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PLANNING & DESIGNING OF SPECIALTY HEALTHCARE FACILITIES



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Sunil Kant
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JAYPEE

CONTENTS

1. **Burns and Reconstructive Surgery Center** 1
   Rakesh Verma, Ravi Prakash Narayan, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
2. **Birthing Center** 7
   Pankaj Arora, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
3. **Assisted Reproductive Technology Facility** 21
   Sheetal Singh, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
4. **Mother and Child Health Center** 38
   Parmeshwar Kumar, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
5. **Organ Transplant Center** 56
   Diwakar Thimmappa, Sandeep Guleria, Aarti Vij, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
6. **Catheterization Laboratory Facility** 69
   Rajesh Harsvardhan, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
7. **Cardiothoracic and Vascular Surgery Center** 75
   MM Singh, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
8. **Oncology Center** 90
   AS Rana, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
9. **Nuclear Medicine Facility** 109
   Neeraj Garg, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
10. **Palliative Care Facility** 116
    Maneesh Rathee, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
11. **Biosafety Laboratory** 124
    Dinesh Negi, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
12. **Clinical Decision Making Facility** 135
    Anil Sain, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
13. **Geriatric Healthcare Facility** 143
    Jitender Mehta, S Satpathy, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
14. **Rehabilitation Center for Locomotor Disability** 156
    Jitesh V, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
15. **Trauma Care Facility** 166
    Angel Rajan Singh, IB Singh, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
16. **Mobile Health Unit** 175
    Saroj Kumar Patnaik, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
17. **Renal Disease Center** 186
    Priti Goel, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar
18. **Dialysis Facility** 204
    Jitender Sodhi, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

19. Critical Care Unit **218**
Pankaj Arora, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

20. Isolation Facility **223**
Kumari Shweta, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

21. Spinal Injury Center **235**
Sudhin Kurien, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

22. Center for Hepatobiliary Diseases **247**
Sunil Verma, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

23. Endoscopy Unit **259**
RY Asangi, Pramod Garg, Aarti Vij, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

24. Integrated and Hybrid Operating Room **265**
Vijaydeep Siddharth, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

25. Endocrinology and Metabolic Facility **281**
Shilipi Verma, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

26. Respiratory Medicine Facility **295**
Surajeet Kr Barua, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

27. Sports Injury Center **304**
Anki Reddy Jangamreddy, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

28. Facility for Nanomedicine and Nanotechnology **326**
Uma Shankar Garg, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

29. Stem Cell Facility **336**
Sapna Ramani, Sujata Mohanty, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

30. Facility for Robotic Surgery **347**
Mukunda Chandra Sahoo, NP Gupta, IB Singh, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

31. Sleep Center **356**
Saroj Kumar Patnaik, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

32. Neurosciences Center **361**
Arvind Kushal, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

33. Gamma Knife **379**
SK Dutt, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

34. Mental Health Facility **392**
Laxmi Tej Wundavalli, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

35. Chemical, Biological, Radiological and Nuclear Facility **405**
Meeta Tyagi, Sudharshan Kumar, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

36. Ophthalmology Center **420**
Parmeshwar Kumar, Kanika Jain, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

37. ENT, Audiology Clinic and Speech Therapy Center **449**
Vijay Kumar Tadia, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

38. Center for Cosmetic Surgery **462**
Sanjeev Sood, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

39. Wellness Center **466**
Shalini Kumar Bhalla, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

40. Green Hospitals **487**
Vijay Kumar Tadia, Dibakar Rakshit, Biplab Kumar, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

41. Smart Hospital **494**
Mohd Kausar, Vijay Kumar Tadia, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

42. Telemedicine **505**
Rajiv Kumar Pathni, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

43. Center for Dental Services **511**
Pawan K Singh, Balakrishan Jayan, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

44. Lighting in Hospitals **518**
Neeraj Garg, Sunil Kant, Shakti Kumar Gupta, R Chandrashekhar

45. Building Management Systems **538**
Vijay Kumar Tadia, Shrish Kumar, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

46. Lean Healthcare Facility Design **548**
Vijay Kumar Tadia, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

47. Urgent Care Facility **558**
Vijay Kumar Tadia, Rajesh Gupta, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

48. Bariatric Surgery Facility **569**
Kanika Jain, Samarpita Dutta, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

49. Hospital Management Information System **576**
Vijay Kumar Tadia, Shrish Kumar, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

50. COVID-19: Planning Premises and Design Considerations for Healthcare Facilities **598**
Khalid Mehmood, Saroj Kumar Patnaik, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

51. Laws Applicable to Hospitals **629**
Khalid Mehmood, Sunil Seth, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

Index **635**



CHAPTER 4

Mother and Child Health Center

Parmeshwar Kumar, Shakti Kumar Gupta, Sunil Kant, R Chandrashekhar

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INTRODUCTION

The special bond that a mother and her child share right from the womb continues, even as the umbilical cord gets severed at birth. While the health of the community is intimately linked to that of the female, it is also noteworthy that the women and children form a substantial and vulnerable group of society. Recognizing this, the Government of India has launched the *Reproductive and Child Health* initiative which is currently in its second phase. The main objective of the program is to bring about a change in three critical health indicators, i.e. reducing the total fertility rate, infant mortality rate and maternal mortality rate.

FUNCTIONS OF THE FACILITY

The aim of the mother and child health facility would be to act as a center for excellence in caring for the health of women and children including neonates and adolescents. Following are the objectives of the facility:

- To provide comprehensive care in obstetrics including assisted reproductive therapy
- To cater to patients with gynecological conditions but excluding malignancies
- To provide complete medical and surgical care to pediatric patients
- To address problems related to the adolescent population including their mental health
- To act as an advanced center for imparting education and research in the field of pediatrics, obstetrics and gynecology.

GENERAL PLANNING CONSIDERATIONS

Stack Diagram of Mother and Child Center

Stack diagram may be designed as a six storeyed structure shown in Figure 1.

OUTPATIENT SERVICES

Special Planning Considerations

The important factors are:

- OPD should be at the ground floor and must be accessible from the main center entrance. It should be integrated with the IPD physically, functionally and from the clinical and administrative points of view.
- Signage should be scientific.

Entrance and parking: The space around the entrance has to be slip free and sized to allow the simultaneous setting down or picking up of patients from two cars. Multilevel car parking is desirable.

Special Design Considerations

Public Area

In the OPD, the waiting spaces for pediatric and adult patients should be separate. Creative waiting areas should be provided for pediatric patient (Fig. 2) Subwaiting areas in the immediate vicinity of various clinics should be provided.

- Lobby and lounge to provide seating.
- Multipurpose room(s) for conferences, meetings, health education programs, etc.

Clinical Facilities

General purpose examination rooms—minimum floor area 7.43 sqm (80 sqft) excluding vestibules, toilets, closets, etc. Wash basin and a counter top for writing. At least 80 cm (30 inch) clearance on either side and at the foot end of the examination table.

Ancillary Area

Public conveniences: Separate for males and females with 1 per 50 patients. At least one toilet must be there for the disabled and children.

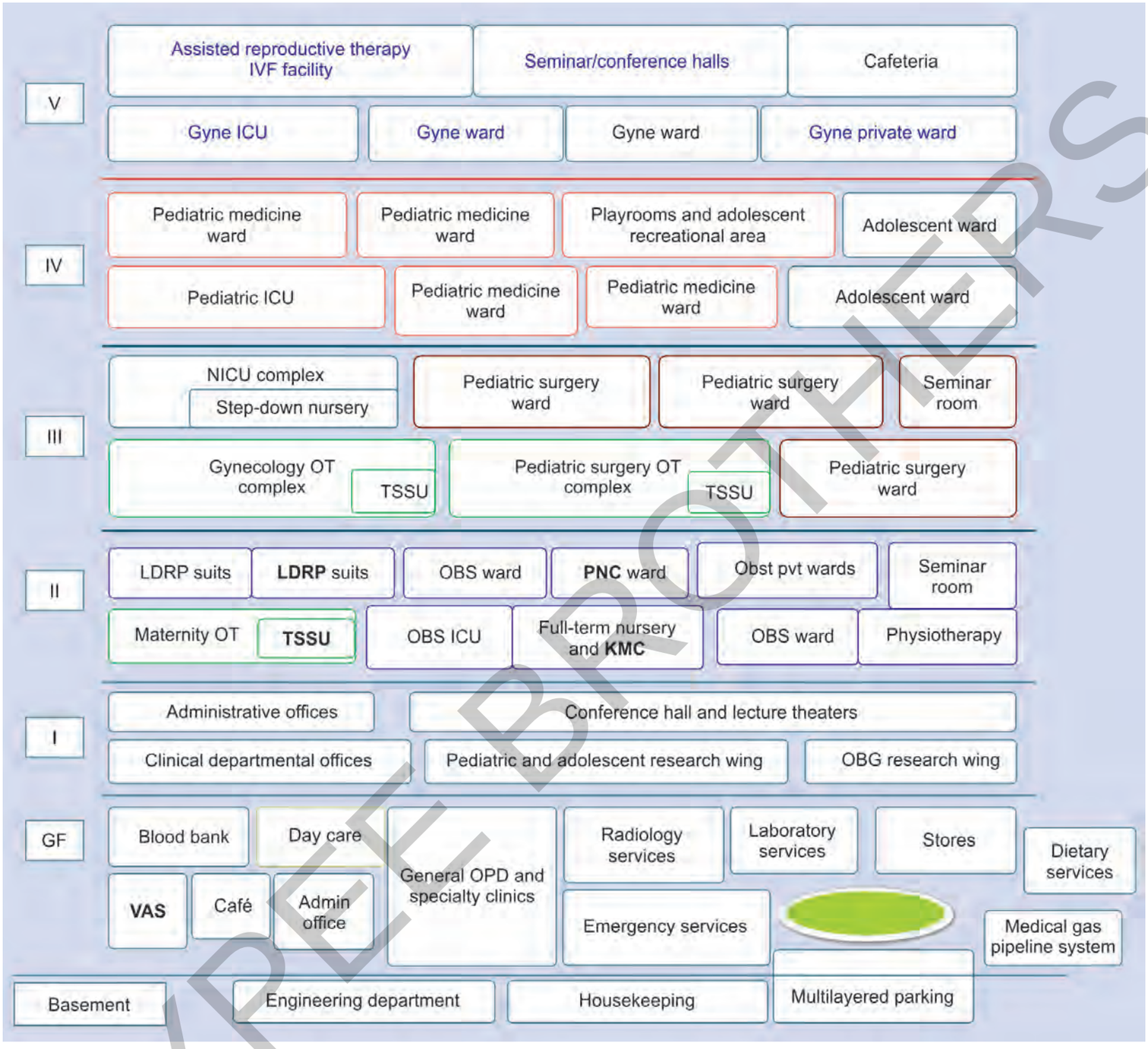

Fig. 1: Stack diagram of mother and child center.
(TSSU: theater steriple supply unit; LDRP: labor delivery, recovery and postpartum; KMC: Kangaroo mother care; VAS: value added services; PNC: postnatal clinical)

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- Coffee shop/snack bar in the vicinity
- Gift shop. Best location is off the lobby in a conspicuous location with adequate display space
- Meditation room/retiring facility—for meditation or for use by anxious or bereaved relatives.

OBSTETRICS AND GYNECOLOGY

The OPD should have the following services:

- Antenatal clinic
- Postnatal clinic
- ART/IVF clinic
- Genetics
- Physiotherapy/Exercise service
- Counseling services
- Immunization services
- MTP clinic
- Gynecological clinic
- Postoperative clinic
- Cancer screening and colposcopy
- Ultrasound clinic
- Family planning clinic.



Fig. 2: Creative waiting areas for the pediatric patients.

Design Considerations Special to Gynecology and Obstetrics

- Entrance should have ramps, with door width being 1.8 m and likewise for steps.
- *Waiting area*: Antenatal clinics usually have a heavy load of patients. To reduce the waiting time and crowding in the facility, *appointment system* should be followed
  - Waiting area should have piped or otherwise soft music which while not hampering the functioning of the OPD would serve to allay the anxiety of the pregnant women.
  - Alternatively, it should also have *television programs* related to antenatal and delivery, family planning.
  - *Space requirement*: An *area of 0.5–0.8 sqm* per patient.
- *Consultation chamber*: Depending upon the expected workload, the number of consultation rooms may be planned:
  - Each consultation room should have a partition or an anteroom where the expectant mother can be examined in privacy.
  - A consultation room should have a couch, furniture for the consultant/residents and the patient, cupboard for documents, the relevant instruments, examination lamp and an ultrasound machine.
  - *Space requirement*: A consultation room requires an area of 14 sqm including the examination room and toilet.
- *Physiotherapy room*: A room with at least 4 couches and instructors tables should be provided for antenatal and postnatal programs.
- *Counseling room*: This is required for the parents pregnancy counseling and consent for preoperative patients.
- *Immunization facility*: For routine immunization, injectable preparations and immediate post-delivery injections to be given to the newborn.
- Nonstress test/fetal cardiotocography: An area/room for NST must be provided in the OPD.
- *Reception and registration*: A counter at the entry should be present to help the patients. One desk per 20 patients should be provided. Counter should be 100 cm high and 60 cm wide.
- Medical records section should be adjacent to the registration office within the complex. Alternatively, electronic medical record (EMR) system may be used to make the entire MRD paperless.

EMERGENCY SERVICES

Special Physical Facilities and Space Requirements

Access to Emergency Department

The directional signs to the ED should be unmistakably marked and clearly visible, day and night. Weatherproof fittings and accessories should be used in all external situations. Per 100,000 annual visits about 6 parking spaces should be provided in a nearby parking lot.

Space requirement: The thumb rule for total special need is— a daily patient load of 100 patients requires about 1,000 sqm.

Public Area

- *Stretcher, trolley, wheelchair store*: A trolley, stretcher, and wheelchair store or bay should be located immediately adjacent to the entrance. Usually, a wheelchair per about 800 annual visits is needed. Stretchers should, be sturdy and provided with wheel-locks.
- Separate waiting area for emergency patients and relatives, for accompanying children a separate waiting area should be provided. A pram bay of about 6 sqm is needed.

Administrative Area

- There may be a requirement of an ambulance attendants, police and a mass media room.
- A room of about 10 sqm near the entrance hall equipped with a desk, chairs and telephones may serve the purpose.

ADMITTING DEPARTMENT

Location

- It would be adjacent or close to emergency service, outpatient department, medical records, laboratory and radiology.
- As obstetric patients may sometimes require immediate care in areas quickly reached by elevators, the department would be located near the main vertical circulation of the hospital.
- The admitting department should be contiguous with the hospital's main lobby as well as the main waiting area of the outpatient department.

PLANNING AND DESIGNING OF NURSING SERVICES

Certain features common to nursing units are enumerated in Figure 3.

GENERAL NURSING UNIT: ADULT

Location

Nursing units have a close relationship with the operating rooms, pharmacy, central stores, laboratory and the dietary. In maintaining this relationship, they are highly dependent on vertical transportation and an efficient communication system (Fig. 3).

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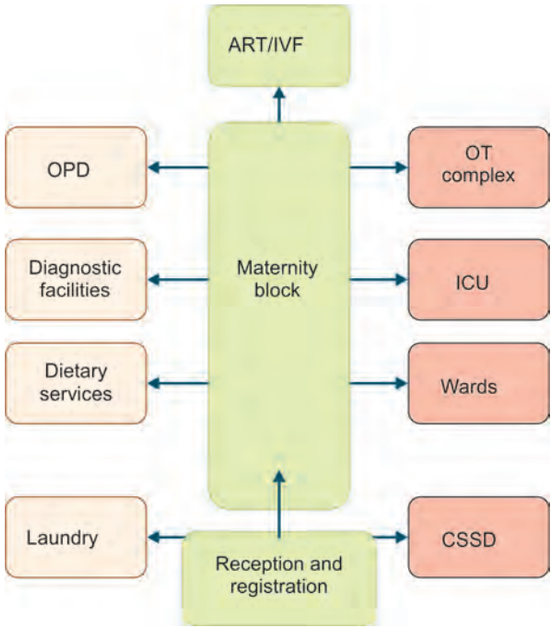

Fig. 3: Functional relationship of the components.
(ART: assisted reproductive technology; IVF: *in vitro* fertilization; CSSD: central sterile supply department OPD: outpatient department; OT: operation theater; ICU: intensive care unit)



Fig. 4: Private ward should be segregated as for the floor plan—The obstetric private ward on the same floor as the labor room and maternity OT.

Design (Fig. 4)

- The most common size of a nursing unit is between 20 and 40 beds.
- *Double corridor*: A double corridor system in which a nursing floor with double corridors resembles a racetrack, is widely used.
- The nurses' station, utilities and supply rooms, treatment and procedure rooms, doctors' rooms, etc. are located in the central core.
- Patient rooms are situated outside the track.
- Double corridors not only serve to shorten horizontal travel and save steps, they also facilitate patient segregation.

Patient Rooms (Fig. 5)

- Paying patients may use the two-bed rooms, dimensions of which would be a minimum of 15 sqm in size and provided with cubicle curtains for visual privacy.



Fig. 5: Patient rooms.

- The four-bed rooms should have a minimum floor area of 30 sqm.
- There should be sufficient space between the beds, and between the bed and the wall to allow the nurse and equipment to pass.
- The patient room toilet should be provided with a grab bar, an emergency call button within easy reach, and a flush valve for bedpan cleaning.
- Bed should have a built-in wardrobe and the regular furniture. Doors should open outward towards the corridor with an outside lock.
- The height of the window-sill should not exceed 0.9 m to allow the patient an outside view.

The Nursing Station

Facilities and Space Requirements

It must be proximal to the elevator, stairway and the corridor. In addition to facilities like patients' rooms, nurses' station, etc. the following additional facilities are also required:

- Examination and treatment room with wash basin, counter, shelf, etc.
- Clean workroom or clean holding room.
- Soiled workroom with clinical sink, work top, waste receptacle, etc.
- Clean linen store.
- Equipment storage room.
- Recessed space for storing stretchers and wheelchairs.
- Staff facilities such as lockers, etc. for staff's personal effects.
- Pantry with sink, work top, storage cabinets and space for temporary storage of dietary trays.
- A multipurpose room for staff and patient conference, education, demonstration, etc.

DAY SPACE

- Solarium—a day room. The room should have large windows, a table, individual seating, magazine and bookracks, storage cabinets, emergency call button connected to nurses' station, etc.

PEDIATRIC UNIT

General Planning for Pediatric Wards

Playrooms and outdoor play areas for children must be provided (Fig. 6). The playrooms would be in the sunny areas accommodating

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Fig. 6: Playroom.

about 25 children. It would be furnished with low stationary tables and child sized chairs.

Location

The pediatric nursing unit is generally noisy. It should therefore be located in a quiet area, away from the main stream of hospital traffic, ensuring natural sunlight into the rooms, and if possible, adjacent to an enclosed terrace which may be used as a play area.

Unique Design Requirements

This unit has some special requirements besides those mentioned above, these are:

- In view of the size variation and the need to change from cribs to beds, and vice versa, space provided for cribs should be the same as for the beds.
- Minimum floor area for a one-bed room be 10 sqm and for a two-bed room 15 sqm. Recommended areas including space for working around the patient and moving beds and stretchers are 12 sqm for single rooms and 18 sqm for two-bed rooms.
- Every pediatric nursing unit should have its own nurses' station, preferably situated centrally within the unit. As a general rule, rooms designed for the use of the sickest patients and for young infants should be nearest the nurses' station.
- It is essential that each pediatric unit be provided with one or more isolation rooms for patients with known or suspected infection. The room should have only one bed and should have an anteroom with gowning and masking facilities, sink with hand washing facilities without the use of hands, foot-operated waste receptacle, and small cabinet for clean gowns, masks, etc.
- At least 25% of the beds should be in single rooms for critically-ill patients for those who are disturbing to other patients.
- A recreation room/playroom should be provided for group activities and recreation. This room should serve as a playroom for the younger children, for games, occupational therapy and school work for the older children, and a social room and library for the adolescents. The room should be so designed structurally as to minimize the transmission of noise and impact through the floor, walls and ceilings.
- Walls between patient rooms and the corridors should have clear glass panels so that children can see activities around them, and nurses can see the children easily.

NEWBORN NURSERIES (FIGS. 7A AND B)

Traditionally, what was only a nursery has now given place to the concept of nurseries like the newborn, suspect (observation), premature, isolation, high-risk and intensive care nurseries.

Location

The location of nurseries is influenced by many factors such as especially trained staff, the advances made in the field and professional philosophy. This is particularly true of isolation and premature nurseries. The trend is to locate these in the pediatric service with the premature nursery as part of the neonatal intensive care unit (ICU).

- The nurseries should be close to the mothers in the obstetrical (postnatal) nursing unit.
- They should also be close to the labor-delivery suite so as to minimize travel distance and exposure of the newborn infants.



Figs. 7A and B: Preterm nursery.

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Design

The intensive therapy units have been designed predominantly for adults.

One ICU-bed for 20 pediatric beds, including subspecialities, has been recommended. It has also been assumed that the beds in pediatric intensive care units should constitute 6% of all beds in the pediatric clinic.

Recent evidence suggests that newborn infants are especially interested in face-like configurations. It is therefore important that planning premises be such that it can maximize parent-infant involvement. The following guidelines are to be used:

- The number of infants in each nursery should be limited.
- Separate bassinets by cubicle partitions to prevent crowding.
- Wide spacing of bassinets within each nursery should be allowed.
- The use of aseptic techniques and individual care and hand-washing facilities should be promoted.
- Optimum conditions of temperature, relative humidity and ventilation.
- Premature infants from infected infants or those suspected of infection should be separate.
- In a full-scale nursery, the maximum number of bassinets would be 12.

Some Special Design Elements and Facilities

Every nursery would contain the following in addition to those in regular ICUs:

- Glazed observation windows which allow the viewing of infants by visitors from the public areas and viewing by the staff from their workrooms.
- Provision for storing linen, nursery equipment and infant supplies
- Provision for storage of emergency carts and equipment out of traffic but at an easily accessible place.
- Mothers' room or area for breastfeeding with a table, infant scales and a rocking chair.
- Facilities for the preparation of infant formulas or milk mixtures with work counter, sink and a small refrigerator, refrigerated storage and provision for warming infant formula must be available at all times.
- A Kangaroo Mother Care (KMC) ward should be at close proximity to the NICU.

Full-term Nursery

The full-term nursery is intended for normal infants, and should be located in the postpartum nursing unit, as close to the mothers as possible. An area of 3 sqm per infant or bassinet is recommended exclusive of the nurses' station, with a provision for at least 0.9 m between bassinets and on all sides.

Observation Nursery

An observation or suspect nursery should be provided for infants suspected of infection. A minimum of 4 sqm per infant or bassinet is recommended.

Premature Nursery

The premature nursery is used for infants "born too soon" and "born too less". Premature infants need more specialized care. So the nursery should accommodate no more than five infants and would have a minimum of 4 sqm of space per incubator or bassinet.

OBSTETRICS NURSING UNIT

Location

- Ideally, the obstetrical unit should be located on the same floor as the labor-delivery suite and in close proximity to it.
- The unit should also be adjacent or close to the nursery to minimize the distance of travel and consequent exposure of babies between the nursery and the mother's room.
- The obstetrical unit should also be close to the vertical transport.

Facilities and Space Requirements

- Ultrasound scanning is a routine procedure during the antenatal period, a scanning room should be provided. Many obstetric patients prefer double rooms because of the social interaction they provide.
- A conference room is necessary for patient education programs and prenatal classes.

Isolation Rooms

Location

Isolation rooms may be located within the individual nursing units and placed at the end of the corridor. They should be available for normal acute care when not required for isolation cases. Isolation rooms may be grouped as a separate isolation unit.

Special Design Considerations

- Each isolation room should contain only one bed and would have all the facilities of the acute care patient room.
- Viewing panel(s) may be provided to allow staff to observe patients from the anteroom.
- Each isolation room should have a toilet, bath and hand washing facilities so arranged as to permit access from the bed without passing through the anteroom or the work area.

INTENSIVE CARE UNITS

Location

- ICUs should be in a centralized place and be close to the emergency department, labor room, operating rooms, recovery rooms, respiratory therapy, laboratory and radiology.
- The ICUs should not be too far away from the general nursing units. This will reduce to a minimum the movement and time required to transfer patients from one unit to the other, especially from the nursing unit to the ICU, in an emergency.
- ICUs should be located away from heavy traffic and noise. In deciding the location, the electrical influence of equipment like elevator motors and X-ray equipment on the displays of monitors would be kept in mind.
- Intensive care now encompasses many disciplines; it is recommended that a minimum of 5% of the total beds be designated to ICUs. However, for practical purposes, 10% may be a better figure considering a woman and child hospital.

Facilities and Space Requirements[1]

- The entrance door to rooms should be at least 1.2 m wide, for easy movement of beds and large equipment.

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- Rooms should be at least 12 sqm with free movable space surrounding the bed.
- Outlets should be no lower than 750 mm off the floor.
- In the non-cubicled curtained area, there should be a clear space of at least 1350 mm between beds, and 1050 mm between the end bed and the wall. There should be a clear space of at least 900 mm between head end of the wall, and 1200 mm (4 ft) at the foot end to permit resuscitation procedures.
- The central control station should be designed to seat two or three persons only. This will discourage staff from idling in that area.
- Multipurpose room for conferences, training sessions, demonstrations for staff, patients, and patients' families.
- Family waiting room with toilet and pay phone facilities. There should be a gowning area and storage for clean gowns, masks, etc.

ICU BED

- The spatial need for an ICU bed in a single-bed room is 17–20 sqm.
- The comfortable working height should be 975 mm for female staff and 1075 mm for male staff. For the patient to get safely in and out of the bed, the compressed mattress height would need to be as low as 325 mm.
- Studies have shown that the space around the bed in a single-bled accommodation can be used most efficiently when the shape of the floor is close to a square.
- For each bed in the open ICU an average of about 20 sqm should be allowed, with about 3.5 m between the centers. About 15 sqm per bed is the minimum.
- The pediatric ICU should be designed to have at least 12 sqm allotted for each bed space. There must be at least 6 electrical outlets per bed space (Fig. 8).

CLINICAL LABORATORY SERVICES

Laboratory Elements

Modular unit: To obtain a multifunctional use, laboratories need to be modular. A module unit choice is 3.0 m. Each pathological assistant needs a functional area of 25 sqm. If traffic and technical areas are included this amounts to about 35 sqm. An acceptable laboratory room height should be between 2.7 m and 3.0 m.

RADIOLOGICAL SERVICES

Diagnostic Radiology

- The CT scan facility must follow Bhabha Atomic Research Center (BARC) guidelines and Atomic Energy Regulatory Board (AERB) in planning and designing.
- In terms of spatial needs, the total area per X-ray room including all the auxiliary and ancillary facilities should be 200 sqm.
- The planning of the CT and MRI facility should ensure that the problem of closed treatment rooms with large and intimidating equipment causing anxiety, claustrophobia, abnormal fear is addressed. This can be creatively done by ensuring that skyline is visible and the view through the bore of the machine is a pleasing piece of art.
- A floor area of about 1.3 sqm should be allowed for each waiting patient. Parking area for trolleys and beds must be provided. A particular waiting area for children and accompanying mothers should be provided. The corridors must be 2.8 m wide for bed traffic.

Location

The diagnostic radiology department should be located on the ground floor, conveniently accessible to inpatients, outpatient and emergency patients. The department should be located close to the elevators and other diagnostic and treatment facilities.

Design

The planning must consult experts who will be familiar with the mandatory regulations of the Atomic Energy Regulatory Board (AERB) and the Division of Radiological Protection, BARC, in designing the department.

There is a definite need for a mammography facility in a mother and child hospital and should be close to the OPD where gynecological cases are being reviewed (Fig. 9).



Fig. 8: Pediatric ICU.

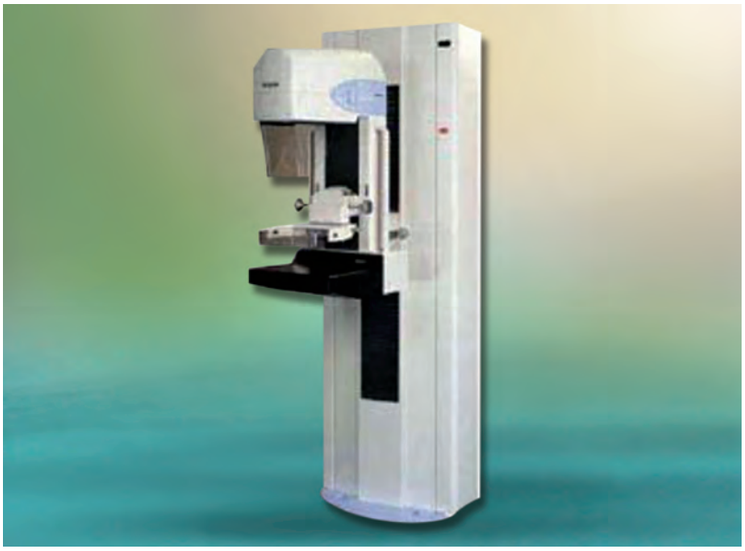

Fig. 9: Force field mammogram.

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PEDIATRIC SURGERY DEPARTMENT

Location[2]

- The best location for the pediatric surgery department is one which permits a convenient and uncomplicated flow of patients, staff and clean supplies traffic.
- Surgery receives inpatients from the floors through non-public corridors, elevators and ramps. Convenient access to elevators is, therefore, essential.
- With regard to services, ideal adjacencies should be emergency, radiology, clinical laboratories, intensive care units, central sterile and supply department and delivery suite.

Design

The design depends on the number and type of operating rooms.

Some key factors to be considered relate to size, usage, lighting (surgical and general illumination), intercommunication and signal systems, electronic equipment and monitoring system, medical gas system (suction, oxygen, nitrous oxide and compressed air) and other service lines, fixtures, safety precautions such as grounding for X-ray, TV camera, and against static electricity, storage, supply cabinets, environmental control, etc.

- Post anesthesia recovery
- The frozen section laboratory
- Changing area
- Scrubbing area.

Dimensions

It is recommended that surgical corridors should be 3 m to 3.5 m wide.

Operating rooms must have a minimum clear area of 36 sqm, excluding fixed cabinets and built-in shelves. Many surgeons, however, recommend larger space, i.e. 45 sqm for major operating rooms and 56 sqm for special procedure rooms. Each operating room should have X-ray film illuminators which will handle at least two films at the same time, and an emergency communication system.

Major operating rooms size should be 48 sqm and special procedure rooms 72 sqm.

Prefabricated Surgical Suite and Stainless Steel Panels

A prefabricate surgical suite is a structural steel shell with a jointless sealed sterile coating. An especially designed steel frame will accept a variety of wall panels. These may be seamless stainless steel or zintex sheets, powder-coated demountable stainless steel or high density compact laminated panels or solid mineral sheets.

Ceiling Pendants and OT Control Panels

Ceiling pendants or ceiling supply units-motorized arm ceiling mounted pendants increase efficiency by keeping medical gases and electrical cables off the floor thereby easing the congestion.

Facilities and Space Requirements

Special facilities and space are required for:

- Control station should be so located as to permit visual observation of all traffic into and within the department.
- *Operating rooms*: Total number of OR for 100 beds in pediatrics surgery—04 (1 OR for every 25 surgical beds).
- *Sterilizing facilities*: High speed autoclave conveniently located to serve all operating rooms. Dumb waiters should be brought to use.
- Laboratory for preparation and examination of frozen section. This can be done in the main laboratory if the distance and time needed do not delay the completion of surgery.
- Provision for refrigerated blood bank.
- Consultation and conference room.

OBSTETRICS DEPARTMENT

Labor and Delivery Suite[1]

Location

- The clinical section of the obstetrical department should be located in a convenient but secluded area. Within the clinical facilities, the labor and delivery suites should be as remote as practicable but easily accessible from the entrance to the department so as to avoid unnecessary traffic and to provide privacy to patients.
- The facility should be close to the nursery, obstetrical nursing unit, and to the vertical transport so that patients can access it easily
- The department should be close to the operating rooms.

Preparation Room

Patients have to be prepared for labor and delivery. The preparation room should be located within the labor delivery suite but away from labor and delivery rooms. The room must have facilities for carrying out the procedures in connection with preparation such as an examining table, bath, wash basin, kit for giving enema and preparation tray. A locker to keep the patient's clothes is desirable.

Labor Rooms

This is the room in which the patient remains during the first stage of labor, i.e. from the time the pains commence till she is ready to be moved to the delivery room (Fig. 10).

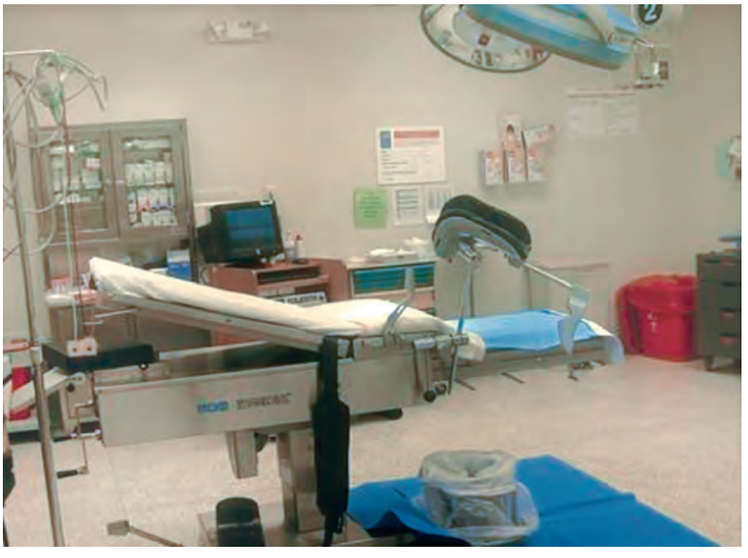

Fig. 10: Delivery room.

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The total number of labor rooms should be as follows:
- High dependency unit labor rooms—10
- Delivery rooms—5.

Design Considerations

- Labor rooms must be designed in such a way that they can serve as emergency delivery rooms. The preferred size is 5.5 by 5.5 meters. Single rooms are recommended. They should be equipped with electronic fetal heart monitors.
- The labor rooms should be close to the delivery rooms, but not so close that the two areas are almost one or that the patients can overhear or view delivery room procedures. Both rooms are noisy and so should be sound-proofed, if possible.
- Lighting and color should be conducive to patients' relaxation.
- There would be a good extension light so that the patient can be properly examined by the obstetrician or the nurse. The other auxiliary facilities are as with other parts of the hospital.
- Doors would be 1.2 m wide to permit passage of the bed or stretcher with attendants.
- The bed must be furnished with oxygen, suction and compressed air outlets, nurse call system, and lighting controls.
- Piped music and a lockable locker for patient's personal belongings are desirable.
- Delivery rooms would be similar to operating rooms in their design with finishes that promote maximum aseptic conditions. Facilities provided in the delivery room are essentially the same as for the surgical suite. A delivery room would accommodate only one patient at a time.
- The delivery room would also contain a designated area to receive the newborn baby immediately after birth. This area would have a baby receiving tray, warmer, suction, oxygen and other resuscitating facilities like an Ambu bag. There would be adequate lighting around the area. Each delivery room would have a foot or elbow-operated emergency call system with a dome light and buzzer on the corridor over each delivery room. Similar light signals and buzzers must be installed in the lounge and at the nurses' station.

Cesarean Section Room

These should be an operating room in the department where major obstetrical surgeries are performed.

Scrub Facilities

Two scrub positions should be provided near the entrance to each delivery room. One area with three positions may serve two adjacent delivery rooms.

Recovery Rooms[1]

Modern maternity departments should have a recovery room where all postpartum patients are observed during the first 6 hours after delivery.

Each recovery room may have two or more beds. It would have a nurses' station with charting facilities and visual control of all beds. Provision must be made for dispensing medicine, washing hands, clinical sink with bedpan flushing device and storage for supplies.

Fathers' Wait

This would be located near the labor rooms but outside the labor-delivery suite, with toilet facilities, pay telephone and drinking water facilities.



Fig. 11: Labor, delivery, recovery and postpartum (LDRP) suite.

Birthing suite or labor, delivery, recovery and postpartum (LDRP) suite (Fig. 11), i.e. labor, delivery, recovery, postpartum care suite is so-called because the whole process of child birth can take place in one room. These suites, built and equipped for labor and delivery, ensures that the expectant mother moves only once, at the time of discharge, with the baby. The focus has shifted to the family. Some studies recommend LDRP suites, where patient is moved to the postpartum room. It is thus an example of patient focussed care.

Planning Premises

- Provisioning of a homely environment
- Provision of modern medical care
- Privacy to the patient
- Patient safety.

Design Parameters

- The feel as well as the decor would be akin to a miniature home with a bed for the patient and a sofa cum bed/settee for the attendant.
- Cupboards are used, both for the convenience of the patient, the relatives and also to store equipment. The equipments remain hidden from view allaying the anxiety of a patient and at the same time saving space while being available conveniently at the time of need.
- The infant warmer is either built-in or freestanding and is placed where emergency care teams have quick access to it without being too close to the bed.
- Entertainment facilities like televisions and communication facilities like telephones and computers may also be used.

Architectural Consideration

- The interiors should have a healing effect on the patient
- The room may be decorated with works of art but should not make the room resemble a museum.
- The room should be provided with a pantry, and would be furnished in such a way that entry is not in direct line of vision.
- The manifold system should be hidden behind a painting or inside a cupboard.

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Labor, Delivery Recovery and Postpartum Beds

The most important furniture is the patient's bed. This can be modified or converted to a delivery whenever required. A monitoring panel with maternal and fetal monitoring would be there at the head end. Provision would be made for a bassinet/cradle with medical gases for neonatal care.

Space requirement:

- Total area for LDRP suite: 28 sqm
- Area for toilets: 5 sqm
- Area for bassinet: 3 sqm

Lighting

The lighting should be adjustable with dimming facility, the range being 300–500 lux.

HEATING, VENTILATION AND AIR-CONDITION

- Temperature: 24°C ± 2°C
- Relative humidity: 45 ± 5%
- Air changes: 8 to 10 air changes per hour
- Filter: HEPA filter

Underwater Delivery

The birthing suite needs to be wider, a peninsular bath with double-sided access is required. The area should be 15 sqm. The temperature of the pool should be strictly maintained between 35°C and 37°C.

Patient's Lounge

- It is important to have a lounge for the first stage of labor patients
- Allowing women in early labor to move around freely and socialize with others will help to minimize problems created by anxiety during labor.

Delivery Room

- The delivery table is equipped with stirrups and footplates, and is also equipped with handgrips. At each delivery bed, there should be oxygen outlets, also for the babies, suction points, and wall-mounted sphygmomanometers.
- An overhead mirror should be available.
- Since the newborn does not tolerate even brief episodes of hypoxia, oxygen warmed to 32–34°C with 60–80% relative humidity is administered.
- When a premature baby is anticipated, the delivery room temperature should be increased to 32°C or higher.
- Storage space is important, hence wall cabinets for resuscitation equipment, measured 650 × 600 × 220 mm, have been recommended.
- A delivery room should have a floor area of about 30 sqm. For obstetrical or surgical lamps a ceiling height of at least 3 m is required. A door width of 1.2 m allows the patients to be moved to the delivery room on a labor bed.

Operation Room

If the obstetric suite is a section of the surgical department, the occasional need for immediate surgical intervention is easily met. In an independent delivery suite, an operation unit should be included as about 20% of deliveries require a surgical intervention.

Recovery Room

- For rest, observation, and care 12 sqm recovery rooms are needed.
- The recovery room should be placed adjacent to the delivery room and be equipped as a postanesthetic recovery room.

Prenatal and Lamaze Classes

Space must be provided for conducting prenatal classes for expectant mothers. Lamaze classes where relaxation and breathing techniques along with movement and positions are taught.

FACILITY GUIDELINES FOR AN ASSISTED REPRODUCTIVE THERAPY FACILITY (ICMR GUIDELINES)

Minimal Physical Requirements for an ART[3,4]

- It should have a non-sterile and a strictly sterile with the space provision for the sterile area not being combined with those for the non-sterile area and vice-versa.
- A reception and waiting room for patients.
- *A room with privacy*: This is for interviewing and examining male and female partners independently is essential.
- A general-purpose clinical laboratory.
- *Store room*: A well-stocked store for keeping essential stock of especially those items that have to be imported.
- *Record room*: Record keeping must be computerized as far as possible.
- *Autoclave room*: A separate facility must be available for sterilizing and autoclaving all surgical items as well as some of those to be used in the *in vitro* culture laboratory.
- *Steps for vermin proofing*: This essential detail should be planned at an early stage because no pesticide can be used in a fully functional IVF clinic, as it could be toxic to the gametes and embryos.
- Semen collection room.
- Semen processing laboratory.
- Clean room for IUI.
- The sterile area.
- The operation theater.
- Room for intrauterine transfer of embryo.
- The embryology laboratory complex.
- Ancillary laboratory facilities.
- Hormone and other assays.
- Microbiology and histopathology laboratory.
- Back-up power supply a power back-up in the form of UPS systems and/or a captive power generation system is available in the ART clinic.

OPERATION THEATER IN GYNECOLOGY AND OBSTETRICS

Operation Department Size and Locating

The number of operation rooms in a hospital has been related to the number of surgical beds. The guidelines recommend one operation room for every 50 general beds, for 25 surgical beds.

The proper number of operation rooms has also been indicated to be 5% of the total number of surgical beds.

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As a thumb rule, 0.1 operations per bed and day, has been used in the past for calculation. It has been assumed that approximately one hour's operation time is required per surgical bed per week.

Up to 35% of operation time has been kept available for emergencies, etc. although usually the emergency operations represent only about 15% of the work load, also in terms of time.

When a hospital requires over ten operation rooms, two or more separated surgery departments may be preferred. The total number of operations-T- is determined by the formula

- T = B × 365 × P
- L × 100
- B—No. of beds in the surgical block
- P—Percentage of bed occupancy
- L—Average length of stay in days
- 50% of obstetrics beds can be considered as surgical beds and all the beds of gynecology should be considered as surgical beds. Therefore, 2 OTs for obstetrics and 4 OTs for gynecology should be planned.

Surgical Department Build-up

Zoning Concept

Areas within the OT should be divided into zones where the bacteriological count progressively diminishes from outer to the inner zone and is maintained by a differential decreasing positive pressure ventilation gradient from the inner to the outer to the outer zone. Four types of zones must be planned:

- *Protective zone*: Includes the reception, waiting area, trolley bay and changing room.
- *Clean zone*: Includes the preoperative room, recovery room, plaster room, staff room and the store.
- *Sterile zone*: The areas included are the operating suite, scrub room, anesthesia induction room and the set-up room.
- *Disposal zone*: The areas included in this zone are the dirty utility and the disposal corridor.

Departmental Planning Approaches

Surgical department corridors should be not less than 2.85 m, preferably 3 m wide.

Spatial Elements

Special waiting rooms for children and accompanying mothers should be provided.

Children need recognizable individuals. They should be accompanied to the anesthetic room, if parents not available, a nurse or attendant with whom they are familiar.

The children's waiting area must be closed to all traffic, and extraneous conversation should not be allowed.

Transfer Areas, Patient Bed in the Pediatric Surgery Department

- To keep the patient bed outside the anesthetic room during the operation special transfer areas or rooms of at least 16 sqm of size, adjacent the holding area have been suggested for transferring the patient from her bed to the operation table or operation table top or from a ward trolley to an operation room trolley.
- A considerable total transfer area is needed in a major surgical department, as each transfer may take 6–10 minutes.
- A technical refinement of the transfer room idea is the patient transfer hatchway between the holding area and the operation room suite area.

Procedure Area

Anesthetic room: In an anesthetic room, also called preparation or induction room the patient is transferred to the OT table.

The anesthetic table requires a space of 0.6 × 1.8 m. The dimensions 5 × 4 m can be recommended for an anesthetic room as they cover the needs of the majority of the anesthesiologists. All stimuli unpleasant to the patient should be eliminated. The anesthetic room should be both visually and acoustically well screened from the surgical department so that the patient is not in any way disturbed.

A temperature of not less than 23°C should be maintained.

For the sake of consistency of quality and intensity, artificial light has been considered more satisfactory.

Egress Room

Instead of using the anesthetic room for terminating anesthesia and for extubation the provision of an egress room with an area of 10–20 sqm has been suggested.

The egress rooms may increase the capacity of surgical departments by about 5%.

Scrubbing and Gowning Area

An area of about 3.0 sqm is required for donning a gown. A scrub-up and gowning area to serve one operation room equipped with three scrub-up places required about 10 sqm.

Operation Room Size

Mostly only about 1/3rd of the operation room space is planned for surgical intervention. The reminder is for support system. Activities around the operation table require 3 × 1.5 m. The circulation needs increase the required area to 4.25 × 2.65 m.

The minimum area of a contemporary operation room for pediatric/gynecological surgery, where standard aseptic techniques can be easily applied is 30 sqm. A suitable size for an operation room for most forms of surgery has been for some time in the region of 40–42 sqm.

A rectangular oblong operation room with rounded internal corners to ease the cleaning procedures meets most of the surgeons' needs.

The free ceiling, with/without a suspended ceiling, would preferably be 3.6 m high and not less than 3 m.

Maximum height for the operation room is about 3.6 m when the ceiling light is considered.

Auditory Effects

The reverberation time in operation rooms should be reduced to below 1 second.

Measured sound from ventilation systems should not exceed 35 dB in anesthetic rooms and 40 dB in operation rooms.

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SUPPORT SERVICES

Blood Bank

The provisions of the *Drugs and Cosmetics Rules* (GoI) relevant to planning and designing of blood banks must be followed.

PHYSICAL MEDICINE AND REHABILITATION

Facilities and Space Requirements

- Reception-control room
- Waiting area
- Speech pathologist's and speech therapist's offices
- Audiologists' offices
- Sound treatment rooms
- Therapy room
- Storage room.

CENTRAL STERILIZATION AND SUPPLY DEPARTMENT

The parameters as applicable for a 500 bedded unit should be applicable. Ordinarily an area of 500 sqm (at 1 sqm per bed) would suffice.

LAUNDRY

The laundry should be a centralized facility which feed the center along with the other satellite centers of the main hospital.

DIETETICS DEPARTMENT[1]

Location

- A ground floor location is preferable, and is also convenient to deliver supplies as one in the basement should be difficult to maintain.
- The department should be close to the materials management department. The storage area should be close to the unloading dock.
- Easy access to vertical transportation system serving patient care units is important to facilitate delivery of patient meals and return of used trays and utensils.
- It can be a cafeteria conveniently located close to the OTs and the private ward.

Design

The design and layout of the dietetics department have a large role to play in the standard of food service, the preparation, the delivery and quality. The area are enumerated:

- Receiving area and control station
- Storage and refrigeration room(s)
- Preparation and production areas
- Serving room
- Special diet kitchen
- Dishwashing area
- Cafeteria.

Admission Office

Creation of an independent medical records department (MRD) for a center may lead to administrative difficulties. Therefore, it is proposed to centralize the MRD at the main hospital with an admission counter being an extension which is electronically linked so that e-records may be facilitated.

The front office of medical records—the registration together with the enquiry—is often the patient's first point of contact with the hospital.

ENGINEERING CONSIDERATIONS

Lighting: Light impacts biological function since it is related to the circadian rhythm, the important factors are:

- The illuminance needed for bedside medical and nursing tasks should not exceed 500 lux. A higher level is considered to be a stress factor.
- The contrast between illuminants and the ceiling should be minimal. Indirect lighting is preferred. For internal rooms, a two level lighting system should be employed: 400 lux during the day and 200 lux during the evening.

Lighting in Operation Theater

General lighting in operation room should attain a minimum of 400 lux. Illumination within the special field a disparity not greater than 10:1 should be permitted between the centrum and the periphery of the visual field.

Intensity: It would be realistic to require an intensity of about 40,000 lux at the plane of incision. The lamp should give an intensity of 8,000 lux at the bottom of an about 13 cm deep and 5 cm wide incision. The intensity at source must be 1.5 lakh lux

Luminance: The normal luminance brightness for the central field during an operation should be 2,000–3,000 cd/sqm. Within the central field of the view of the surgeon the relationship between the maximum and minimum brightness—the wound and the surrounding drapes—should be less than 2.5:1, the relation between maximum and minimum luminance should not exceed 1:10 within a base of a 60° cone.

Reflectance: It is the measure of light reflected from the surface of an object and expressed as a percentage of the light striking the surface.

Reflectance values: Recommended values are—ceiling reflectance 80%, wall reflectance 70%, surgical wound 9%, surgical drape 30%, light pastel colored wall 60%, retractors and instruments up to 90%, and white plaster 90%.

Operating Lamp Characteristics

- An illumination adjustable between 30,000 lux and 1,35,000 lux without any change of the spectral characteristics in the red is offered.
- The color temperature should be at least 5000 K.
- The color reproduction index should be RI-70. The heat radiation should be as small as possible.
- The maximum temperature of outer surfaces of luminaires should be less than 58°C to avoid injury to the hands of the surgeon or ancillary staff.
- The operation lamp should have no part hanging lower than 2.0 m above the floor.

ICU lighting: General illumination must be of adequate intensity—300 lux would suffice.

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PLANNING AND DESIGNING
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