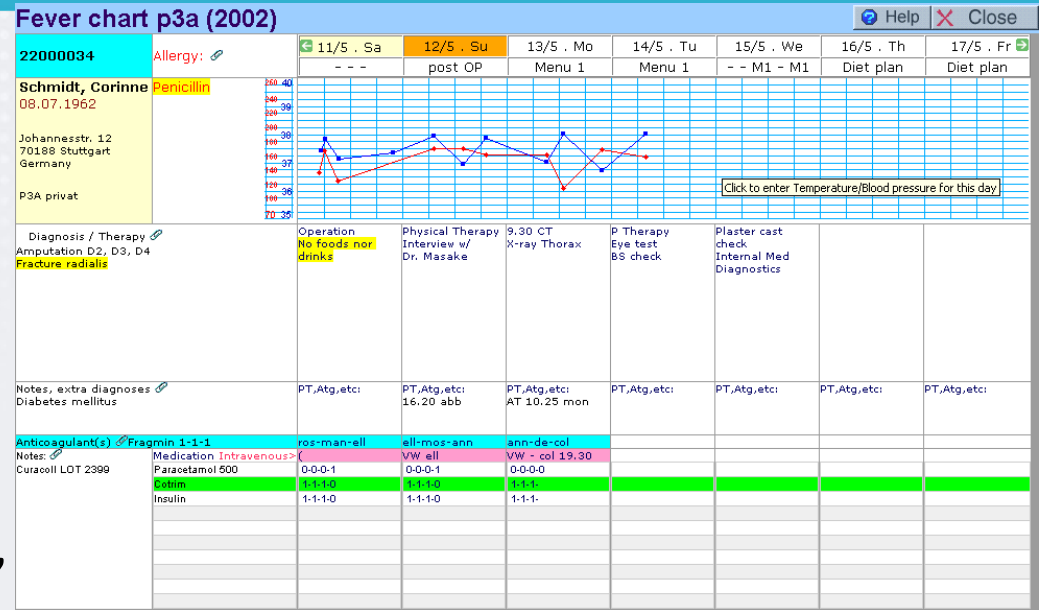
Start (Date Time) / / : : Duration: [] วัน Regular Order: [] Urgent: []

Specific Time: [] Specific Day: [] Every Day: [] Select: [] Mon: [] Tue: [] Wed: [] Thu: [] Fri: [] Sat: [] Sun: []

F2 : Post Medication							F3 : Current Medication											
OrdDate	Drug Name	DisCo	OrdDate	Drug Name	Dose	Unit	Route	Site	Freq	Me	OrdDate	Drug Name	Dose	Unit	Route	Site	Freq	Me
	AmikACIN 250 mg 2 ml			NA > D-5-1/2 NSS (Plastic) 1000 ml +	1	Bottle	IV		od									
	AmikACIN 500 mg 2 ml			D-5-W (Plastic) 100 ml	1	Bag	IV		q12h									
	AmikACIN 250 mg 2 ml			Paracetamol Tab 500 mg +	2	เม็ด	PO		q6h									
	Flagyl 400 mg			Acyclovir 250 mg 10 ml	1	Amp	IV		q8h									
	MaXipime 1 gm			Disc> D-5-W (Plastic) 100 ml	1	Bottle	IV		q8h									
	Mesalazine 400 mg			Neupogen 30 MIO 0.5 ml	1	Amp	SC		od									
	Metronidazole Inj 500 mg 100 ml			Air-X	1	เม็ด	PO		t.i.d pc									
	Gentamicin 80 mg 2 ml			Hyoscine 10 mg	1	เม็ด	PO		t.i.d									
	Sulperazon			D-5-W (Plastic) 100 ml	1		IV		ud									

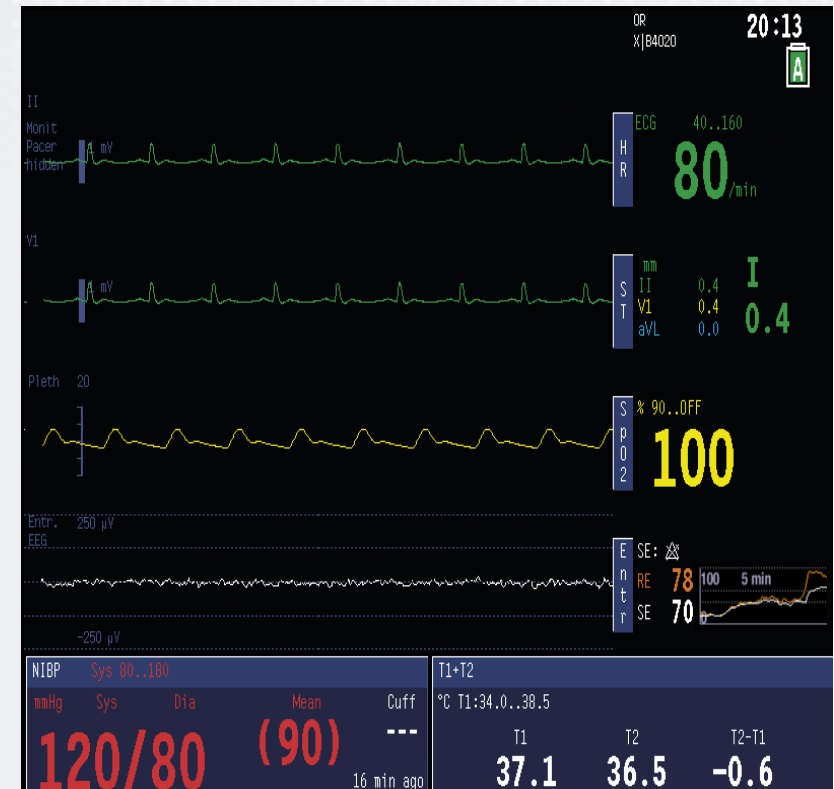
Nursing Information System (NIS)

- Facilitates nursing documentation:
 - from assessment to evaluation, patient care **decision support** e.g. **care planning**, assessment, flow-sheet charting, patient acuity, patient education.
- Nurses also use **Medication Administration System** to document given medications, their dose, and at what time.



Monitoring Information Systems

- Monitoring systems are devices that automatically monitor **biometric measurements** in critical care and specialty areas, such as cardiology and obstetrics.
- These devices may send information to the nursing Information system.
 - For example, a monitoring system would directly enter measurements such as blood pressure instead of manual entry



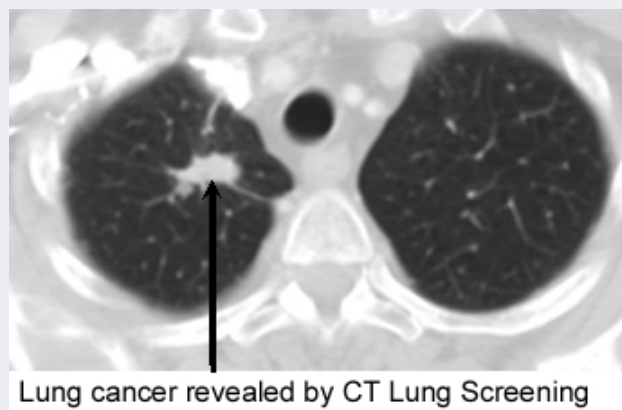
Laboratory Information System (LIS)

- Laboratory information systems report on **blood**, **body fluid** and **tissue** samples along with biological specimens that are collected at the bedside and received in a central laboratory.
- Supports a **collection**, **verification** and **reporting** of laboratory tests.
- These systems provide clinicians with **reference ranges** for tests in order to make **correct** patient care decisions.



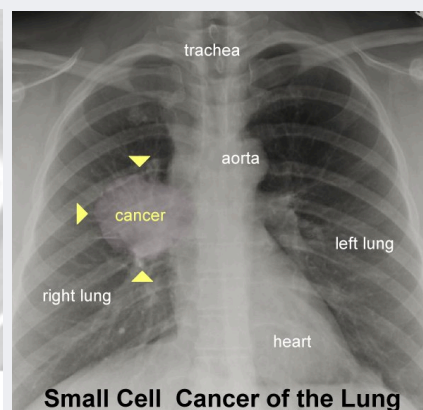
Radiology Information System (RIS)

- Supports digital image generation
 - picture archiving and communication systems (PACS), image analysis, image management.
- PACS replace traditional hard copy films with **digital media** that is easy to store, retrieve and present to health professionals.
- This system collects, stores and distributes medical images such as Computed Tomography (**CT**) scans, Magnetic Resonance Imaging (**MRI**) and **X-rays**.
- The benefit of RIS and PACS systems is their ability to assist in **diagnosing** and storing vital patient care support data.



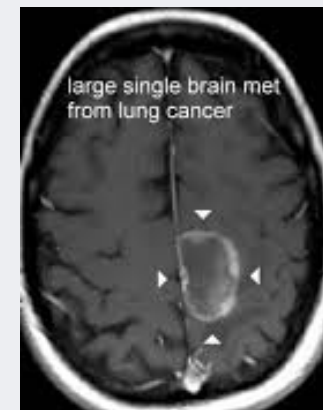
Lung cancer revealed by CT Lung Screening

CT scan



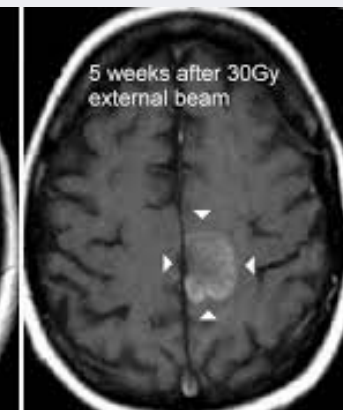
Small Cell Cancer of the Lung

X-Ray



large single brain met from lung cancer

MRI



5 weeks after 30Gy external beam

Pharmacy Information System (PIS)

- PIS supports **medication** ordering, dispensing, inventory control, drug compatibility checks, allergy screening, medication administration.
- For effective medication management, PISs should incorporate **allergies** and **height** and **weight** information.
- PIS helps clinicians achieve both
 - order and document the **administration** of medications and **prescriptions**
 - Receive decision support for **alerting** and drug **interaction** checking.



HBS RxGENESYS V8.5.3 - Multi-Site Pharmacy: 0 HBS Support Pharmacy User:

File Edit Options Clinical Reports Billing Communications Utilities Window System Help

Dispensing Patient Chart Prescriptions Products Pricing Clinical Inq. EPR 005 Image 004 Workflow Delivery Services Exit

RPh Check: 60000321-000 Shorts, Jim

William Johnson M.D. WM1234567
Martina Johnson M.D. M12345678
George Robertson M.D. G123456789

85 Elm Avenue
Suite B
Springfield, PA 19111
(215) 444-3333
Fax: (215) 555-4444

Patient: Jim Snock DOB: 12/13/54
Address: _____
Phone: _____ Date: 9/11/2019

Zyprexa 10mg
1 po qd

Refill 6 times Substitution Permissible M.D. 6 Feb
Date: _____

In order for a Brand name to be dispensed, the prescriber must hand write "BRAND NECESSARY" or "BRAND MEDICALLY NECESSARY" in the space below.

Allergies
Pencillins

Diseases
Diseases not Entered

Queue Counts: My Store/All
R.Ph Check: 1/1

Rx #: 60000321-000 Fill # 0 CASH \$427.70
Date: 4/27/2015 16:09:35
Date Written: 4/27/2015

Patient: Shorts, Jim
Address: 1234 Any Street, Apt 126
AnyTown, pa 18974
Phone: (267) 280-5176 DOB: 12/13/1954
Gender: M
Notes: Test Patient comments for the dispensing screen

Prescriber: WILLIAM JOHNSON
Phone: (215) 444-3333 DEA: vM1234567

Product: ZYPREXA Tablet-10 MG
NDC: 66105-0155-09 DAW: 2
Qty: 30.000 Days: 30 Refills Remaining: 6.0
vWritten For: ZYPREXA Tablet-10 MG Qty Remaining: 180.00

Instructions: Take one(1) tablet by mouth daily

Rx Notes

Queue Notes: Add Note...

Scan
Save
Delete
Print
Zoom In
Zoom Out
Left 90
Right 90
Previous
Next

Front: LILLY 4117
Back:
Color: white
Shape: round
Score: _____
tablet
film-coated

No Scan-Option Disabled

Workflow Audit Send to Pending Fill Dispense History Transfer
Claim Status Pass Times Approve DUR Print Label Close

Electronic Medical Records (EMR)

- EMR supports electronic capture and reporting of **patient's health history, problem lists, treatment and outcomes**
- Clinicians can document **clinical findings, progress notes, and other clinical patient information**
- Provides **decision support** tools, reminders and **alerts.**

The screenshot displays the 'Handy patients enterprise edition' software interface. The top left shows a patient profile for David Anderson, born on 5 January 2009, with a current age of 8 months and 10 days. The interface includes a menu bar (File, Edit, View, Help) and a sidebar with various navigation options like 'Forms', 'Sheets', 'Meetings', 'Diagnosis', and 'New documents'. The main content area is titled 'Digestive' and dated 'Thursday, 22 Jan 2009'. It contains several input fields for clinical observations: 'Digestive inspection' (Normal), 'Digestive auscultation' (Normal abdomen noises), 'Digestive palpation' (Little pain on the right lower area), 'Liver' (No hepatomegaly), and 'Rectal'. Below the text is a diagram of the human digestive system with red arrows and a question mark pointing to the lower right quadrant. The bottom of the interface features a 'Documents manager' and navigation buttons for 'Previous page' and 'Next page'.

Rehabilitation Information System

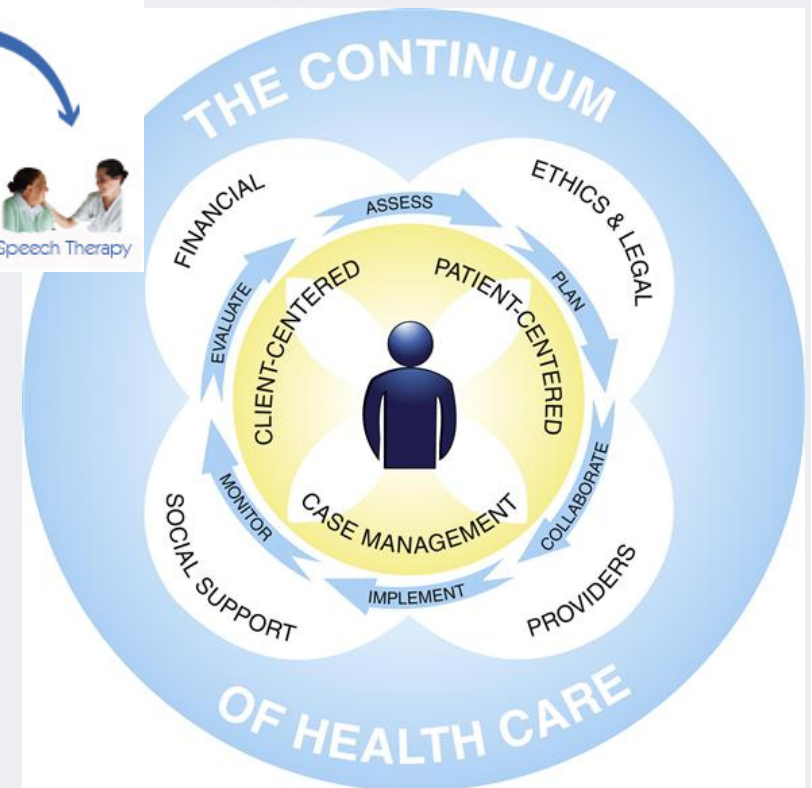
- Supports the capturing and reporting of
 - occupational therapy
 - physical therapy
 - speech pathology services



Patient Case Management Information System

- Patient Case management Information system integrates patient information obtained over **a patient's lifetime** from all their relevant medical visits and encounters from across all medical departments or carers.
- Supports the function of a Patient Case Manager
- Helps to reduce risks, ensures quality, and decrease costs.

(Simpson & Falk, 1996)

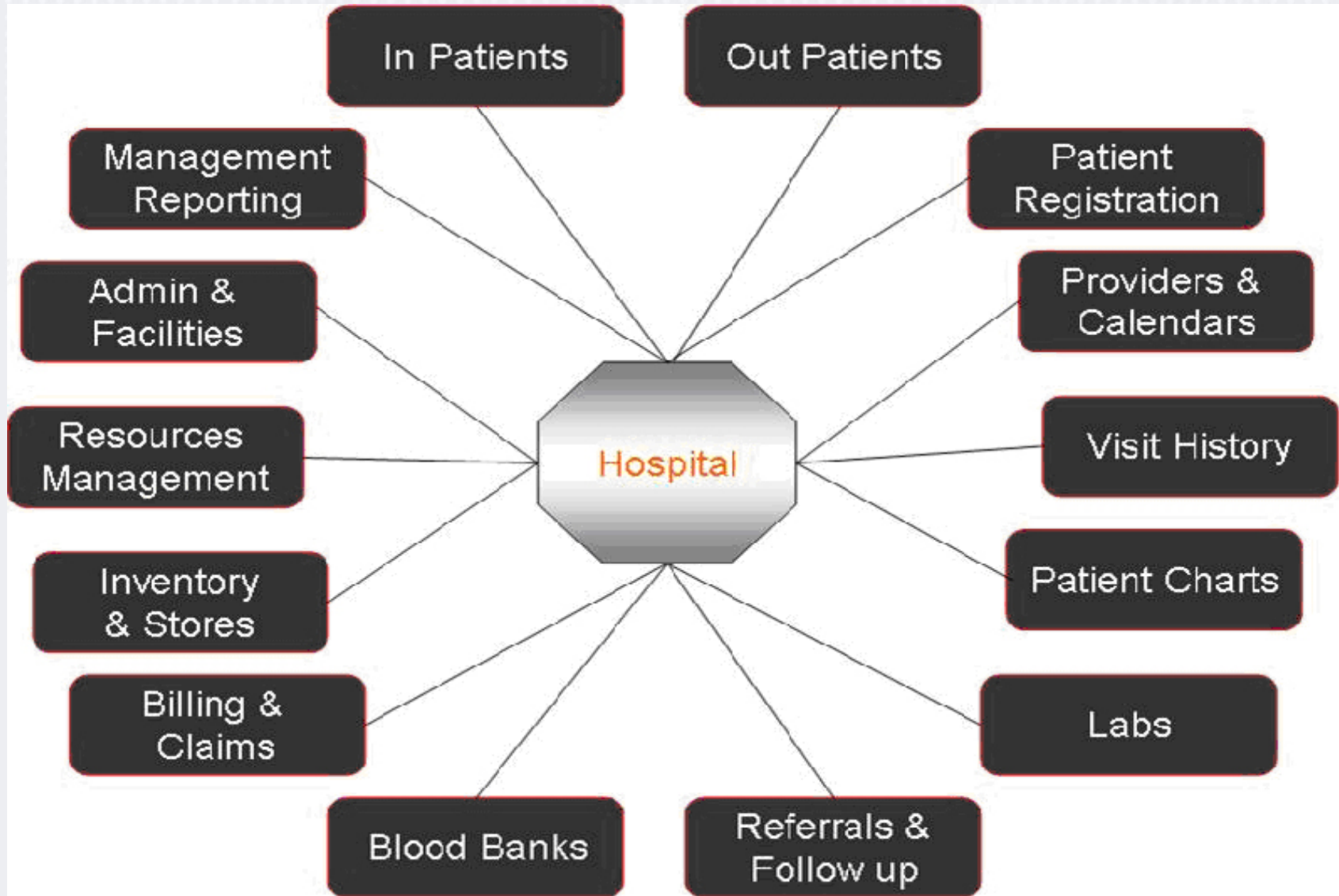


Administrative Information Systems (AIS)

- AISs support the **management of healthcare** within an organisation (unlike clinical information systems which aim to provide direct patient care).
- Provide the framework for reimbursement, support of best practices, quality control, and resource allocation.
- AISs support
 - administrative or financial functions
 - management functions and
 - general operations of the health care organisation.
- AISs manage **information** for personnel, finances, materials, supplies, or equipment.
- May include human resource management, materials management, patient accounting or billing, or staff scheduling.



Administrative Information Systems (AIS)



<http://www.darehost.com/HealthCareManagement.html>

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Patient Registration System (PRS)

- Captures information of patients when they enter to the healthcare institute (e.g., hospital)
- tracks patient encounters among multiple points of data input
- PRS is the core HIS in any healthcare institution
 - PRS is the starting point of the patients' trip and provides the required information that identify patients to other HISs

Patient Registration

Emergency : Registration Module

GDH-HMS

- New Patient Registration
- Old Patient Encounter
- Search Patient
- Update Patient Information
- Health Card
- Emergency Home

New Patient Registration:

Patient Info

First Name:

Last Name:

Father/Husband Name:

Date of Birth: V

CNIC No:

Gender: Male Female

Address

Street Address:

Town:

City:

Picture:

Administrative Information Systems: Types

- **Patient Administration Systems:**

- **Admission, Discharge, Transfer (ADT):** tracks the patient's movement of care in an inpatient setting.

- **Scheduling:** aids in scheduling of patients visits, includes information on patients, providers, date and time of visit, rooms, equipment, other resources.

- **Patient billing or accounts receivable:** includes all information needed to submit claims and monitor submission and reimbursement status.

- **Utilisation management:** tracks use and appropriateness of care.



Administrative Information Systems: Types

- **Other administrative and financial systems:**
 - **Finance management:** manages finances, monitors debts incurred by the organisation and status of purchases.
 - **Personnel management:** manages human resource information for staff, including salaries, benefits, education, training.
 - **Materials management:** monitors ordering and inventory of supplies, equipment needs and maintenance.
 - **Payroll:** manages information about staff salaries, payroll documents, tax withholding, pay status.
 - **Staff scheduling:** assists in scheduling and monitoring staff needs.
 - **Staff time and attendance:** tracks employee work schedules and attendance.

Administrative Information Systems: Types

- **Other administrative and financial systems:**
- **Risk Management Systems:** track and plan prevention of unusual occurrences or incidents.
- **Quality Assurance Systems:** monitor outcomes and produce reports that are used to guide quality improvement initiatives.
- **Executive Information Systems:** Provide administrators with easy access to summarized information related to the financial and clinical operations of the organization.
- **Materials Management Systems:** facilitate inventory control and charging of supplies.

Other Healthcare Systems: Communication Systems

- **Communication Systems:**
- A Communication System includes People, Messages, Mediating Technologies, and Organisational Structures
- Communication systems support formal or informal structures organisations to support their communication needs.
- A communication system follow an organisational structure that defines and constrain what and how conversations occur.

Other Healthcare Systems: Communication Systems

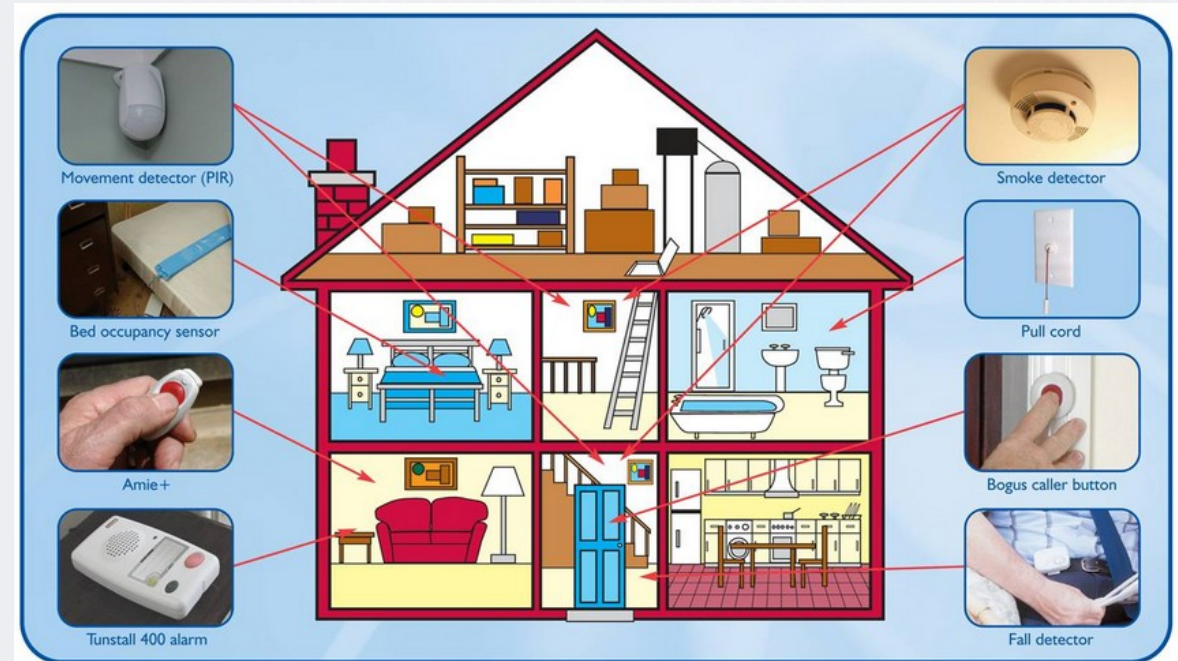
- **Communication Systems:**

	Sound	Image	Data
<i>synchronous</i>	telephony	video-conferencing	shared electronic white boards, shared documents
<i>asynchronous</i>	voice-mail	letters and notes, computer image store and forward	paging, fax, e-mail

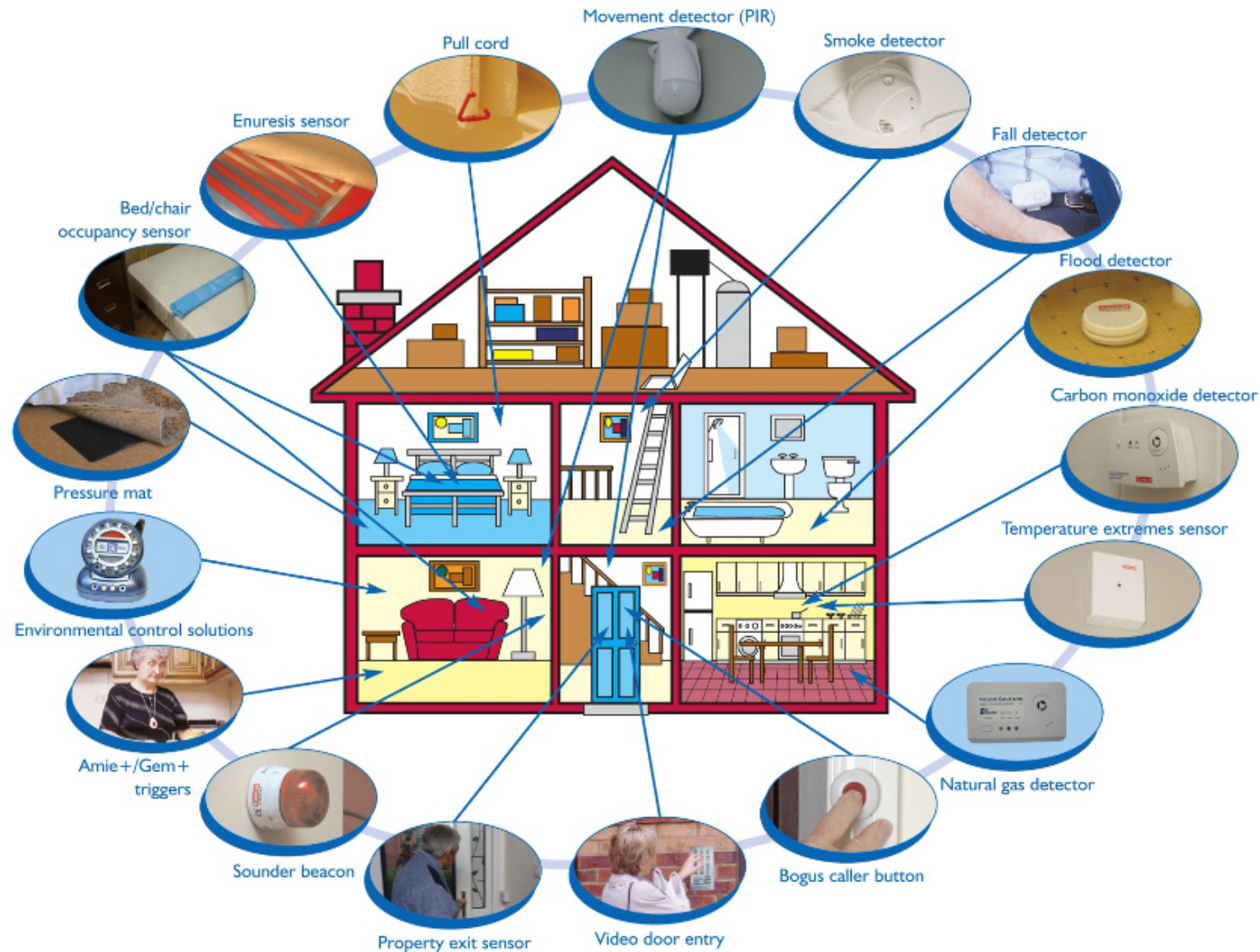
Other Healthcare Systems: Telehealth

Telehealth:

- Telecommunication technologies to provide health-related services **mainly monitoring** patients
 - by collecting their health data indicators
 - by monitoring their health or physical status.



Other Healthcare Systems: Telehealth



Other Healthcare Systems: Telecare

Telecare:

- Telecommunication technologies to deliver health-related services mainly both **monitor** and **provide** health care
 - by connecting patients and healthcare providers to maximize patients' health status.
- Support a wide range of health care services that can be delivered by telecommunications such as telephone, videophone and computer.



Setting-Specific Systems

- **Telemedical systems**
- Telecommunication technologies to deliver health-related services, mainly **between healthcare providers**, e.g.
 - used between hospital-based specialist services and primary care
 - used between small hospitals, which may not have access to the highly specialized clinicians that can be found in larger institutions like teaching hospitals.
 - used to share highly specialized expertise across different hospitals, to save time and overcome travelling large distances.



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AFIX0TK
www.alamy.com

Setting-Specific Systems

- **Examples of real-time clinical telecare applications include:**
 - Telemental Health
 - Telerehabilitation
 - Telehomecare
 - Teleconsultations
 - Telehospice/ Telepalliative care
- **Examples of real-time clinical telehealth applications include:**
 - Remote Monitoring Devices: are used to capture and transmit biometric data.
 - Telephone Monitoring for Telehealth

Setting-Specific Systems

- **Decision Support System (DSS)**
- This system use the data from both the clinical and administrative information systems and can provide information related to clinical and administrative users.
- DSS is a computer-based information system that supports organisational decision making activities
- DSS help management to make decisions on Unstructured and Semi-Structured problems
- Does not give a decision itself

Setting-Specific Systems

Decision Support System (DSS)

Several forms of DSS

- Aid and strengthen the selection of variable options using the information of an organisation or a field to facilitate Decision Making and overall efficiency. A single recommendation or series of recommendations implying next steps based on care protocols.
- The computer reminders and alerts to improve the diagnosis and care of a patient.
- These alerts include screening for correct drug selection and dosing, medication interactions with other medications, preventive health reminders in areas such as vaccinations, health risk screening and detection and clinical guidelines for patient disease treatment (IOM, 2003).

Health Informatics in Healthcare



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Thanks!

Any questions?

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