COMP2322:
Introduction to Health Informatics

Health Informatics:

Health Information Systems

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

Location: **Masri406**

Section: **1**

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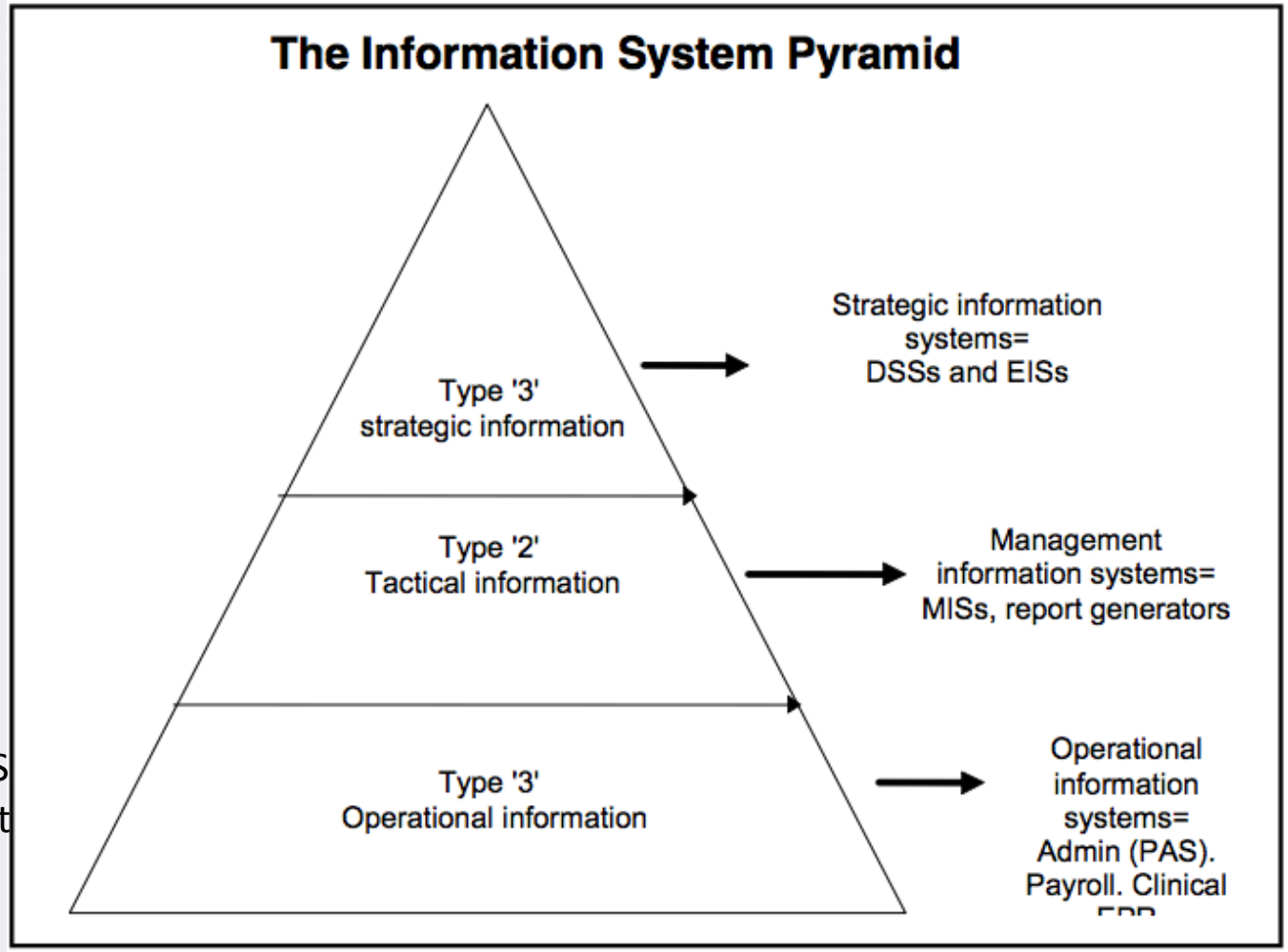
Co-funded by the Erasmus+ Programme of the European Union

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.



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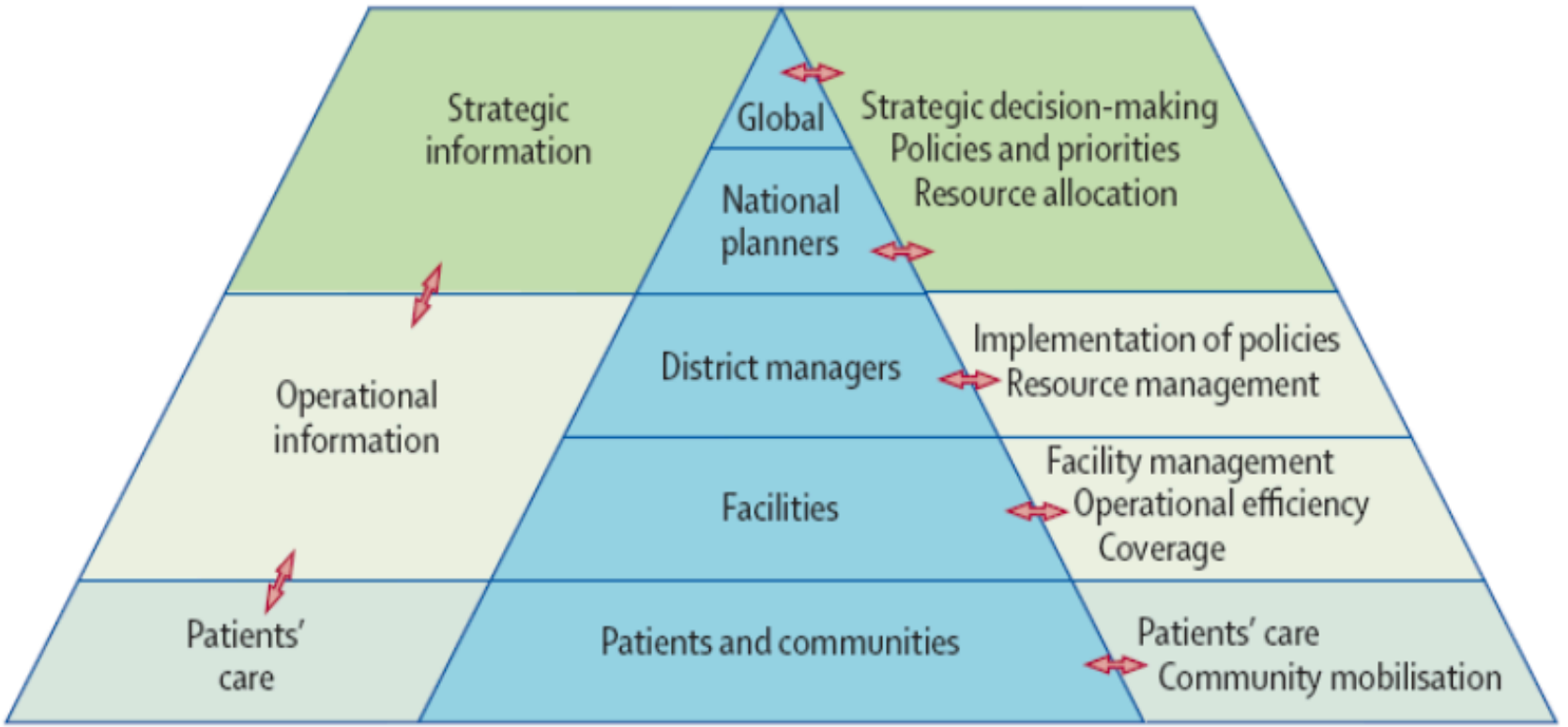
Health Information Systems: Types (General)



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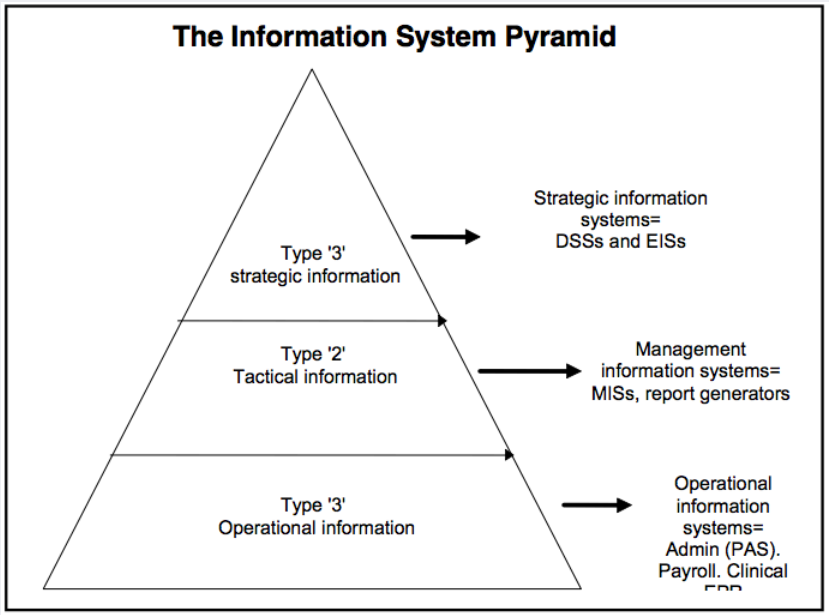
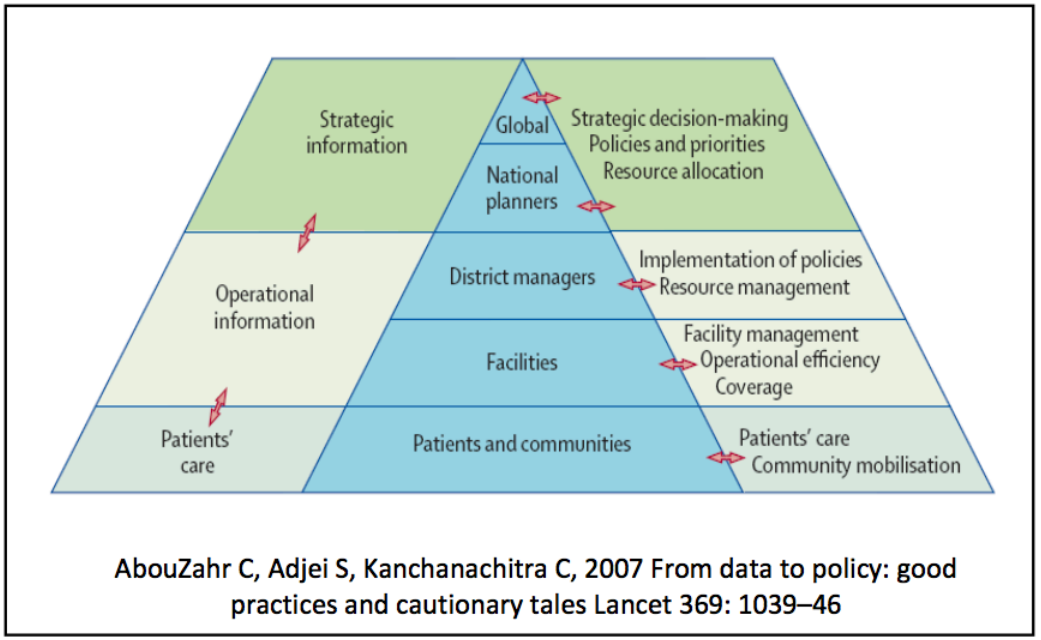
Health Information Systems

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





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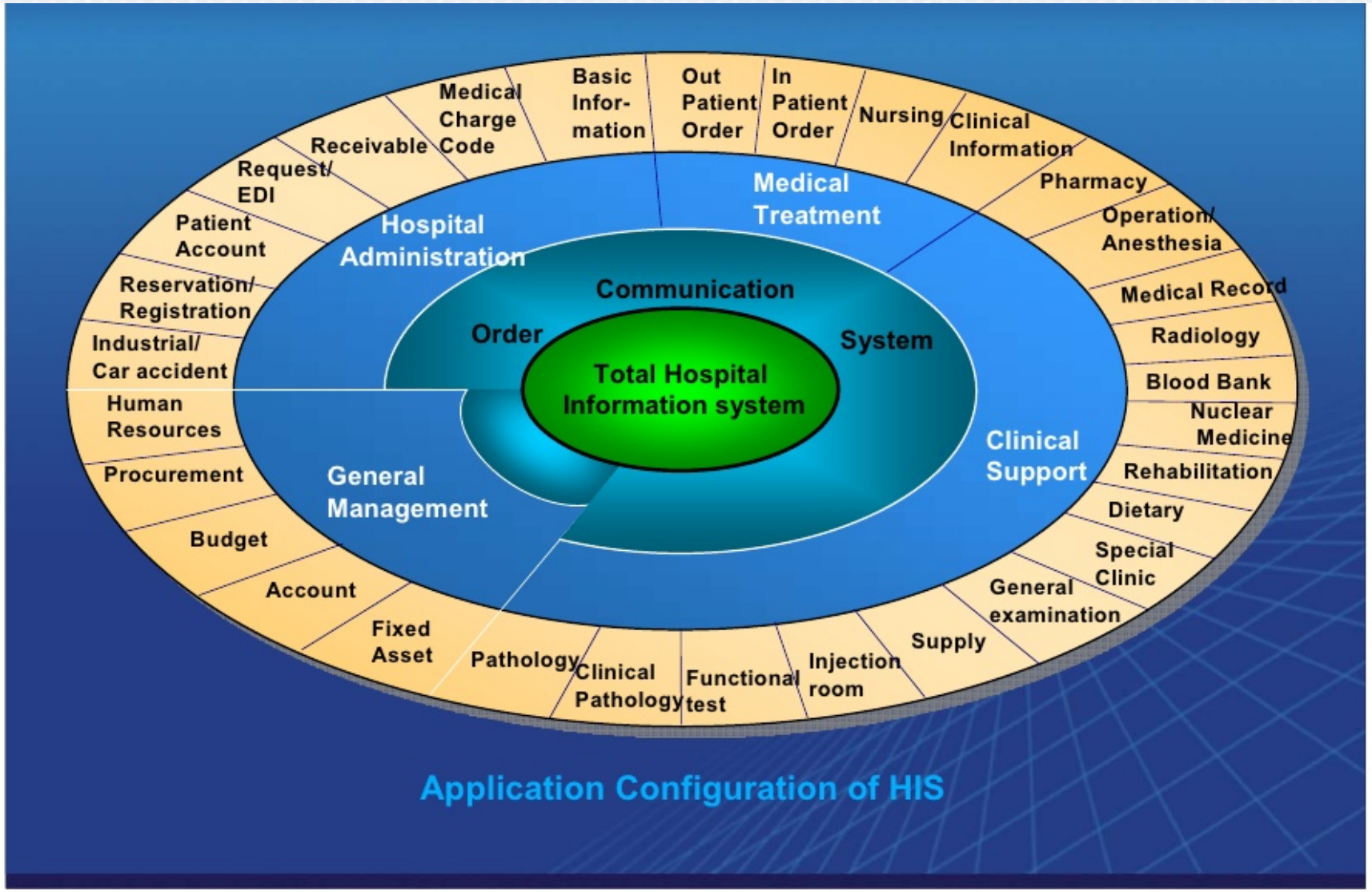
Information Systems in Health Care

How to support various functions of healthcare?

Hospital Information Systems



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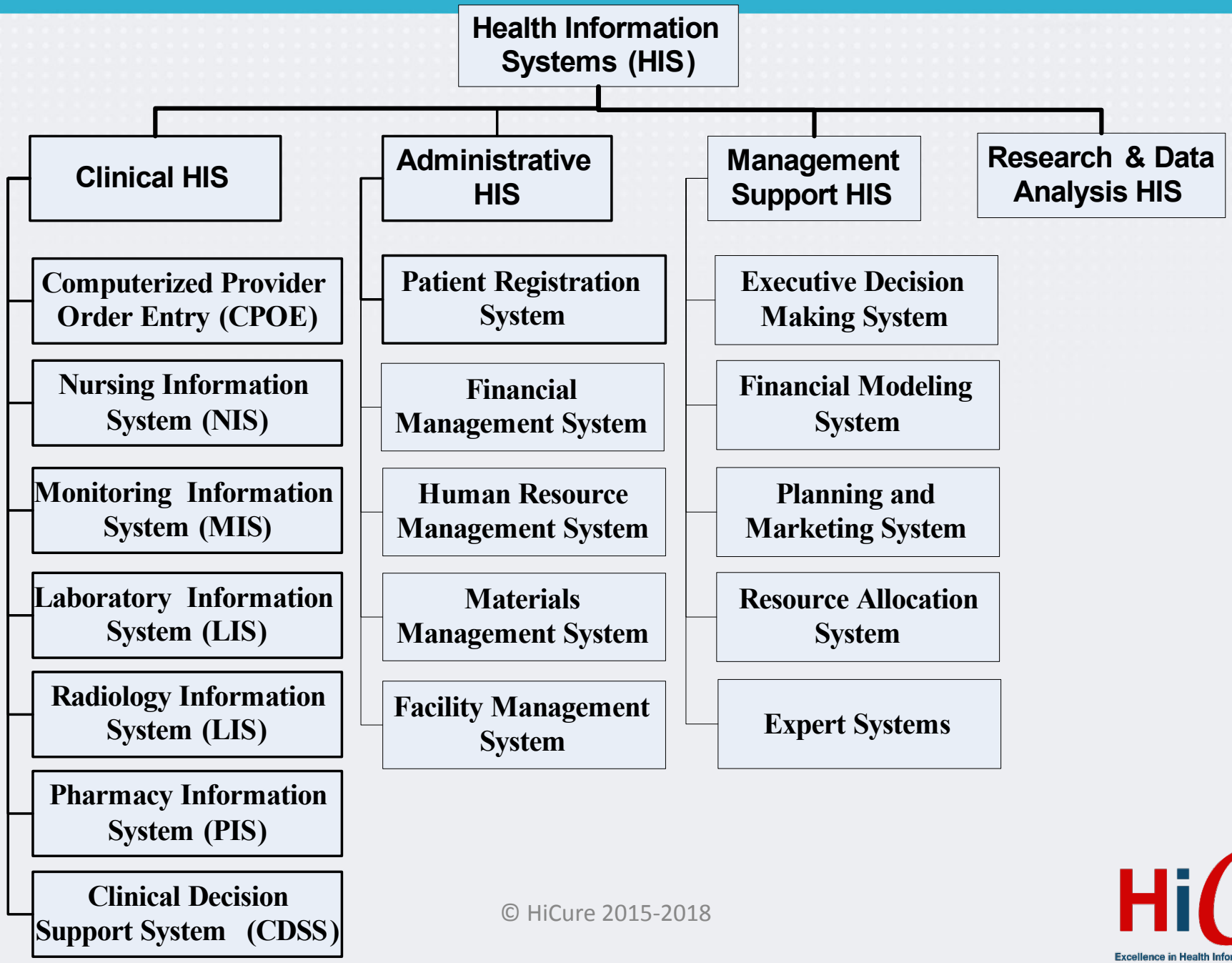
Information Systems in Health Care

- 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)



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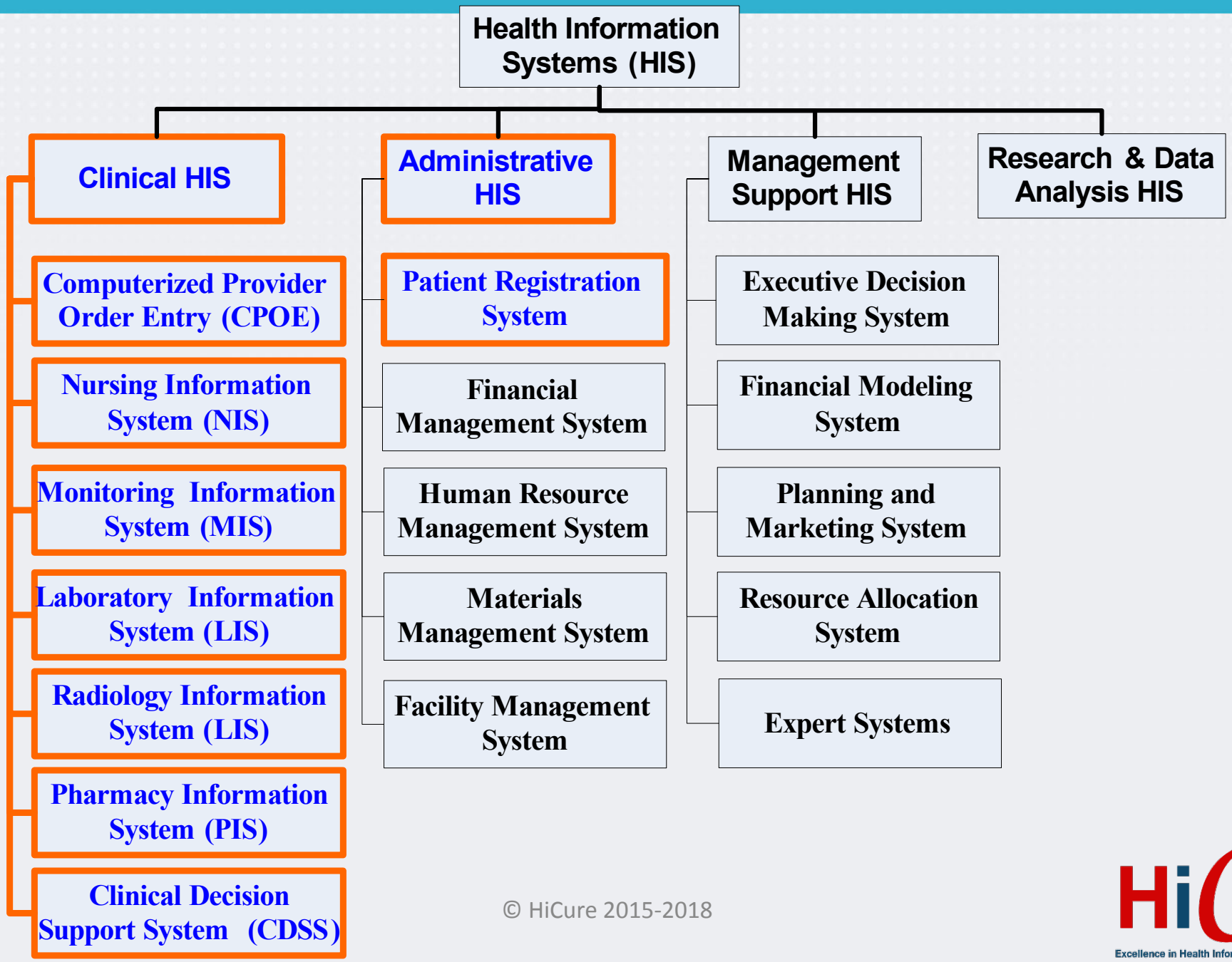
Patient Oriented HISs



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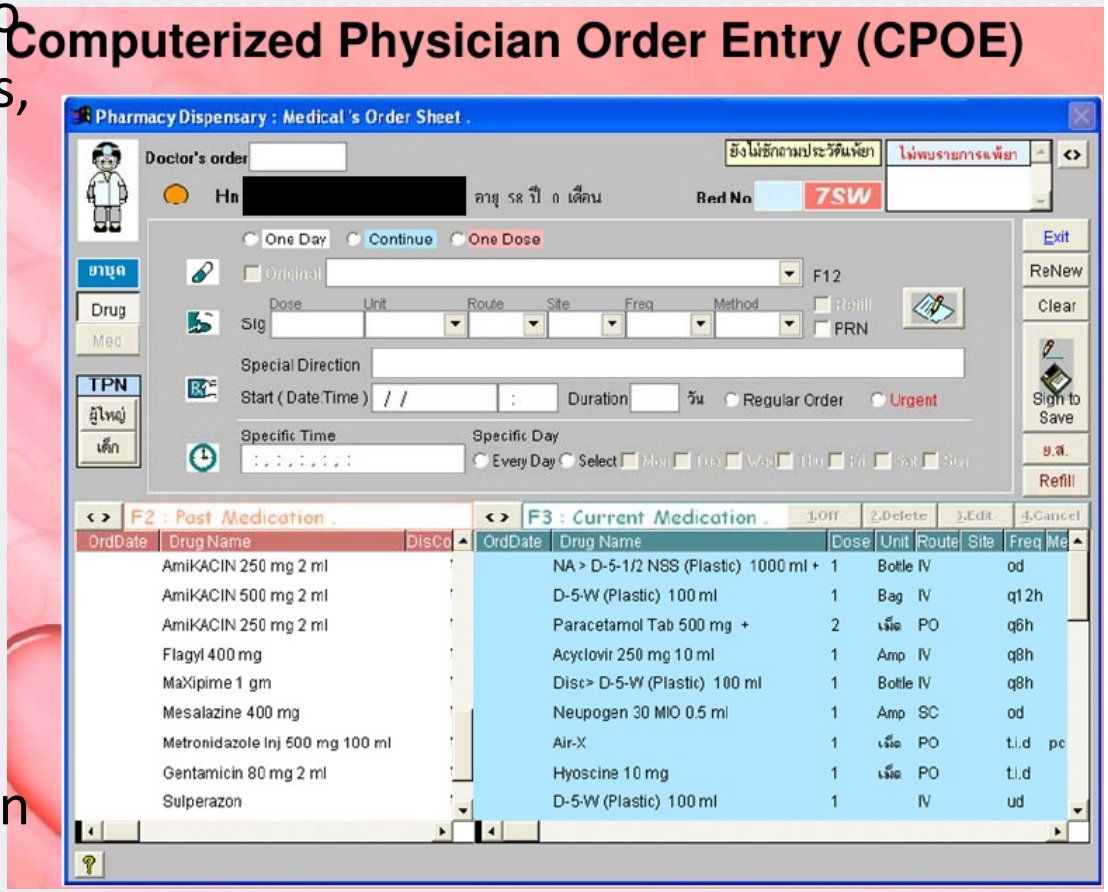
Clinical Information Systems (CIS)

- 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).



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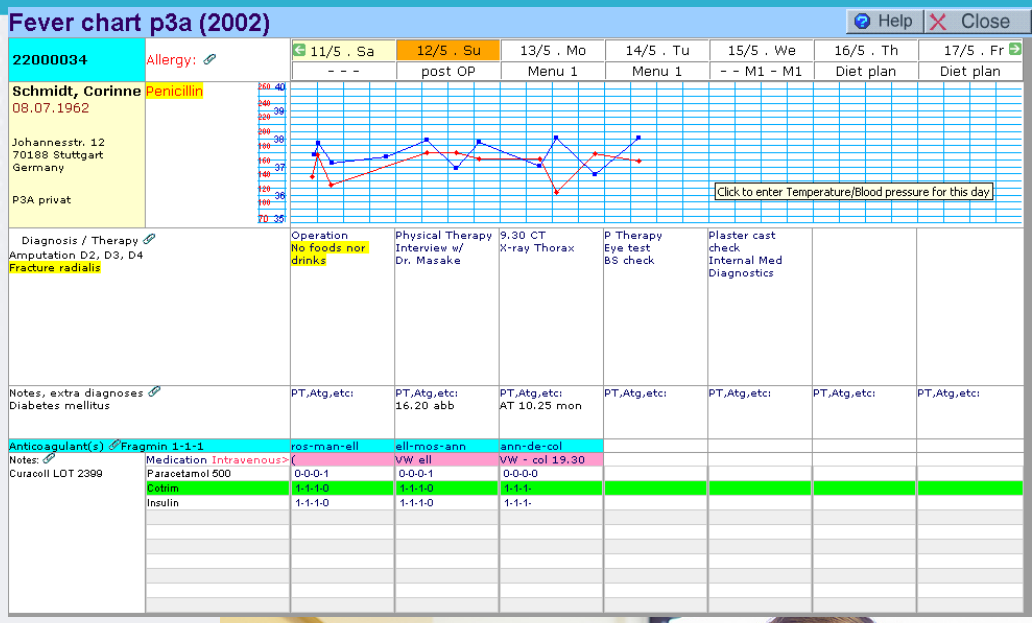
Nursing Information System (NIS)

- 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.



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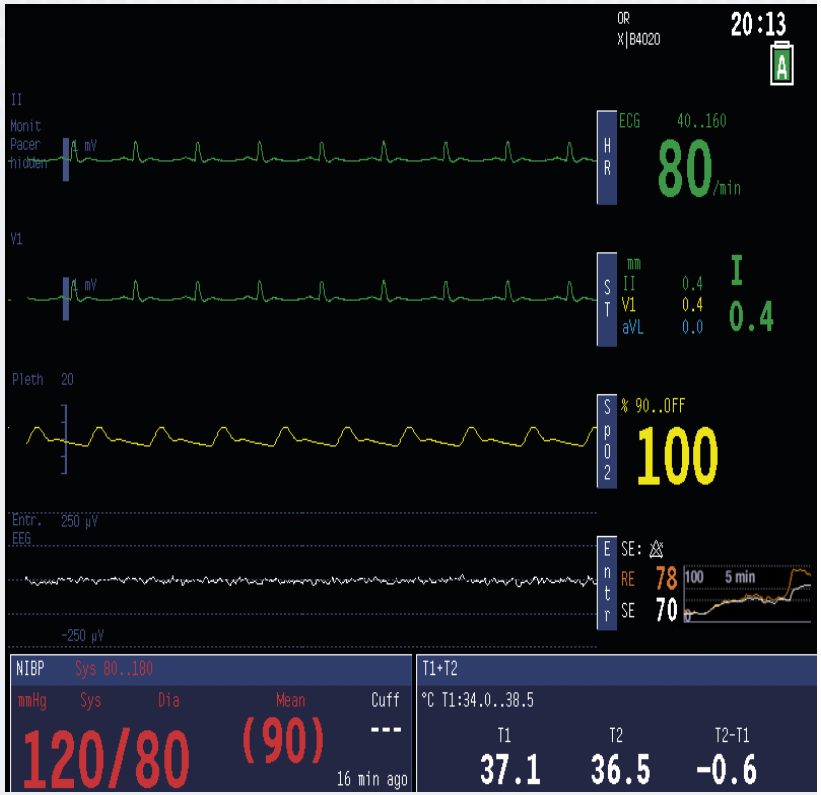
Monitoring Information Systems

- 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



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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.

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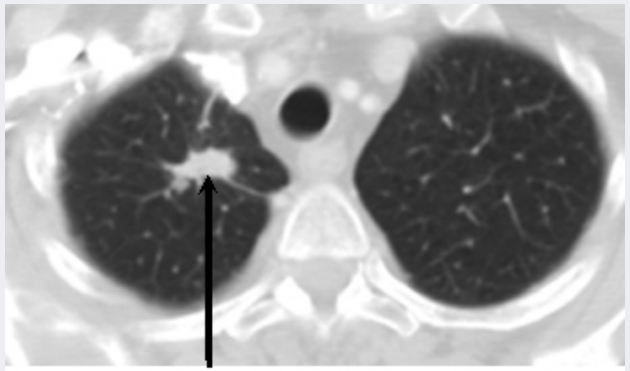
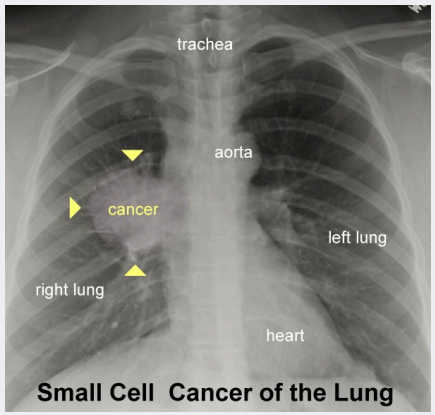
Radiology Information System (RIS)

- 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.

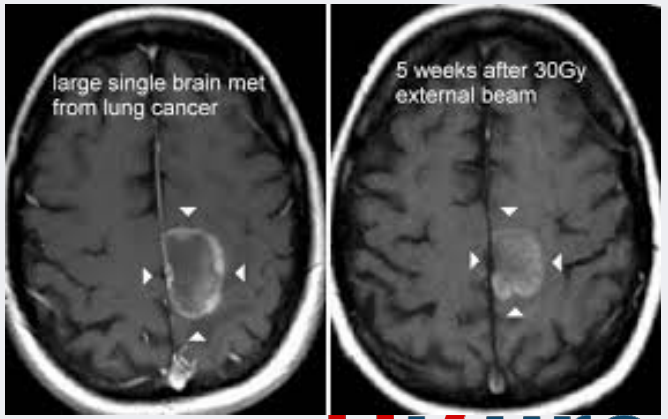


Lung cancer revealed by CT Lung Screening

CT scan



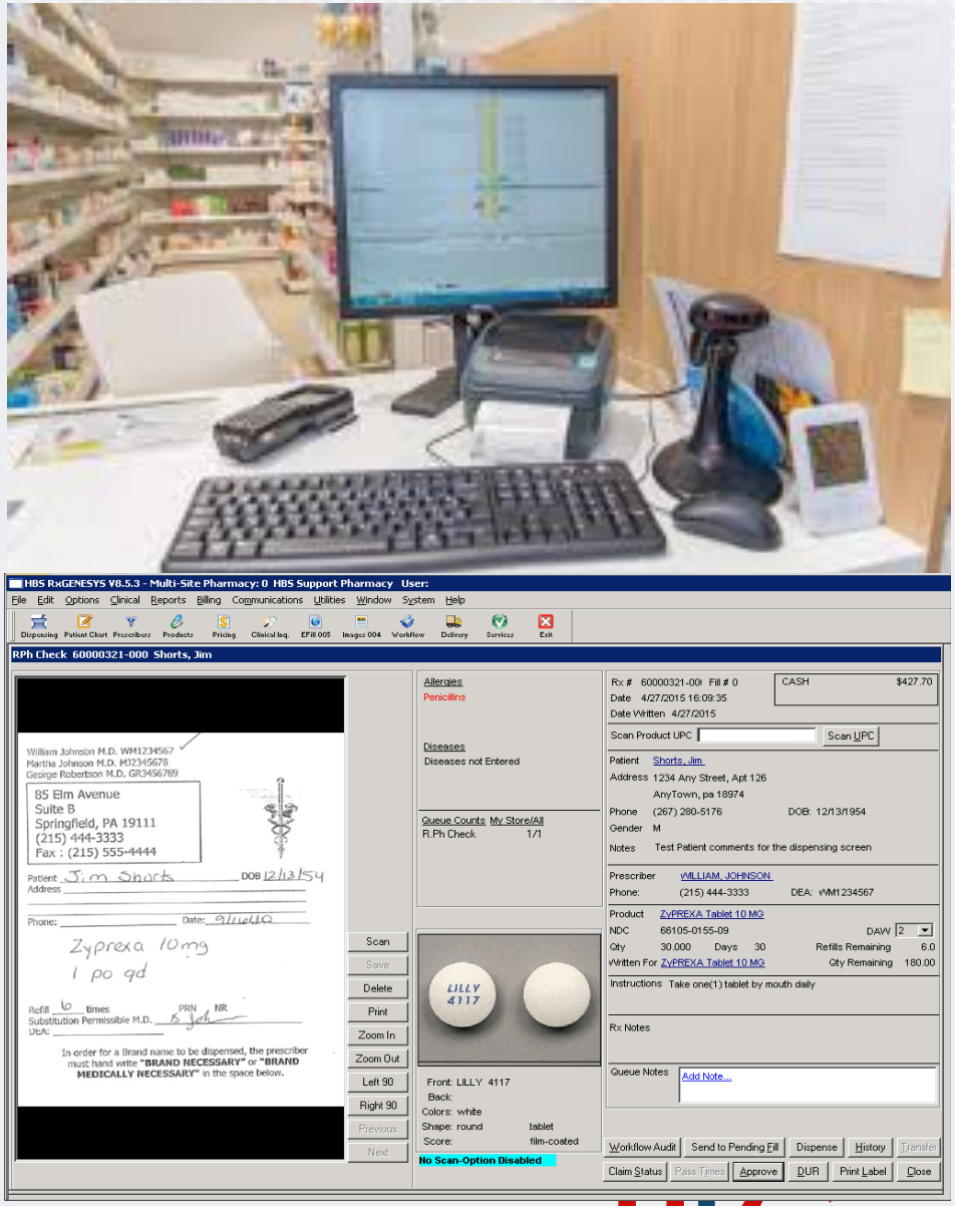
X-Ray



MRI

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.



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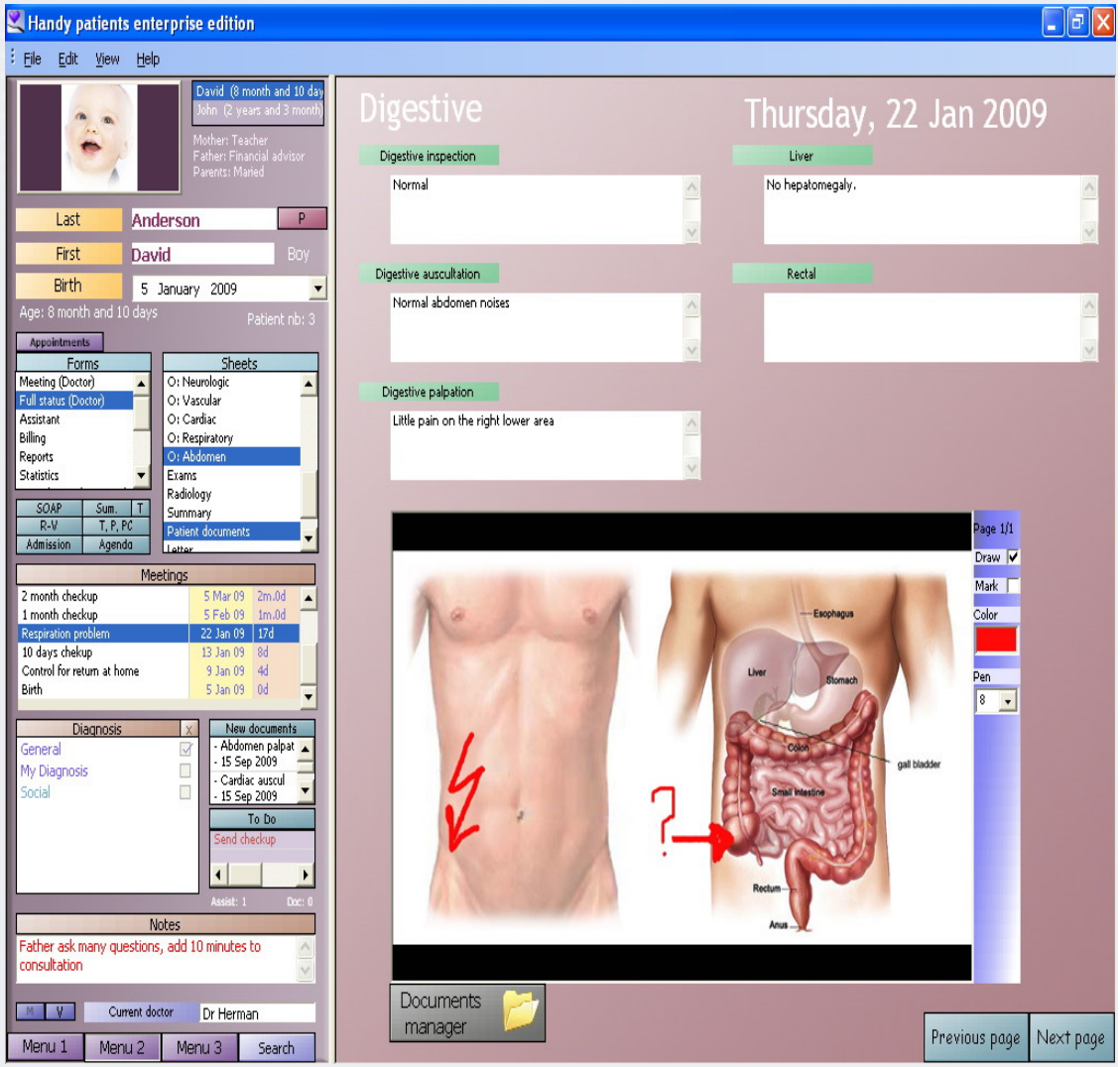
Electronic Medical Records (EMR)

- 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**.



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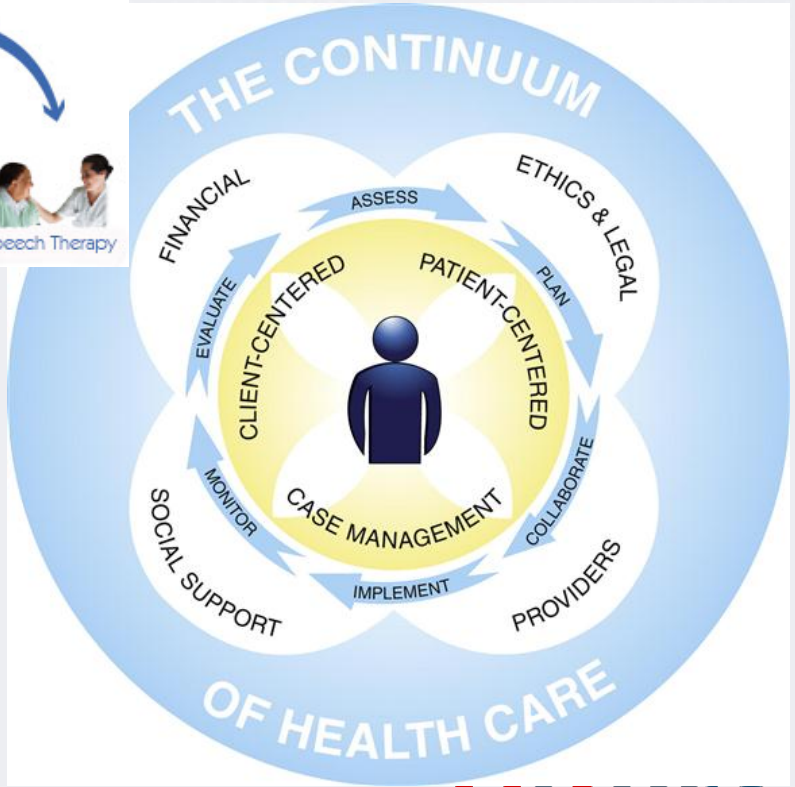
Rehabilitation Information System

- 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)



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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.

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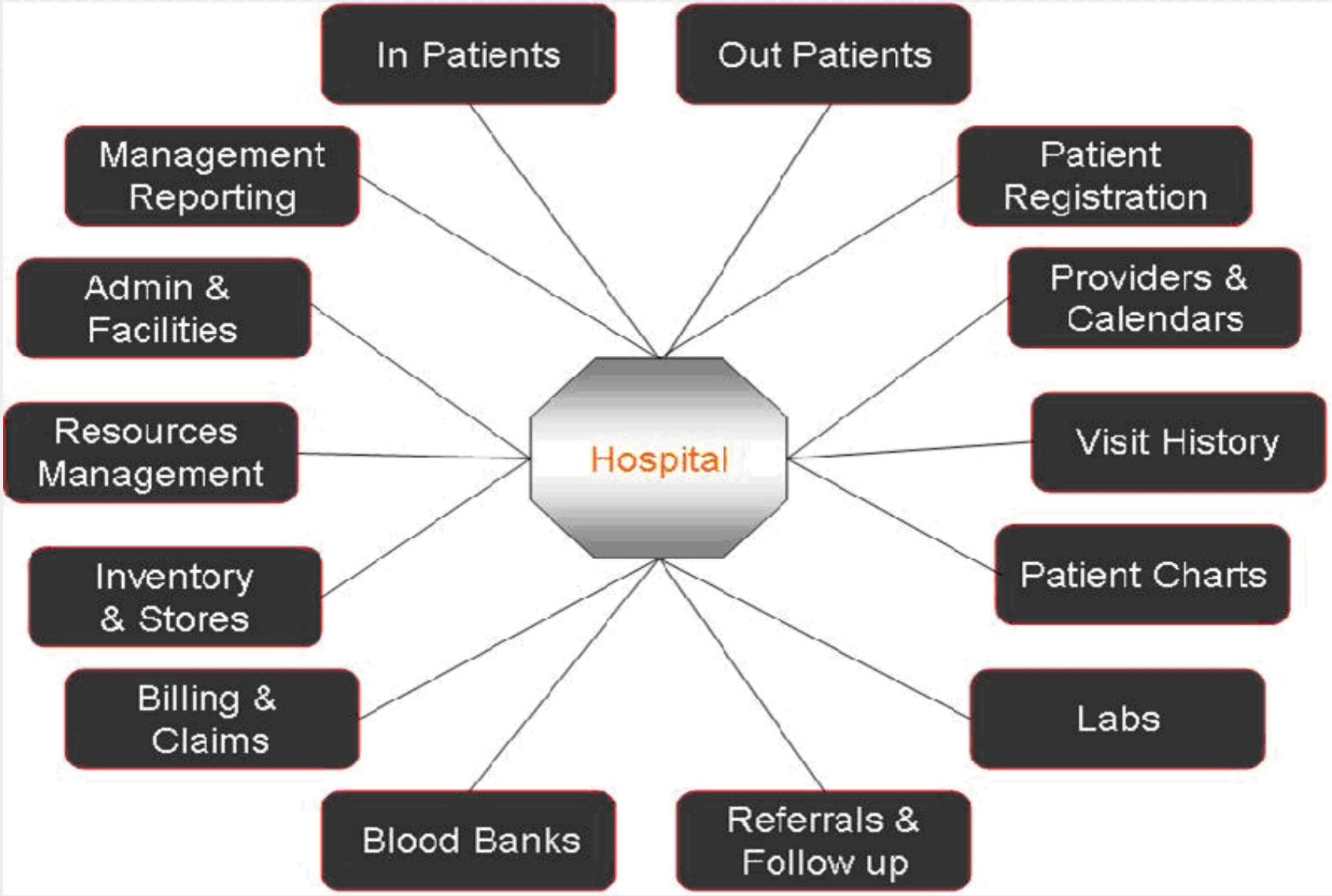
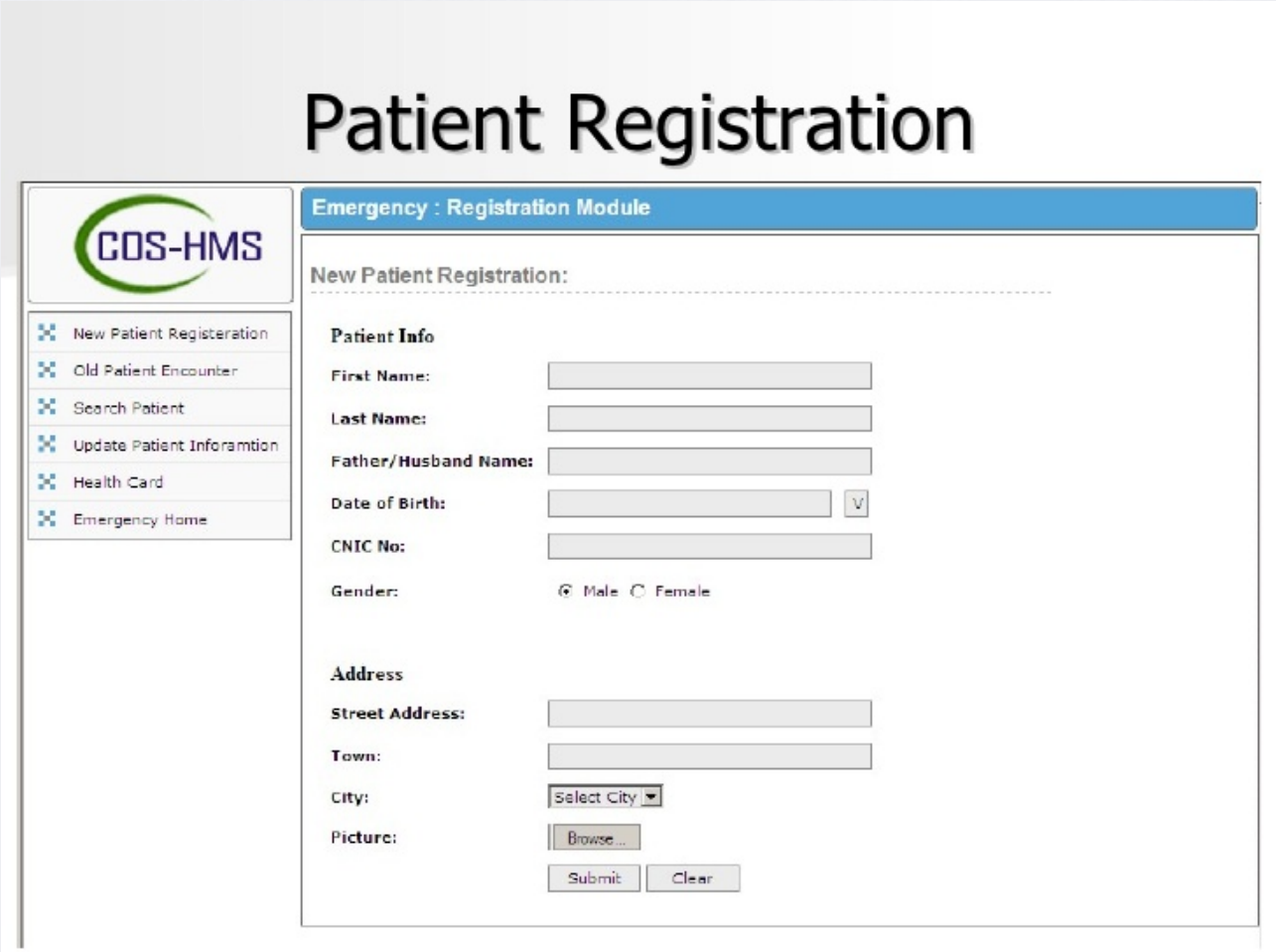
Administrative Information Systems (AIS)



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

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



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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.

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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

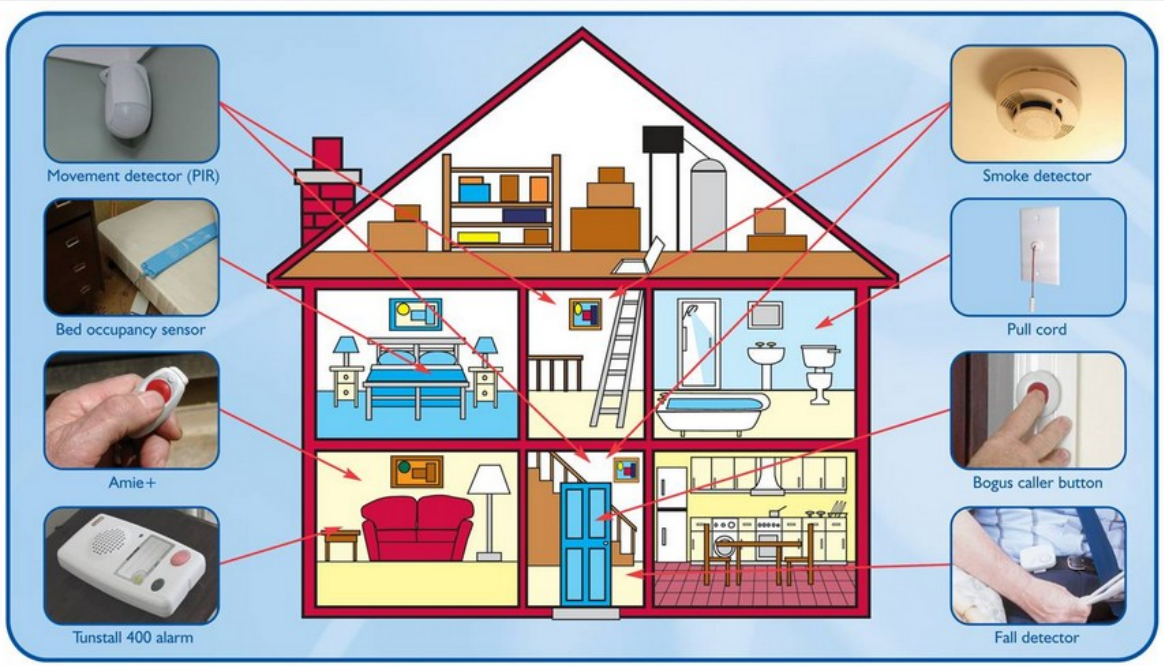
- **Communication Systems:**

	Sound	Image	Data
synchronous	telephony	video-conferencing	shared electronic white boards, shared documents
asynchronous	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.



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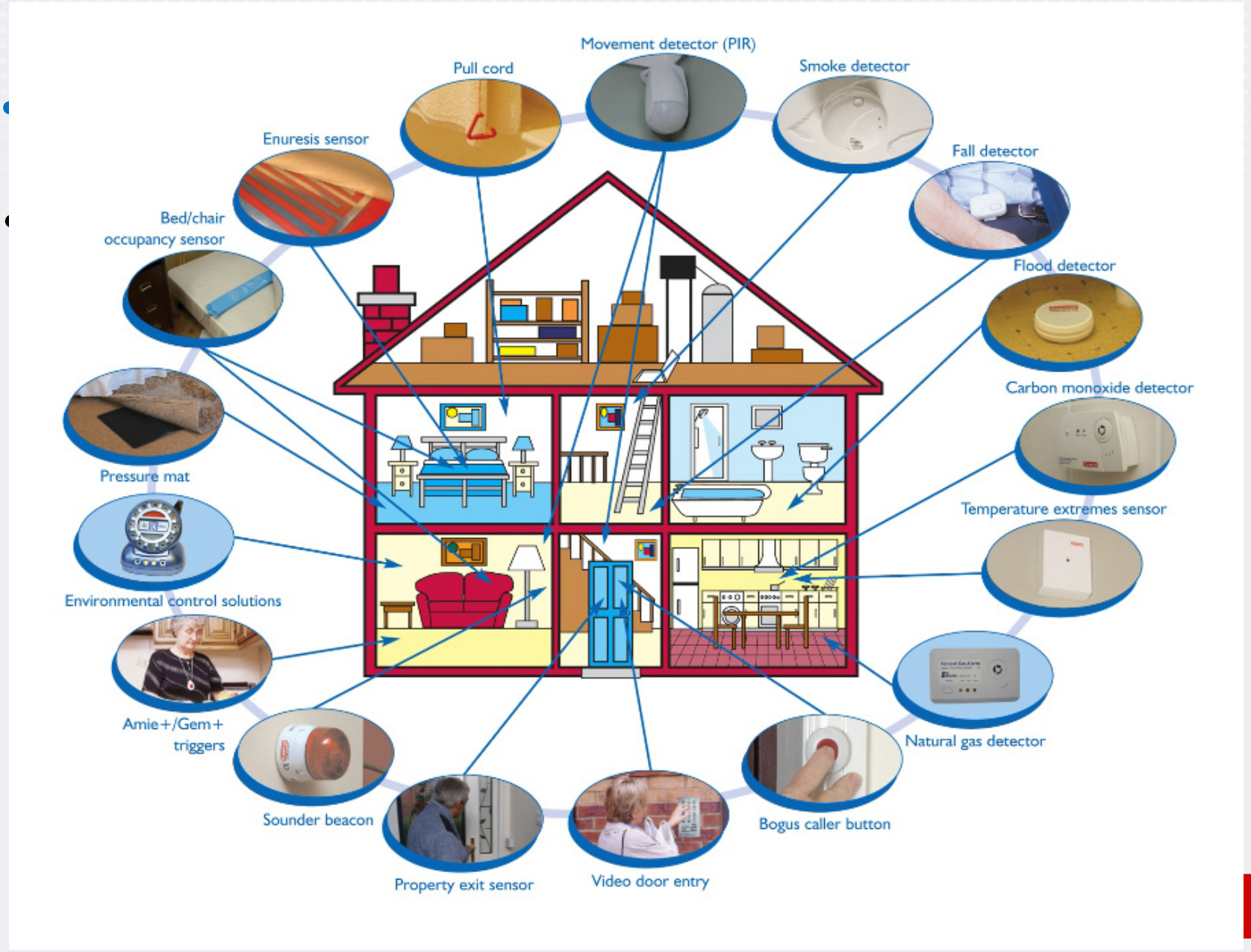
Other Healthcare Systems: Telehealth



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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.

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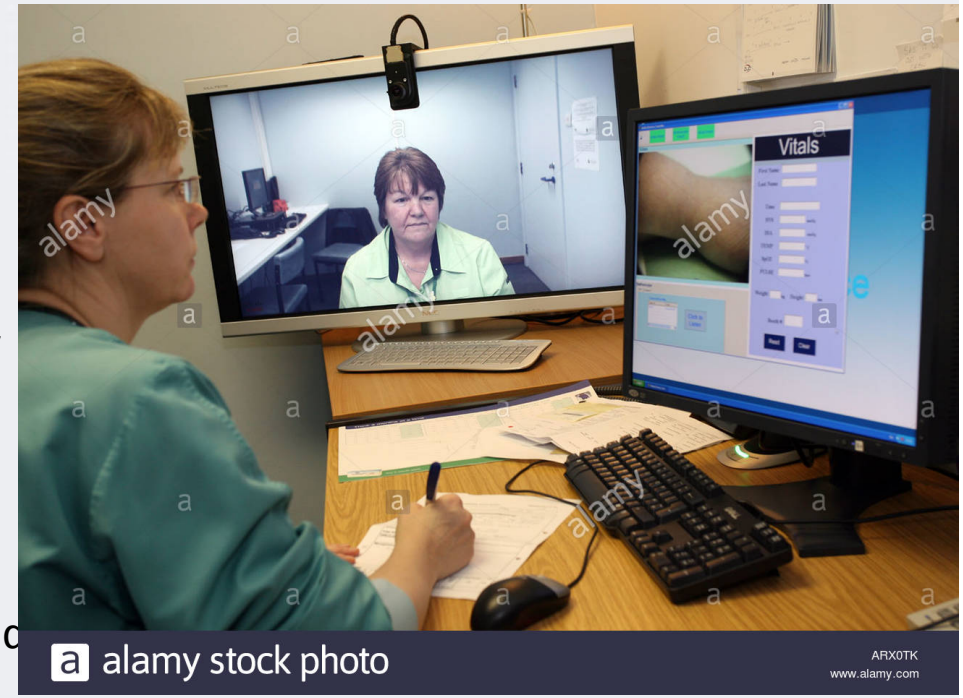
Setting-Specific Systems

- **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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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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