

Department of Medical Instrumentation Engineering Techniques  
Laboratory Medical Instrumentation I



# *University of Al maarif*

Department of Medical Instrumentation Techniques Engineering

Laboratory Medical Instrumentation I

***Second Class***

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*Master of Medical Physics*

***Lecture Four***

***Design of hospitals***



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# Hospitals

## Definitions:

A hospital is a health care institution providing patient treatment with specialized staff and equipment.

An institution providing medical and surgical treatment and nursing care for sick or injured people.

## Why hospital design science is important?

- Hospitals are the most complex of building types. Each hospital is comprised of a wide range of services and functional units.

## Hospital design staff

- Architect.
- Biomedical Engineer.
- Doctors.

Biomedical engineer and Doctors responsible for: Function, Proper Location, Utilities & Operating Conditions of Medical Equipment.

Architect responsible for: studying information given by the biomedical engineer and considering it for the final design.

## Layout of a Hospital

Hospitals are the most complex of building types. Each hospital is comprised of a wide range of services and functional units. These include diagnostic and treatment functions, such as clinical laboratories, imaging, emergency rooms, and surgery; hospitality function, such as food service and housekeeping; and the fundamental inpatient care or bed-related function. Hospital functions constantly evolved, including highly complicated mechanical, electrical and telecommunications systems.

The basic form of hospital is ideally, based on its function:

- Bed-related inpatient functions.
- Outpatient- related functions.
- Diagnostic and treatment functions.
- Administrative functions.
- Service functions (food, supply).
- Research and teaching functions.



## Division / Units

1. **Administration division.**
2. **Outpatients division:** Outpatient clinics, Pharmacy, Emergency, Bed-Related Inpatient Functions.
3. **Diagnostic services division:** Laboratories, Radiology (Diagnostic).
4. **Therapeutic services division:** Physical therapy, Radiology (Therapeutic).
5. **Internal medical treatment division:** Operation Theaters, Intensive Care Unit, Maternity Section, Central Sterilization Department.
6. **Inpatient division:** Patient wards, Nurses wards, Inpatient services.
7. **Research and Teaching Division.**

## Types of Hospitals

Some patients in a hospital come just for diagnosis and/ or therapy and then leave (“outpatients”) while others are ‘admitted’ and stay overnight or for several weeks or months (“inpatients”). Commonly there are four major types of hospitals which are:

### **(1) General Hospitals**

The most- known type of hospital is the general hospital, which is large enough set up to deal with many kinds of disease and injury, and typically has an emergency ward to deal with immediate threats to health and the capacity to dispatch emergency medical services. Its size measured in terms of bed numbers range from 200 to well over 1000.

### **(2) Teaching Hospitals**

Teaching hospitals (or university hospitals) are those health-care facilities combine assistance to patients with teaching to medical student and are often affiliated with medical schools. One advantage of obtaining care at teaching hospital is to receive treatment from highly qualified physicians with access to the most advanced technology and equipment. A disadvantage is the inconvenience and invasion of privacy that may be results from multiple examinations performed by residents and students. Its size measured in terms of bed numbers more than 2000.

### **(3) Community Hospital**

Is the term used for smaller hospitals (50- 250 beds) where most people receive care, intended to be staffed by general practice physicians (GP's) and requiring less intensity of medical, nursing and teaching services. Most of these hospitals offer emergency services as well as a range of inpatient and outpatient medical and surgical services.

### **(4) Specialized Hospital**

They are dealing with one category of patient only, from a different class. These hospitals may be a single building or campus. Some hospitals are affiliated with universities for medical research and training of medical personnel. Types of specialized hospitals include trauma centers, rehabilitation hospitals, children's hospitals, geriatric hospitals and hospitals for dealing with specific medical needs such as psychiatric

problems, certain disease categories and so forth. Such hospitals are very large in size (over 200 bed or more).

## **Hospital Planning**

Modern hospitals are complex social institutions providing health services, including prevention, diagnosis, treatment, and support for acutely ill, long-term care, and ambulatory patients.

### **Location of Hospital**

Rebuilding hospital often takes place on the edges of towns, where land is cheaper and more plentiful, such site is often bought at the cost of impaired accessibility, specially where cross town journeys are involved.

## **Attributes of Hospital Planning**

Regardless of their location, size, or budget, all hospitals should certain common attributes.

- 1. Efficiency and Cost Effectiveness**
- 2. Flexibility and Expandability**
- 3. Therapeutic Environment**
- 4. Cleanliness and sanitation**
- 5. Relationship between Departments**
- 6. Fir safety and security**

## Hospital design

Common factors that should be taken in consideration in the design of any given hospital. Factors common to all modern hospital include:

- 1-Design standards.**
- 2-The elements in the architectural and engineering design process.**
- 3-Long –range facility plans.**
- 4-Structural systems.**
- 5- Functional adjacencies.**
- 6-Traffic and transportation.**
- 7- Site and parking.**
- 8-Electronic systems.**
- 9-Engineering systems.**
- 10- Heating, ventilation, air conditioning and electrical system.**