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HOSPITAL DESIGN

- To discuss about
  - Govt. Regulations
  - Hospital Design
  - Construction Guidelines
  - NABH Recommendation
  - User Friendly
  - Total Healing Environment
  - Hospital Finance Plan .



# THE SIX PHASES OF THE BUILDING PROCESS

1. *Planning* - Master planning, and predesign efforts.
2. *Schematic design* - Drawing a rough outline of room layout, structure.
3. *Design and development* - This includes adding details to the design, including fixtures, furniture location, and decor.
4. *Construction documents* - Cost analysis, contract conditions the rights and duties of all participants, including the owner, the contractor, and the architect.
5. *Construction* - This is the phase in which the building or facility is actually built.
6. *Commissioning*.



- Hospital building differs from other building types in the complexity of functional relationships that must exist between the various parts of the hospital.



# REGULATION



# CERTIFICATES TO BE NEEDED BEFORE CONSTRUCTION

Local body approval .

- Pollution control board certificate
- Fire safety certificate
- Lift License
- Generator license
- Temporary EB connection



# LAND CLASSIFICATION

- Residential
- Mixed residential
- Commercial
- Semi public
- Public



# LAND CLASSIFICATION

- CLINIC
  - Only Outpatient Service
- NURSING HOME
  - 20 Bed
  - No ICU
  - No Operation Theatre
- HOSPITAL
  - Full pledged hospital



## LAND CLASSIFICATION

- |                    |                |
|--------------------|----------------|
| •Residential       | - Clinic       |
| •Mixed residential | - Nursing Home |
| •Commercial        | - Nursing home |
| •Semi public       | -Hospital      |
| •Public            | - Hospital     |



## APPROVAL AUTHORITY

### Local Body (Panchayat, Municipality, Corporation)

Up to 2000 SqFt - Commercial building

Up to 4000 Sqft - Residential building

### L.P.A (Local Planning Authority)

Up to 25000 sqft

### DTCP (Directorate of Town and Country Planning)

Above 25000 sqft



## WHAT IS MULTI STORIED BUILDING (M.S.B.) ?

If the building height is more than 50 ft from the ground level is called multi storey building.

Building more than 1+3 floor is MSB.

For Multi storey building corporation and LPA will not give approval.

For MSB ,DTCP approval is must.



# WHAT IS F.S.I. (FLOOR SPACE INDEX) ?

Ratio of the total floor area of buildings(surface area of all floor) to the size of the land.

Thus, an FSI of 2.0 would indicate that the total floor area of a building is two times the gross area of the land on which it is constructed



# WHAT IS F.S.I.FOR HOSPITAL ?

## 1.5

Total surface area of the building is 1.5 times than the total land area.

**Relaxation :**

Car Parking, Stair case area, Lift area, OTS area will not be included in F.S.I Calculation.



# HOSPITAL DESIGN



# Elements and divisions of the hospital

The main division of the hospitals are:

1. Administration division.

2. Outpatients' division, includes;  
Outpatient clinics.  
Pharmacy.  
Emergency reception.

3. Diagnostic services division, includes;  
Laboratories.  
Radiology (diagnostic).

4.



4 Internal medical treatment division, includes

Operation Theatres.

Intensive Care unit.

Maternity section.

Central Sterilization Department.

5 Inpatient division, includes;

6 General service division, includes;

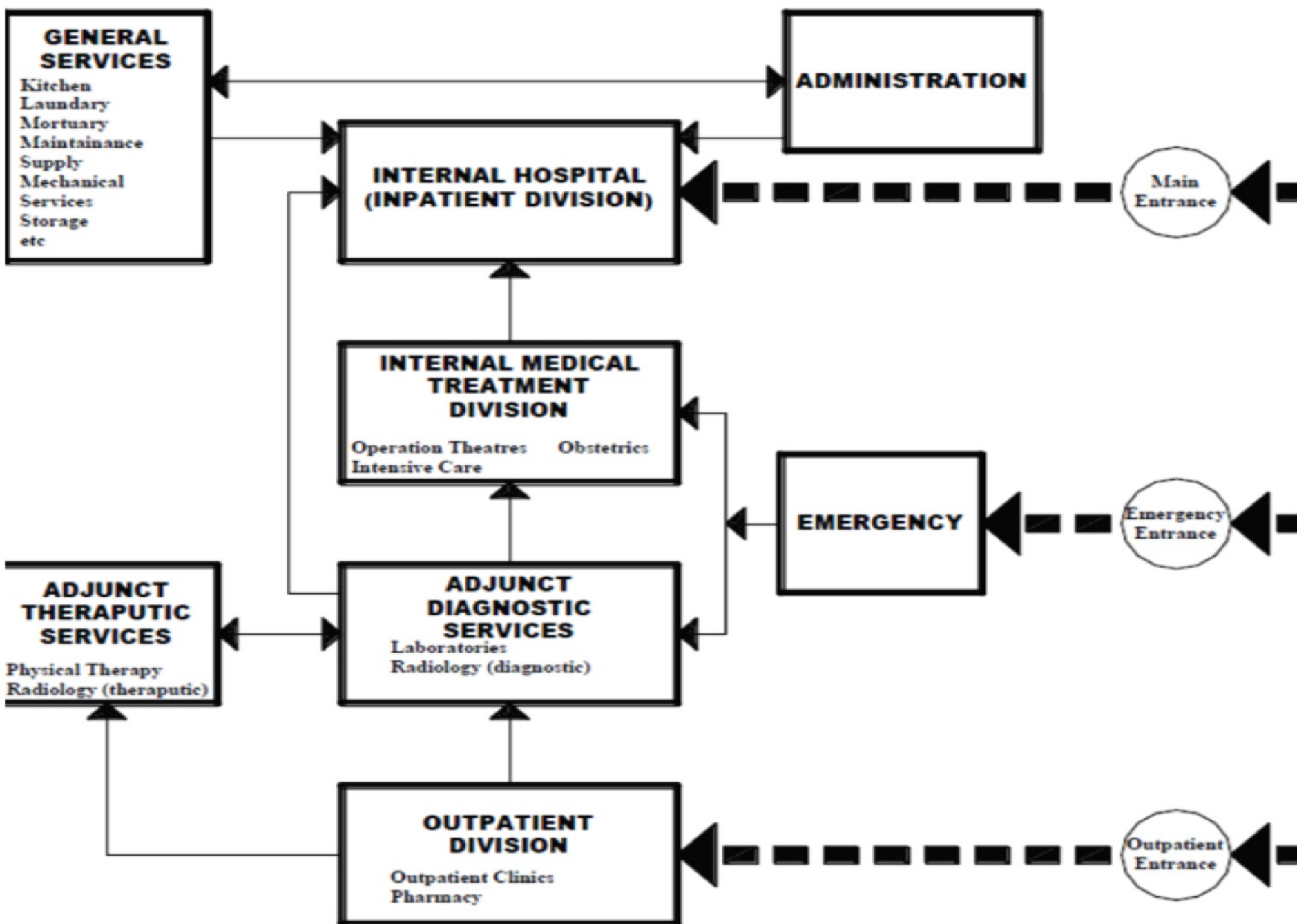
Kitchen

Laundry

Storages

Security





## MINIMUM REQUIREMENT

- Corridor - 6 Feet width
- Lift - 8 X 4 Sq.Ft
- In Common ward , area requirement for each bed should be 7 x 8 Sq.Ft
- There should be a 3.5 Ft between each cot and the space between head end of the cot and outer wall is should be 2 ft.
- Staircase should be two in number additionally either two lifts or one lift and ramp to be provided.



# CONSTRUCATION GUIDELINES





- Tiles
- Granites
- Vinyl
- Pavor block

## WALL PROTECTION

To maintain the wall, the wall to be covered with

- Tiles
- Vinyl
- Washable painting - Enamal



# FALSE CEILING ADVANTAGE

- Ambiance
- Above the false ceiling wiring need not be concealed
- Above the false ceiling plastering and painting not necessary on the wall as well as roof
- Cost effective





**DOOR**

**IN OPERATION THEATRE AND OTHER  
STERILE AREA SS DOOR IS PREFERABLE**



IN PATIENT ROOM DOOR SHOULD BE DIVIDED INTO 2 PARTS 20 : 80

FOR BETTER AMBIENCE AND UTILITY THERE SHOULD BE A GLASS OVER THE DOOR.



# ELECTRICAL



## ELECTRICAL - LT Vs HT

Before Construction electrical load to be calculated

Less than 150 HP – LTCT (Low Tension Current Transformer)

More than 150 HP – HT ( High Tension )

- Installation of new transformer with in the campus mandatory for HT connection.



# ELECTRICAL - UPS

Since hospital is loaded with Costlier Biomedical / Electronic equipment it should be safe guarded.

## Online UPS :

Since sudden cut-off of the power supply can cause damage to the equipments, All kind of supply to equipments only through the UPS. (No Direct power supply)

All equipment should be provided UPS and RAW Power Plug points.



# ELECTRICAL -STABILIZERS

## Stabilizer :

To avoid equipment damage by voltage flexuation, the stabilizer to be incorporated in all equipment - line to be passed through the stabilizer. – It will provide constant 240 V.



# NON ELECTRICAL LINES

- CCTC Camera
- Cable Tv
- Intercom
- LAN
- Speaker wiring



# CENTRALIZED ANNOUNCEMENT SYSTEM



# CCTV SURVEILLANCE SYSTEM



THIS HOSPITAL PREMISES IS UNDER CCTV SURVEILLANCE  
இந்த மருத்துவமனை CCTV கண்காணிப்புக்கு உட்பட்டது



# NABH RECOMMENDATION



# AERB REGULATION



- As per AERB guidelines In Radiation room (X-Rays) door should be covered with lead.





# OPERATION THEATRE



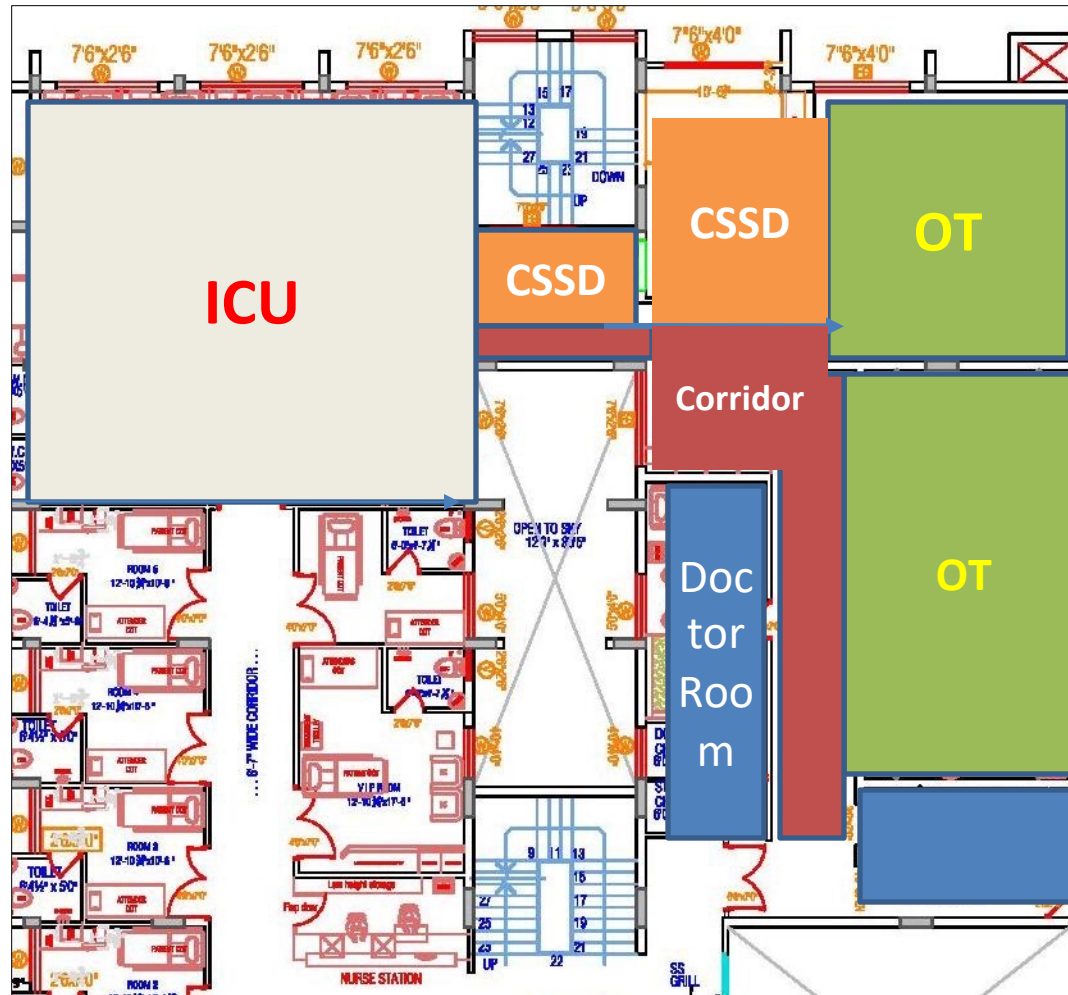
# OPERATION THEATRE SETUP - TIPS TO IMPROVE YOUR OT

Operation theatre complex consists of 3 zone viz,

- **STERILE ZONE** – Operation theatre, sterile room of CSSD
- **SEMI STERILE ZONE** – OT Corridor, Scrub area, Post operative ICU
- **NON-STERILE ZONE** – Doctor's lounge, Unsterile room of CSSD

The design should be made in such a way that Post operative intensive care should be adjacent to the theatre, have 2 entrances, One from OT & Other from IP block





## **STANDARD OT SIZE**

20'x20'x10' height below the false ceiling level

## **FLOORING, WALLS**

The flooring, walls and ceiling should be non porous, smooth, without corners and should be easily cleanable repeatedly, The materiel should be choosen accordingly



## AIR CONDITIONER

Air flow is unidirectional Air is supplied through terminal HEPA Filters in the ceiling & return air is via the return air duct situated In corners of OT just above the floor level

Particle allowed in the filter 0.5 microns.

The fresh air component of the air change is required to the minimum 5 air changes.

There is requirement to maintain positive pressure differential between OT and adjoining areas to prevent outside air entry into OT. The minimum positive pressure recommended is 15 pascal.



## HEPA FILTER & AHU



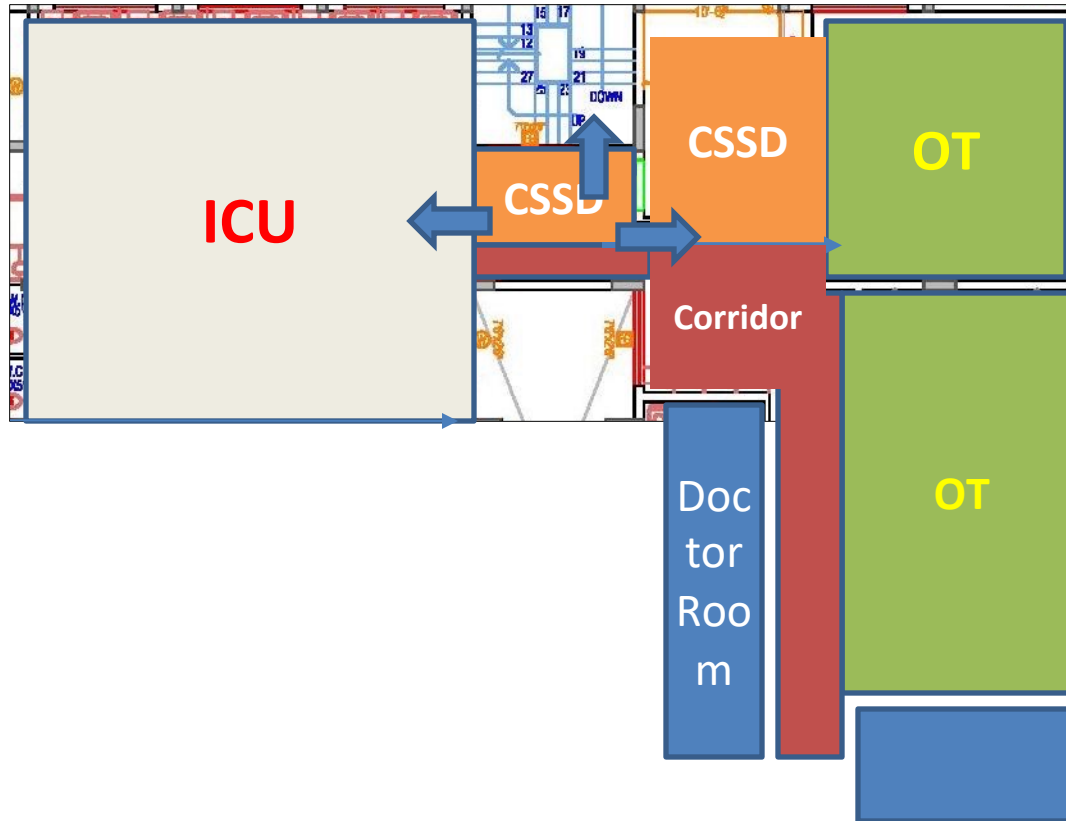


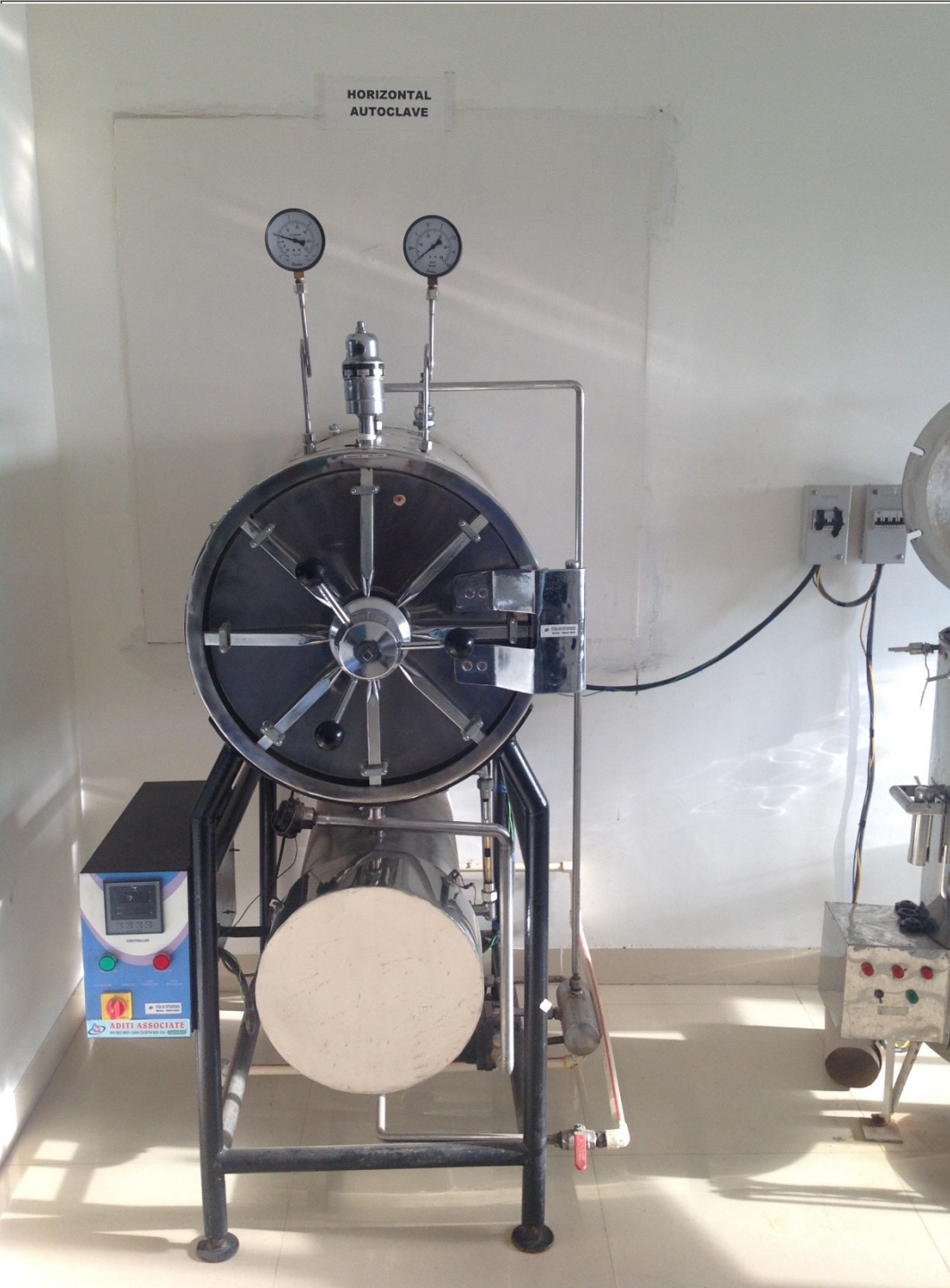
## AIR CONDITIONER

Window and split AC should not be used in any type of OT because the air pure re circulate the units and have convenient pockets for microbial growth which cannot be sealed .



# CSSD





**CSSD**

**HORIZONTAL AUTO CLAVE**

உன்னால் முடியும்

# MANIFOLDS





# FIRE & SAFETY



# DURING CONSTRUCTION

## RAMP EMERGENCY EXIT EVACUATION PLAN

- Emergency exit direction board - UPS Operator
- It should glow during power shutdown



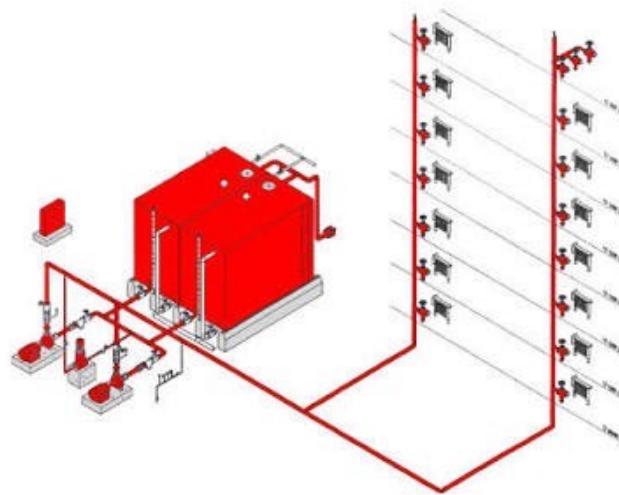
# FIRE SAFETY EQUIPMENTS

- WATER SUPPLY & HYDRANT SYSTEM  
(FIRE DUCT WITH HIGH PRESSURE PUMP)
- SMOKE DETECTOR FIRE ALARAM
- SPRINKLERS WITH THERMO STATIC  
REQULATION.
- FIRE EXTINGUISHER



**WATER SUPPLY & HYDRANT SYSTEM  
(FIRE DUCT WITH HIGH PRESSURE PUMP)**

- Underground water tank, Trace tank connected with vertical water duct, Operated by high pressure pump
- In high raising building both tank mandatory .



# SMOKE DETECTOR FIRE ALARM

Automatic sensor system  
connected to electrical  
panel and it gives alarm  
whenever contact with  
smoke



# SPRINKLERS WITH THERMO STATIC REGULATION.

## SPRINKLERS

- It works with thermo static regulation connected to hydrant system.
- Because of high temperature caused by fire it will get activated and hydrant opened automatically



# FIRE EXTINGUISHER

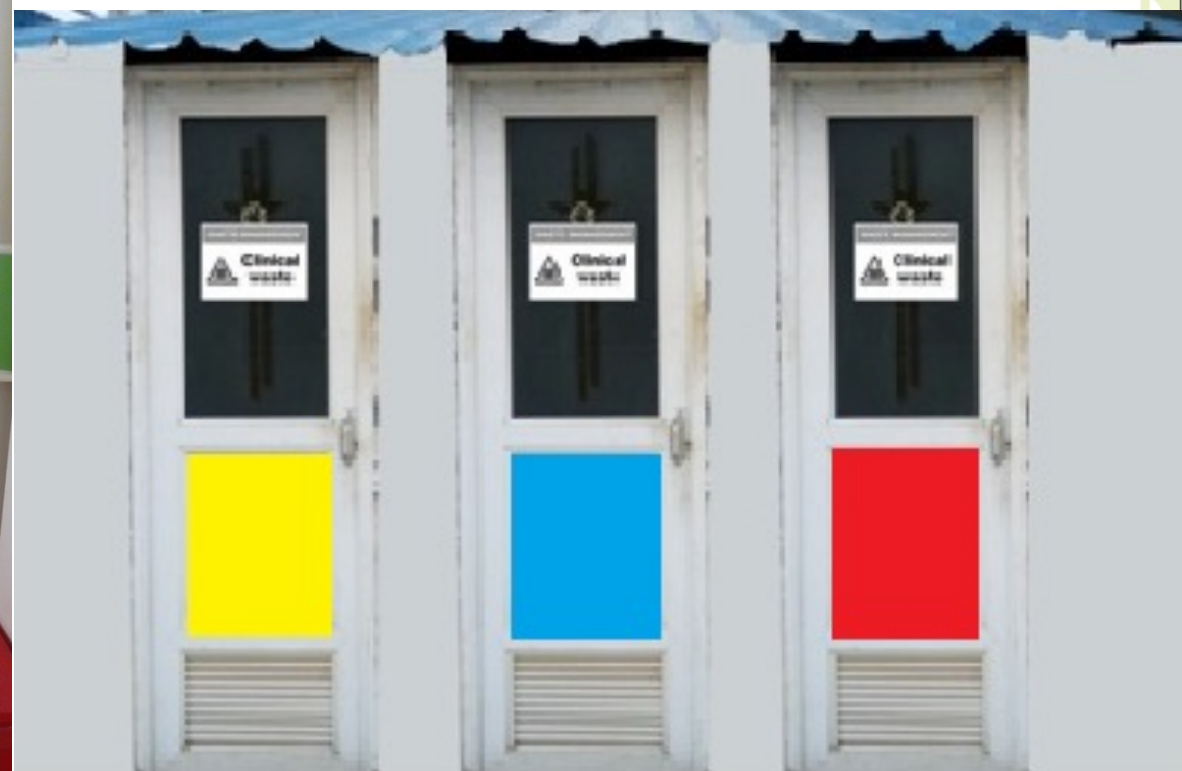
- It is a manually operator used for small scale fire
- It should be fitted lab, ups area, power house & near the high cost equipment



# BIOMEDICAL WASTE MANAGEMENT



Biomedical Waste Management- Disposal Criteria	
JEWELRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE, New Delhi, 2016	
<b>RED</b>	<p><b>Contaminated Sharps (Surgical)</b></p> <p>Waste generated from disposable items such as syringes, needles, scalpels, suture needles and pins, scalpels, wire loop, scalpel, rubber needles and dental needle cartridges and instruments used for sutures and gloves.</p> <p><b>Disposal:</b> Contaminated Sharps</p> <p>(1) Solid Waste: Items contaminated with blood, body fluids like sharps, plastic waste, cotton swabs and gauze, containing needles or discarded blood and blood components.</p> <p>(2) Liquid or Hazardous Materials: Pharmaceutical waste like antibiotics, cytotoxic drugs, resulting of items contaminated with cytotoxic drugs along with gloves or sharps, needles, scalpels.</p> <p>(3) Chemical Waste: Chemicals used in production of sharps and used or discarded sharps.</p> <p>(4) Discarded items, instruments, needles contaminated with blood or body fluids.</p> <p><b>Disposal:</b> Collection in discarded and contaminated glass (including needles, scalpels and syringes) except those contaminated with cytotoxic or toxic.</p> <p><b>Hazardous Waste Disposal:</b></p>
<b>YELLOW</b>	<p><b>Waste during Autopsy:</b></p> <p>Needles, scalpels with blood, needles, scalpels from inside up under or human, scalpels, needles, or any other contaminated sharp object that may cause puncture or lacerate. This includes both used, discarded and contaminated sharp, sharp.</p>
<b>BLUE</b>	<p><b>GENERAL WASTE (Food and Paper waste)</b></p>
<b>WHITE</b>	
<b>GREEN</b>	



OTHERS



# ELBOW OPERATED TAP



# TOILET WITH HAND SUPPORTING



# SIGNAGES



## GURU HOSPITAL - MEDICAL SERVICES

### SUPER SPECIALITY SERVICES

- Surgical Oncology
- Medical Oncology
- Radiation Oncology
- Reproductive Medicine
- Nephrology
- Urology
- Cardiology
- Cardiothoracic Surgery
- Vascular Surgery
- Plastic Surgery
- Surgical Gastroenterology
- Neurology
- Neurosurgery
- Endocrinology

### SPECIALITY SERVICES

- Obstetrics & Gynaecology
- General Surgery
- General Medicine
- Laparoscopic Surgery
- Orthopedics
- Traumatology
- ENT Surgery
- Diabetology
- Pulmonology
- Paediatrics
- Dental
- Dermatology
- Psychiatry
- Family Medicine

### 24 HOURS SERVICES

- Emergency Services
- Critical care
- Pharmacy
- Lab
- Ambulance

### DIAGNOSTICS

- Digital X-Ray
- Ultrasound Scan
- CT Scan
- ECHO
- Mammogram
- Endoscopy
- Doppler Study

**COMPREHENSIVE AND HOLISTIC MULTI-SPECIALITY HOSPITAL.**

# QUALITY SIGNAGES - SIGNAGE

## TURN AROUND TIMES FOR LAB INVESTIGATIONS

Investigations	Sample Type	Processing Time	Expected Report Time
CBC, ESR	EDTA	1 Hour	1 Hrs 20 mts
Hb, Tc, Dc, Pcv	EDTA	30 Mts	40Mts
Platelat Count, MP, MF	EDTA	45 Mts	55 Mts
Grouping & Typing	EDTA	15 Mts	30 Mts
Sugar F, PP, R	EDTA (or) Serum	30 Mts	40 Mts
Urea, Creatinine, Uric Acid	Serum	45 Mts	55 Mts
Na+, K+, Electrolytes, Lipase	Serum	45 Mts	55 Mts
Electrolytes, Lipid Profile	Serum	45 Mts	55 Mts
Bilirubin, Sgot, Sgpt, TP, ALP	Serum	45 Mts	55 Mts
GGTP, Ciadium, Phosphorous	Serum	45 Mts	55 Mts
Magnesium, LDH, Toatl CPK	Serum	45 Mts	55 Mts
CPK-MB, Amylase, RA, CRP	Serum	45 Mts	55 Mts
ASO, Acid Phosphates, RFT	Serum	45 Mts	55 Mts
LFT, Blood Routine, Precath	Serum	1 Hour	1 Hour 15 mts
PT/INR, APTT	Soidum citrate	1 Hour	1 Hour 15mts
Ammonia	EDTV	1 Hour	1 Hour 15 mts
ABG	Heparin Samle	05 Mts	05 Mts
Trop - T, HBA1C	EDTV	30 Mts	40 Mts
NT Pro BNP, D-Dimer	Lithium Heparin	40 Mts	50 Mts
HIV, HBSAG, HCV, VDRL	Serum	45 Mts	1 Hrs
Dengus, Lepto, Chikungunya	Serum	45 mts	1Hrs
HIV, HBSAG, HCV, TPHA (Elisa Method)	Serum	3 Hours	3.30 Hrs
Deegue, Lepto(Elisa Method)	Serum	Daily Evening 8pm	Daily Evening 9 pm
Thyroid function & Profile, PSA, ANA, C3, C4, Total IgE ADA, Igm Hav & HEV, TSH	Serum	Week 1, 3, 5(9pm)	9.30 pm
Urine Routine, Dipstick, BS, BP, Acetone, Albumin, Sugar, Depo	Urine	30 Mts	45 Mts
Urine Micro Albumin, PCR, 24 Hours Urine Protein	Urine	1 Hour	1.10 Mts
Culture & Sensitivity	Urine, Sputum, Pus, Motion Swab, Tib, Fluid	48-72 Hours	73 Hours
Culture & Sensitivity	Blood	72-96 Hours	97 Hours
AFB, Fungal, Gram Stain	Sputum, Fluid, Pus	Next day	25 Hours

## X - RAY CRITICAL VALUES

- HEMOTHORAX
- PNEUMONIA
- PNEUMOTHORAX
- PLEURAL EFFUSION
- RENAL CALCULI
- INTESTINAL OBSTRUCTION
- MULTIPLE FRACTURE
- BONE TUMOUR
- INTESTINAL RUPTURE

# INSTRUCTION SIGNAGES - SIGNAGE

## How to Handrub?

**RUB HANDS FOR HAND HYGIENE! WASH HANDS VISIBLY SOLIED**

Duration of the entire procedure : **20 - 30 seconds**

1.a



Apply a palmful or the product in a cupped hand, covering all surfaces.

1.b



2.



Rub hands palm to palm

3.



Right palm over left dorsum with interlaced fingers and vice versa.

4.



Palm to palm with fingers interlaced

5.



Backs of fingers to opposing palm with fingers interlocked

6.



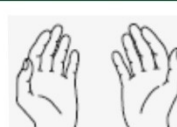
Rotational rubbing of left thumb clasped in right palm and vice versa.

7.



Rotational rubbing backwards and forward with clasped fingers of right hand in left palm and vice versa.

8.



Once dry, your hands are safe.



**World Health  
Organization**

**Patient Safety**

**SAVE LIVES**  
Clean Your Hands



# DIRECTION - SIGNAGES



- **CT Scan**
- **Radiotherapy**
- **Brachytherapy**
- **Treatment Planning System**
- **Chiller Plant**



- **Mammogram**
- **Xray**
- **Lab**
- **Biomedical Department**
- **Mould Room**
- **MRD**



# PATIENT RIGHTS & RESPONSIBILITIES - SIGNAGES



## Patient Responsibilities / நோயாளிகளின் கடமைகள்

### Patient responsible include

- Giving respect and treating with dignity all health care workers, other patient and visitors.
- Giving as much information as possible about their present health, past illness allergies and any other relevant details including family history of diseases and allergies.
- Following the prescribed and agreed treatment plan and complying with the instruction given.
- Not taking medication without medical advice.
- Keeping up appointments made and notifying the hospital, as early as possible if unable to do so.
- Not littering the hospital and help in keeping the premises clean.
- Using garbage bins.
- Keeping toilets clean after use.
- Not drinking alcohol, smoking or spitting inside the hospital premises.
- Not asking for or giving inaccurate information for incorrect certificates.
- Maintaining silence in hospital.
- Accepting responsibility for their actions if they refuse treatment.
- Accepting responsibility for the safekeeping of their valuables and possessions.
- Respecting the property of other and that of the hospital.
- Abiding by all applicable National, state and local Laws.

### நோயாளிகளின் கடமைகளின் இவை அடங்கும்

- உடல்நல பராமரிப்பு பணியாளர்கள், மற்ற நோயாளிகள் மற்றும் பார்வையாளர்களுக்கு மதிப்பளித்தல் மற்றும் அவர்களை கண்ணியத்துடன் நடத்தல்.
- நோயாளிகளின் உடல்நலம், முந்தைய நோய்கள், ஒவ்வாமைகள் மற்றும் குடும்பத்தினர்களுக்கு இருந்த நோய்கள் மற்றும் ஒவ்வாமைகள் போன்ற மற்ற உகந்த அனைத்து விவரங்களையும் முடிந்தவரை அளித்தல்.
- பரிந்துரைக்கப்பட்ட, ஒப்புக்கொண்ட சிகிச்சை திட்டத்தை பின்பற்றுவதல் மற்றும் அளிக்கப்பட்டுள்ள அறிவுறுத்தலுக்கு இணங்கி நடத்தல்.
- மருத்துவ ஆலோசனை இல்லாமல் மருந்துகள் உட்கொள்வதை தவிர்த்தல்.
- நியம சந்திப்புகளை (அப்பாயன்ட்மெண்ட்களை) தவறாமல் இருத்தல், நியம சந்திப்பின்படி வர இயலவில்லை என்றால் முடிந்தவரை முன்கூட்டியே மருத்துவமனைக்கு தெரிவிக்க வேண்டும்.
- மருத்துவமனை வளாகத்தை சுத்தமாக வைத்திருக்க உதவுதல்.
- குப்பை தொட்டிகளை பயன்படுத்துதல்.
- கழிவறைகளை பயன்படுத்திய பிறகு சுத்தமாக வைத்திருத்தல்.
- மருத்துவமனை வளாகத்திற்குள் மது அருந்தாமல், புகைப்பிடிக்காமல், எச்சில் துப்பாமல் இருத்தல்.
- தவறான சான்றிதழ்களுக்கான தவறான தகவல்களை அளிக்க வேண்டுமென்று கேட்காமல் இருத்தல்.



## Patient Rights / நோயாளிகளின் உரிமைகள்

### Patient right include

- Respect for personal dignity and privacy during examination, procedures and treatment.
- Protection from physical abuse or neglect.
- Treating patient information as confidential.
- Obtaining informed consent before carrying out procedures.
- Obtaining information on how to voice a complaint.
- Obtaining information on the expected cost of the treatment for that particular procedure.
- Right to ask information contained in the Medical Records in the form of Discharge Summary.
- Right to accept/Reject the decision of the treating doctors.
- Right to request for second opinion.
- Right to receive a clear explanation regarding the services available in the hospital.

### நோயாளிகளின் உரிமைகளில் பின்வருபவை அடங்கும் :

- மரியாதையுடனும் கண்ணியத்தோடும் தனிநபரின் நம்பிக்கைகள், சிகிச்சை பெறும் போதும், சோதனை செய்யும் போதும் காக்கப்படுகிறது.
- உடலை பலாத்காரப்படுத்தாதபடி காக்கப்பட வேண்டியது
- நோயாளி குறித்த தகவல்களை இரகசியமாக வைத்திருத்தல்.
- சிகிச்சைகளை மேற்கொள்வதற்கு முன் தகவலளிக்கப்பட்ட படிவத்தைக் பெறுவதற்கான உரிமை உண்டு.
- மருத்துவமனையின் குறைகளை எடுத்துரைப்பதற்கு தங்களுக்கு உரிமை உண்டு.
- குறிப்பிட்ட மருத்துவ சிகிச்சைக்கு தேவைப்படும் மருத்துவ செலவைப் பற்றி அறிந்து கொள்வதற்கான உரிமை உண்டு.
- மருத்துவ அறிக்கை/டிஸ்சார்ஜ் சம்மரி (மருத்துவமனையில் தங்கி சிகிச்சைப் பெற்று திரும்பும்பொழுது அளிக்கப்பட்ட சிகிச்சை குறித்து அளிக்கப்படும் தொகுப்பு)
- மருத்துவ பதிவில் குறிப்பிட்ட தகவல்களை பெறுவதற்கான உரிமை உண்டு.
- சிகிச்சையளிக்கும் மருத்துவரின் முடிவை ஏற்பதற்கான / நிராகரிப்பதற்கான உரிமை உண்டு.
- இரண்டாவது அபிப்பிராயத்தை கோருவதற்கான உரிமை உண்டு.
- மருத்துவமனையில் கிடைக்கும் சேவைகள் தொடர்பாக தெளிவான விளக்கத்தை பெறுவதற்கான உரிமை உண்டு.

# USER FRIENDLY



# ADMIN OFFICE NO INDIVIDUAL TABLE WITH OVER HEAD STORAGE



# HOW THE RECEPTION SHOULD BE

- Should be at the entrance it is a walk through area it should not be waiting area for OPD patient
- 3 Inter linked Departments
  - Registration
  - Enquiry
  - Billing
- High ceiling preferable



# HOW THE RECEPTION SHOULD BE



## OTS - OPEN TO SKY



OTS means area with in the building in which no construction.

Why ?

Excellent lighting and vendilation and it save the power.

Ambiance.

The area will not be calculated in F.S.I.

# ICU



Nursing Station  
Should be placed  
such a way they  
will monitor all  
the patient.

# ICU - CUSTOMISED HEADED PANEL



# ICU - HANGING I.V STANDS



If T.V installed in the bed, patient feels homely environment especially treatment like dialysis AND chemotherapy



# TOTAL HEALING ENVIRONMENT



Known factors in a “total healing environment” include having access to nature, incorporating positive distractions, imparting a sense of control, and providing social support spaces.



# INTELLIGENT BUILDINGS

- Create a healing architecture
- Aesthetic – an essential requisite
- Go green



# FLOOR - COLOUR CODE









TEMPLE

உன்னால் முடியும்

## PRAYER HALL





GURU HOSPITAL

# HOSPITAL PROJECT FINANCE



- Estimated cost of the project for construction is approximately 2000 Rs/Sq.ft.
- To construct the full pledged hospital including land and equipment cost is 40lakhs/Bed.
- Only 80% project cost should be utilized for construction, 20% for working capital.



# THANK YOU

