

Important Parameter of Infrastructure for Obstetrics and Gynaecology Hospital

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Abstract

In healthcare facilities most of the daily activities require strict coordination between clinicians, who often operate under heavy workloads and minimal workforce conditions in environments filled with increasingly complex technology.

Ubiquitous Computing applications constitute a suitable solution for both reducing medical costs and improving patient safety by better supporting clinical processes.

In this study we introduce an intelligent infrastructure for Obstetrics and Gynaecology smart hospitals which implements basic infrastructure require various services.

Keywords: Infrastructure; Obstetrics and Gynaecology Hospitals

"A Hospital is an integral part of Social and Organisation, the function of which is to provide for the population complete health care, both curative and preventive, and whose outpatient services reach out to the family and its home environment: the hospital is also a centre of health workers and biosocial research".

-WHO definition of Hospital

Introduction

Hospitals play important role in public life. It is an institution where the sick or injured are given medical or surgical care. A healthy hospital environmental is found to have an impact on the quick recovery of disease. The physical infrastructure is playing important role to deliver high-quality care at a reasonable price. Inadequacies in health system infrastructure limit access and contribute to poor quality of care and outcomes. The role of hospital infrastructure is very much important for quality healthcare delivery. Hospitals play an important role in shaping public perception of the performance of countries health systems. Country health system means, high infrastructure will give better performance. But this is possible for rich countries. Mostly poor country does not spend more money on Infrastructure. One should concentrate on requirement of infrastructure which will give better performance of health related services. It is an institution where the sick or injured are given medical or surgical care. They are complex in nature itself.

Obstetrics and Gynaecology offers the full spectrum of women's health care services. Hospital has to offer state of the art, technologies with superlative care offering a range of services such as painless deliveries, management of high risk pregnancies/late pregnancies etc. women in different age groups have different health concerns, which should be appropriately addressed.

To have an optimum level of comfort and care physically, socially and symbolically it is indispensable for a hospital to provide an environment which would heal the ailments. Proficient hospital design may lead to a great business outcome, as patients are looking for quality care in a safe and healthy environment with minimum cost.

The recent concept is to strongly promote wellness as opposed to only treating diseases, such as heart disease and stroke, cancer, diabetes, and lung disease, The Difference Between, Health and Wellness. According to the World Health Organization, "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". Wellness is the action while (good) health is the desired outcome.

For the better outcome of the patient, the result plays a very important role. We found that today, a huge amount of money is spent on building a new hospital structure to cater for people; so as to ensure their wellness and treat their various diseases. 'Little or no change can be made to hospitals' physical structures once they have been erected, so careful planning has to be done before a decision is made on the final structure to be erected.' So we have to take decision regarding requirement initially with various different factors. The infrastructure design of the building should be attractive, functional and as well cater to the needs of the patient.

Structure of gynaecology hospital

Gynaecology department

Gynecology deals with non-pregnant women, while Obstetrics deals with pregnant women and their unborn baby. Gynaecology is branch of physiology and medicine which deals with the functions and diseases specific to women and girls, especially those affecting the reproductive system. The Department of Gynaecology treats and investigates the female reproductive organs, e.g. for problems of Menstrual irregularities, Uterine problems, Infections and irritation, Family planning, Perimenopause and menopause issues, Breast pain, infections or changes, etc.

Here we consider the following treatments:

- High-risk pregnancies
- Reopening fallopian tube blocks
- Gynaecology Cancer management
- Hysterectomy (abdominal/vaginal)
- Ovarian Cystectomy
- Tubectomy
- Ovarian cyst
- Polycystic Ovary Syndrome (PCOS or PCOD)
- Myomectomies
- Oophorectomies
- Ectopic pregnancy.

This type of practice requires a large staff, as each physician needs one or two nurses.

Obstetrics department

Obstetrics consists of the following process.

Obstetrics deals with pregnant women and their unborn baby. Obstetrical patients usually make monthly visits, which entail weighing and brief examination.

- Labour
 - Delivery Birthing
 - Recovery
 - Postnatal (or Post-Partum)
- 
- LDR

The Obstetric Unit will require rapid access to Operating Unit for emergency Caesarean Section deliveries; the Operational policy will determine the requirement for Operating facilities located within the Birthing Area.

Neonatal nursing area

General care nursery area:

- Feeding the baby
- Bathing, changing and weighing the baby
- Allowing the baby to sleep during the day.

Planning and designing of the hospital

“Below is our suggestion for the planning of an Obstetrics and Gynaecology hospital.

Functional zone

There are three zones, mostly in ground floor: Public zone, joint use zone and staff-zone.

Public zone

This includes:

- **Main entrance:**
 - The main entrance to the Hospital should have a gently sloping ramp to facilitate movement of patients on a wheelchair and those carried on stretchers. The surface should be slip/skid free.
 - The entrance should have a double door with a width of 1500 mm to facilitate passage of stretcher and wheelchair.
 - The wheelchair should be readily available at the entrance.
 - Barrier-free movement for the disabled should be provided.
 - Place required for parking of trolley and wheelchair.
- **Foyer, which further includes**
 - Reception: At Reception receptionists help patients, answer phones, assist patients, handle mail, file records etc. also Billing section and cash counter. There will be a separate counter of cash and billing in many hospitals.
 - Sign Board: This will be helpful to give direction to various departments in the hospital.
 - Layout plans: This will also give direction to the various departments, as well as, brief information about each department.
 - Touch screen: This will give more comprehensive information about the hospital. It will provide such information like; doctors on duty, type of treatment given in this hospital etc.
- The waiting area for new patients waiting to see a doctor.
- Public telephone booth.
- Public conveniences - with separate male and female toilets. The number to be provided will depend on the size of the hospital.
- Vending machine for beverages and snacks.
- Pharmacy: The pharmacy would serve medicine and drugs to both inpatient and OPD patient.
- Children play area may be included in the design; to cater for children who accompany their parents, majorly to limit their exposure to nosocomial infections.

Joint use zone: This includes area jointly utilized by the staff and the patients such as OPD and Examination Rooms:

- **OPD rooms:** No. of Rooms depends upon the size of the hospital. The rooms are for visiting doctor like paediatrician, Pathologist, Gynaecologist and Laparoscopic surgeon etc. The size of the room should be 8 to 12.5 Square Meter (Sq.mt.). This also includes space for an examination table, a washbasin, instrument trolley, an X-Ray Viewer, table for doctors and visitors chair.

- **Diagnostic centre:**

- There may be a small pathology Laboratory. The size of the laboratory will depend on how big the hospital is. You may go for outsourcing with other laboratories.
- There is one Ultrasound room for carrying an Ultrasound test. The room is with attached toilet.

Staff zone:

- In this zone, there will be staff cloakrooms and toilets for male and female staff. Both are separate.
- Seminar room for a general meeting.

The size of the staff zone will depend on the size of the hospital.

Birthing area and gynaecology surgery

Location

Strictly speaking obstetrics deals with the process of childbirth but it is practically impossible to separate it from pregnancy-related problems. In small hospitals, the delivery suite is adjacent to the surgical suite. This particular locational arrangement has some peculiar advantages and disadvantage. The advantages include: the two departments will have the same isolation, type of nursing services, same cleaning, air conditioning, sterile supplies and so on. However, inter-traffic, between the two suites, is a disadvantage of such design, so also is the possibility of cross-contamination, between the delivery and surgical suites.

We will firstly discuss, our recommended design for a 100 bed hospital; with a combined labour-delivery and surgical suite. We will start by recommending a design plan for the labour room and gynaecological surgery area. This area should be isolated from other areas of the hospital. The size of the rooms would depend on the size of the hospital, i.e. depends on no. of beds. The followings are our recommendations for these areas.

Waiting area

Waiting area would be required at the entrance of the surgical complex for a relative of the patient. This will be designed to consider the proposed number of beds for the hospital, i.e. the size of the hospital.

Reception area

Needed information on the labour room and operation theatre and other patients' related matters would be provided here.

Superintendent office

This will house the superintendent; an officer whose function would be the supervision of the operation of the whole hospital complex. Under his/her supervision all the Operation Theatre (OT)/Labour work will be carried out under his instruction. He/she will give instruction for plan gynaecology surgery. The size of the office should be 10' X 12'.

Preparation room

Patients admitted in labour department have to be prepared for labour and delivery. First labour patient will bring in this room. The patient receives a cleansing bath, is shaved and given an enema before being sent to the labour room. The preparation room should be located in the labour delivery suite (means whole complex of delivery labour area), but should be away from the labour and delivery area. The reason is patient in the preparation room should not be disturbed by loud sound (scream voice) of a patient in the labour or delivery room. The room must have facilities of examination table (for carrying out procedure), washbasin, kit for giving enema and preparation tray. Also one locker is desirable for putting patient's cloth.

Labour room

Before going for delivery, patient is kept in the labour room. This is the first stage of the patient, before delivery time, she is kept in the Labour room, from the time the pains commence till she is ready to be moved to the delivery room.

Many times in emergency patient get delivery in the labour room only. Hence the labour room designed in such a way that it can serve as a delivery room in case of emergencies. It is recommended that it should be a single room and size of the labour room preferably 18' X 18'. They provide greater privacy for the patient and permit the father to visit during labour.

The labour room should not be too far away from the delivery room, but till not too close to it. so as for the two rooms not to appear as if they are a single room. Otherwise, patients would be able to have a know of the going ons in the delivery room, before their turns to deliver their babies. It is advisable that both rooms should be made sound proof because of their noisy nature, when compared to the other parts of the hospital.

Toilet and washbasin should be provided in the room. There should also be extension lights to allow for proper examination of the patients. A clock with provision for counting in seconds should is required. The door should be 4' wide so that bed or stretcher would be able to go inside easily with the attendant. There should be a provision for oxygen, suctioning and compressed air outlets, nurse call system and lighting controls on each bed. And there should also be a side locker attached to the bed.

Delivery room

This is a hospital room specially equipped for the delivery of pregnant women. It is similar in design to the operating room. A delivery room will accommodate one patient at a time. There is operating OT light and also one examination light required. There should be a toilet attached with an exhaust fan and a hand washing sink and scrub facility also provided. This area should have; baby receiving trays, warmer, suction, oxygen and other resuscitating facilities like an Ambu bag. One buzzer system is also provided. The minimum size of the room is 18' X 18'.

It is strongly recommended that there should be an operating room in the department where major obstetrical surgeries are performed.

Operating room

The Operation theatre suit is a complex workshop and the most important facility of the surgical department. Cleanliness must be kept and the safety of facilities, equipment and devices must be maintained at all times. Nowadays, modular operation theatres are becoming more popular in use, so it is necessary to control Operation Theatre (OT) air in respect of temperature, humidity and particulate matter content of air, micro-organism i.e. bacteria, viruses, fungi etc.

Air handling systems process air through various stages. Air is cooled, moisture is removed, air is filtered to remove dust particles, bacteria, viruses, etc.

Laminar Air Flow (LAF) is the flowing of non-turbulent air flowing in parallel lanes vertically arranged. LAF is filtered air coming over the operative area from diffuser plenum above it. Plenum also works as a light source above operative area; it has CFL/LED light inside which provide clear shadow-less light over the operative area.

It is necessary to maintain particular air velocity in LAF so that filtered air coming over operative area carries bacterial load away from it. According to international standards, it should be between 90 - 120FPM (feet per minute). Highly clean air of LAF falls in CLASS 100/ ISO 5 Category.

Air handler has 5 filtration stages in total; First, 10 micron pre-filter, second, ultraviolet (UV), third, 5-micron fine-filter, fourth, gas-phase filter (optional) and finally 0.3 micron HEPA Filter (The air will pass through High Efficiency Particulate Air filter called HEPA Filter). Four out of the five filtration stages are fitted in the air while the last stage, i.e. HEPA, is fitted in the plenum above operation area.

Also, in Operation Theatre (OT) positive pressure has to be maintained in such a way that the outside air coming into the OT (Operation Theatre) is free of bacteria and dust.

In Modular OT, there is full air-conditioning alongside filtered air supply. Cool filtered air comes through HEPA filter, which is 0.3 micron in diameter, in Air Handling unit (AHU).

Scrub area

Two scrub positions must be provided near the entrance to each room. A scrub area with three scrub positions may be enough to serve two delivery rooms if they are adjacent.

New-born care area:

1. Labour Room should have a New-born Care Area (NBCA). The NBCA should be an area within the labour room rather than being a separate enclosure attached to the labour room.
2. The NBCA should be situated in a way that there is no obstruction between the labour table(s) and the NBCA and any child needing resuscitation can be shifted there within 5 seconds.
3. The NBCA should have the following:
 - a. Radiant warmer.
 - b. Resuscitation kit with functional bag and mask.
 - c. Mucus extractor.
 - d. Pre-warmed baby receiving towels.
 - e. Shoulder roll.
 - f. Paediatric stethoscope.
4. The radiant warmer should be placed in a way that it has free space on three sides.
5. There should be a clock with seconds hand on the wall near the NBCA.
6. There should be an oxygen /oxygen concentrator in the vicinity of the NBCA.

Clean utility room

There should be a clean utility area for storing autoclaved supplies and other clean utility items.

Dirty utility room

There should be a dirty-utility area for storing used and dirty re-usable supplies and other items.

Sterile supply room

Here sterilized packs, drums and disposable, dressing materials etc. are stored for use during delivery or other operations. The racks should be provided for the storage of these items.

Pre-operative holding room

The preoperative (also referred to as pre-op) unit is where patients are prepared for surgery. Also sometimes called "Preoperative" Unit and surgery preparation. In the preoperative room, the pre-op nurse plans the necessary procedure for pregnant woman.

Recovery room

The recovery room, also called a post-anaesthesia care unit (PACU), is the place a patient is taken to after surgery until they fully regain consciousness from anaesthesia and receive appropriate post-operative care.

The number of bed, in the recovery room, depends on the size of the hospital and operation theatre. All post-partum patients are watched by the nurse or the doctor, for at least six hours after delivery for any sign of delayed haemorrhage. Here, patients are placed under close observation.

Each recovery room has two or more beds and a nursing station, and also provided with a toilet facility.

Doctor's lounge

The doctor's lounge is the meeting place for doctors. It is place where only doctors could go to, to discuss medical cases and share experiences from their daily medical practice. It is the place for relaxation after delivery or surgery. The room is designed with toilets attached.

Nurse lounge

This will serve as a place of relaxation for nurses after delivery or surgery or heavy schedules.

Anaesthetic store

It should be designed to facilitate cleaning, testing and storing of anaesthesia equipment. It should contain work benches, sink and rack for other storage.

Linen room

This is the room where all necessary linen-like gowns, caps, bedsheets etc. are stored before use.

Staff lockers room

This will be the changing room for staff, with toilets provided for their use. There should also be separate lockers for their clothes and other things.

There should also be a shoe rack for shoes and where shoes used in the labour room are also kept.

Doctor's locker room

Doctors' locker room should also be provided separately for both male and female doctors with attached toilets. There should also be a shoe rack for their shoes and the shoes to be used in the labour room.

Equipment store

In the delivery room and operating room, there is much medical equipment required as standby. Many types of equipment are stored in the equipment room. The room is located in the delivery complex only.

All the above-mentioned rooms are designed as per requirements: the more the number of the OT, the more the number of the supporting rooms needed. So it is necessary to know the estimated size of the proposed hospital for the proper design of the total hospital complex to be possible.

Neonatal ICU (NICU)

The process of delivering a baby is interesting as well as complex. A baby has to make many physical adjustments to life outside the mother's body, since after birth, the baby's bodily functions will now be done independently of the mother's body. Sometimes, a baby may

have a difficult delivery, or birth defects which will further make these adjustments more challenging. For such babies, special new-born care has to be made provided for them. Those new-born babies that need intensive medical attention are often admitted into a special area of the hospital called the Neonatal Intensive care Unit (NICU). The NICU combines advanced technology and trained healthcare professionals to provide specialized care for babies.

Location: The NICU shall be in close and controlled proximity to the area of the hospital where delivery of babies takes place. It should be on the same floor or close proximity to a lift.

The followings should be considered in designing the NICU.

Space Required: Each infant requires a space of about 120 sq.ft. of floor space. The room is totally closed and the total space will be at least 10% to 15% of total hospital bed strength. Minimum width is to be considered 8'. Only duty nurses are given free access to this room.

There should also be an isolation room to control the influx of airborne infections into the NICU. The minimum required area of this room should be 150sq.ft. A hand free handwashing station for hand hygiene and area for gowning and storage of clean and soiled materials shall be provided near the entrance to the room. Ventilation systems for isolation rooms shall be engineered to have negative air pressure with air 100% exhausted to the outside and shall meet acoustic standards for infant rooms.

Airborne infection isolation room perimeter walls, ceiling and floors, including penetrations, shall be sealed tightly so that air does not infiltrate the room from the outside or from other airspaces. An emergency communication system and remote patient monitoring capability shall be provided within the airborne infection isolation room.

There will be feeding room adjacent to this where mothers can feed their babies. A wash basin will be placed near the entrance for doctors and nurses to wash their hands before entering the room on each visit.

A glass screen will be provided through which mothers can see their children from outside. The permissible noise level in the room shall be between 45 db to 50 db.

Electrical, gas supply, and mechanical needs

Each bed will have bedhead panel containing Electrical plug and gas outlet. There will be 6 electrical outlets and working on normal supply as well as on Uninterruptable Power Supply (UPS). The minimum no. of accessible gas outlet is:

- Air 3
- Oxygen 3 and
- Vacuum 3.

Ambient temperature and ventilation

The NICU is designed for ambient temperature between 72°F to 78°F (22° - 26°C) and relative humidity of 30 - 60%, while avoiding condensation on wall and window surfaces.

A minimum of 6 air changes per hour is required, with a minimum of 2 changes being outside air.

Lighting in infant care areas

Ambient lighting levels in infant spaces shall be adjustable from 10 to 600 Lux's.

Clean utility

Clean utility room or space is required for storage of clean linen or disposable. They are from "Central Sterilization and Supply Department (CSSD) or fresh one.

Dirty utility

Space or room require for used things as well as dirty utility. A closed room is desirable, from which dirty linens can be taken for laundry and disposable.

Staff support space

There must be a separate room for staff with lockers and toilets provided.

Below is the general specification for NICU.

Patient ward and rooms

The patient area, which may consist of private and semi-private rooms and multi-bed general wards, is designed to be a safe and aesthetically pleasing treatment area that is conducive to specify recuperation. It must contain space for equipment, staff and the various needs of the patients. The nurse control station provides workspace for the nursing staff.

The responsibilities of obstetrical nursing service include prenatal care, observation and comforting of the patient in labour, providing assistance in the delivery room, care of the mother after delivery and care of the new born. The nursing care of the infant is carried out at the bedside of the mother by the nurse who makes each procedure a lesson for the mother.

Location

The rooms or ward should be as close as possible to the labour delivery suite. It should also to the nursery and the vertical transport system.

Design

The size of the nursing units varies. The optimum size of a general nursing unit is governed primarily by the number of patients and nursing staff that the nurse in charge of the unit can manage efficiently. It should be planned on a standardized modular grid. It should harmonize with the functional requirements of treatment and technology as well as patients physical and emotional needs.

Specifications

The followings are some of the recommendations for the design of the room:

- The minimum distance between the centre of beds should be 2.25m (7.38ft), space at foot end should be -0.90mt (2.9ft) and recommended space at the head end is 0.25m (0.82ft).
- Electrical outlet should include reading light, nurse call button, and night light. Additional outlet for cleaning equipment and portable X-ray should also be provided.
- The nurse station should be located as centrally as possible to the activities of the unit and provide optimal visibility of the patient.
- The toilet door should be possible to open from outside only.

Lighting

The in-patient department should have glare free lights. Illumination should be as follows:

- General illumination: 150-200 lux
- Nursing station illumination: 300 lux
- Examination illumination: 500 - 750 - 1000 lux.

Central sterile supply department (CSSD)

The sterile instruments and other surgical consumables are the most important necessities of any hospital. This department is highly essential in any big hospital that worth its salts. It is from here that sterile instruments are centrally supplied to all parts of the hospital. This will provide an efficient, economic, continuous and quality supply of sterile materials to various areas of the hospital with the ultimate objective of ensuring high quality patient care.

Functions and activities

These include the following processes:

- Receiving of the materials like instrument, dressings and other specialized items for processing.
- The cleaning of the received material either manually or by machine like an ultrasonic cleaner, jet glove washing machine, washer disinfectors, anaesthetic tubing washer and dryers. This function may also include the cleaning of the trolley.
- This is where after check process is done; to look out for any breakage in glass items, the sharpness of needles and instruments etc. Broken articles are separated. Materials for sterilization are then separated into sets and packed for sterilization.
- Then all packages are put in the sterilization machine and times are set on the sterilization machine depending on the materials to be sterilized.
- The materials are then stored in a storage rack after they are removed from the sterilization machine.
- The materials, after the completion of the sterilization process, are then issued and distributed to departments where they are needed.

Designing of the department

The space requirement depends on total beds of the hospital and other factors such as number and type of sterilizers installed. Normally thumb rule for space required is from 0.7 to 1m².

The location of CSSD should be such that it is as close as possible to the major user areas, such as the operation theatre, ICU, Delivery room etc. In multi storage building the CSSD department may be connected with the dump elevator.

The design of the space will be as follows:

- Receiving of the material area and decontamination area.
- Assembling area for making packs for instrument set of trays etc. Here there is also a linen pack area with an inspection table.
- Glove processing area.
- Gauze cutting area.
- Area for storage of above mention items before autoclaving.
- Sterilization room equipped with sterilization machine. There are many types of sterilization machine and so, they are selected based on the specific requirements of the hospital.
- A sterile store should be provided.
- Supervision room.
- Issue counter.

Medical gas pipe line

Medical gases: Oxygen, clean air, nitrous oxide for anaesthesia, and suction for the patient are very important and lifesaving necessities in the hospital and the most important adjuncts to clinical services. They should therefore, never be in short supply in the hospital.

It is very important that the place for the storage of these medical gases are carefully selected, having in mind good ventilation and fire hazards. The selected location should have considerations for easy accessibility to delivery vehicles and transportation of cylinders. When gas cylinders are kept indoors, then it must be such that they are kept away from the patient area, kitchen area, and any location where flammables and generating sets are kept. The temperature should not be more than 54°C (130°F). There must be a separate emergency supply of cylinders and a caution sign 'Medical Gases', 'No Smoking' or 'Open Flame'.

According to the provisions of Static and Mobile Pressure Vessel rules 1981; provision should be made for adequate water supply in the storage area as per local fire service regulation. The hydrants should be accessible and control of water pressure should be possible from outside the danger area. Sufficient hose length should be provided, with outlet equipped with a combination jet and fog module.

Bulk liquid system is used for hospital having more than 200 beds.

Hospital store

General: Hospital store comprises of stores needed for various hospital functioning and should be grouped centrally in the service complex. The area for each type of stores should be utilized to the optimum by providing built in shelves at different heights according to the type of stores. Adequate ventilations and security arrangement shall be provided. The Store should also be provided with fire- fighting equipment. A cold storage area within the medical store for storage of medicines shall also be provided.

Types of stores:

- Medical and drug stores: This stores various types of drugs etc.
- Surgical Store: This stores surgery utilities such bandages, gauze, sutures instruments, rubber goods, glass items, cotton and general surgical items.
- Machinery and equipment stores: This deal with procurement and maintenance of machinery and equipment.
- General Store: Items such as cleaning materials like soaps and detergents, ward/general furniture, small electrical items and so on are stored here.
- Linen Store: Linen stores include clothing items for patient care and staff. Also stores woollen articles and furnishings.
- Stationery stores: all the stationery items including medical forms and papers for medical documentation are stored here.

Space requirements for hospital stores depend upon the number of beds, disciplines/departments in the hospital, level of care, and access by supplies. In large hospitals, there will be sub stores also in department like OT, ICU etc. The minimum space requirement of such store should be 20 m² and furnished with shelves, storage racks and refrigerator.

Canteen (catering department)

In a modern hospital this department is very much important. Good food is important in the treatment of the patients and is a part of their total care. Only professionals can run this department.

Location: Canteens are mostly situated in the basement or ground floor.

Functional areas will be designed as follows:

1. There should be receiving area of food supplies like, grains, milk, vegetables etc. Which must be a separate entrance from the main hospital entrance.
2. The store where these food supplies are stored must be close to the receiving area, for easy and proper storage of these items. There must be sufficient racks of different sizes. There should also be a space for refrigerators with varying degree of temperature for the storage of perishables such as meat products, dairy products and vegetables.

3. Then the food preparation area is next. Here sufficient space is required. In this area; sorting, peeling, slicing, chopping, mincing and kneading are done. This area should be sited between the storage and the cooking areas.
4. Cooking Area: This area will require cooking ranges, bulk cookers, baking ovens and frying equipment. The area is required to be located between the preparation and service area.
5. Service Area: In this area, prepared food is received and arrange into food trays. Here storage facility like cupboard, tables, refrigerator for storing tray, prepared food, cutlery etc. is provided.
6. Food distribution: A cart distribution system should be provided with space for storage, loading, distribution, receiving and sanitizing of the food service cart. Trolley- washing area should be provided.
7. Dishwashing area: Automatic dishwasher should be installed properly as per the work load, Stainless steel sink with water facility should be provided. Also there must be rack for storage of these items after cleaning.
8. Garbage disposal: Provision should be made for wet and dry garbage storage for disposal outside.

Other things are to be considered

- The area should be properly ventilated and proper lighting should be arranged.
- There should be steam supply.
- LPG gas supply must be arranged.
- Fire protection.
- Hot and cold water supply where it is necessary.
- The Internal door should be with a window to avoid an accident.

Dining Room

Most of the hospital also provide food to non-patient and non-patient areas, such as the hospital staff visitors and patient bystanders. Following factors should be considered:

- There must be separate sitting arrangement for medical staff, VIPs and other staff.
- There are two types of services, one is self- service and 2nd is table service.
- Also there should be provisions for vegetarian and non-vegetarian diets and a separate kitchen may have to be provided for their preparations.
- Size of the dining room is once again depended on a number of beds and staff. Also we have to take into consideration, the time duration of the full meal.
- Method of cleaning table: For where self-service is provided, a person saddled with clearing the tables and cleaning should be provided.

Dietitian

One dietitian is required who will decide the food given to patient. Sometime dietitian has to ask patient history and then he/she will decide the most appropriate food to be given to a particular patient.

All the points mentioned above are considered when designing the department.

Administrative office

Administrative department is highly needed in running any hospital. The main duties, of this department, are to plan, direct, coordinate and supervise the delivery of healthcare. The unit is involved in recruiting, hiring, and training the doctors, nurses, interns and other technical and administrative staff. They also plan a budget and make development policies and guidelines.

Location: Location should be close to the main hospital entrance but with separate departmental entrance. Most times, this department is preferably located in the basement of the hospital.

The design of the administrative office should include the following offices and sub-departments:

- Chief executive office
- Directors office
- Account department
- Marketing department
- Meeting and conference Room
- Store room for stationary and other related items
- Pantry
- Toilets for male staff and female staff
- The waiting area for visitors
- Server room
- Chief security officer room.

Engineering section

The engineering department provides highly specialized services which can only be provided by specialist engineers. The engineering and maintenance department are responsible for ensuring safe and economical operation and maintenance of hospital facilities and expensive equipment. The department should be capable of providing technical and management support to hospital administration.

The followings are the functions of the engineering section:

- Plant operation and maintenance
- Building operation and maintenance
- Mechanical and electrical maintenance
- Biomedical equipment and electronics maintenance
- Elevator maintenance
- Plumbing, water supply sanitary system maintenance
- Solid waste disposal and incinerator
- Communication system and maintenance
- Fire-fighting equipment maintenance.

The ideal location for the engineering and maintenance department is on the ground floor close to the lift. The storage area for ground maintenance equipment should have an outside entrance. Some of the activities of the engineering and maintenance department are noisy and unpleasant to watch. They should be isolated and screened from the patient care areas so that they will not disturb quietness of the patient care area and not hinder provisions of critical hospital services. A basement location or a place away, opposite in direction to the patient room is the most ideal.

The following offices and rooms should be provided at the engineering section:

- Chief Engineer's office with space for storage of protected drawings, records, manuals etc.
- Office for assistance to the engineer.
- Central electrical Room attached to the electrical engineer's office.
- General maintenance workshop for repairing of equipment and other things.
- Sub store for storing spare for repair.
- A separate workshop for biomedical equipment and instrument with biomedical engineer workshop.
- Sanitary storage and disposal of solid waste or its removal.

All the above mentioned are the general requirements of the engineering department, but what would be included in the design will depend on the size of the hospital; taking into considerations, the number of beds etc.

All the above mentioned specifications are essential for the plan of the physical structure of any well planned gynaecological hospital [1-3].

Conclusion

The design of gynaecological hospital is complex. So many parameters are to be kept in mind to ensure a good design. This article describes general design parameters to be considered in the design of any gynaecological hospital but a deeper perspective to this is needed in the actual design of the hospital, especially in the areas of the actual space requirement, equipment planning, electricity planning, gas pipeline design etc.

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