



SPACE PLANNING & CRITICAL DESIGN FEATURES IN HEALTHCARE PROJECTS



By
V.Sukumar Hebbar
Larsen & Toubro Ltd.
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HEALTH CARE INDUSTRY

PRESENT SCENARIO

India's Health care industry Revenue is Rs. 2,50,000 Crore (5% G.D.P)

GROWTH:

- 16% Y-O-Y
- 4 MILLION PEOPLE EMPLOYED
- ONE OF THE LARGEST SERVICE SECTOR IN INDIA

HEALTH CARE EXPENDITURE

- INDIA – 0.9% G.D.P
- LESS DEVELOPED COUNTRIES – 2.8% G.D.P
- DEVELOPED COUNTRIES – 5-6% G.D.P

TOTAL EXPENDITURE ON HEALTH

- PUBLIC EXPENDITURE – 20%
- PRIVATE EXPENDITURE – 80%



HEALTH CARE INDUSTRY

CONTRIBUTION:

- STATE GOVERNMENT – 15.2%
- CENTRAL GOVERNMENT – 5.2%
- THIRD PARTY INSURANCE & EMPLOYERS – 5.2%
- MUNICIPAL GOVERNMENT – 1.3%

INVESTMENT:

- PRIMARY HEALTH CARE – 58.7%
- SECONDARY & TERTIARY HEALTH CARE – 38.8%
- NON-SERVICE COSTS – 3.88%

MEDICAL INSURANCE SCHEME:

- India – 3 to 5% of Total Population
- 12% penetration in top 20 cities
- Developed Countries – 75% of Total Population



Super Specialty Hospital & Medical college,
JIPMER, Puducherry

HEALTH CARE INFRASTRUCTURE

- Inadequate for serving the needs of growing population
- Efforts are made up to create Infrastructure and to provide Manpower
- Build up Appropriate linkages between the various centers

INDIA'S THREE TIER PUBLIC HEALTH SYSTEM

1. PRIMARY HEALTH CENTERS
2. DISTRICT HOSPITALS
3. TERTIARY CARE HOSPITALS

- SUB CENTERS – **137271 Nos.**
- DISPENSARIES – **27400 Nos.**
- PRIMARY HEALTH CENTERS – **22971 Nos.**
- COMMUNITY HEALTH CENTERS – **2935 Nos.**
- HOSPITALS – **15097 Nos.**



HEALTH CARE INFRASTRUCTURE

HOSPITALS

Government Hospitals –	4475 Nos.	375987 Beds
Charitable Trusts Hospitals –	335 Nos.	19677 Beds
Private/ Corporate Hospitals –	10289 Nos.	228155 Beds
TOTAL	15099 Nos.	623819 Beds

DISTRIBUTION OF HOSPITALS

- Varies according to Socio-Economic conditions

FOR EG.

U.P (HIGHEST POPULATION)

– 139 Million – 735 Hospitals

KERALA

– 29 Million – 2053 Hospitals

REFERRAL HOSPITAL, GANGTOK



HEALTH CARE SCENARIO

- Government Health Service focusing on Primary Health Care
- Attainment of Development Indicators is significant
 - a. Reduction in Birth rate & Death rate
 - b. Reduction in Infant Mortality rate
 - c. Increase in Life Expectancy

STATISTICAL DATA

HOSPITAL BEDS TO POPULATION

India - 0.9:1000

Developed Countries

Japan - 14:1000

U.S.A - 5:1000

U.K - 5.5:1000

German - 10:1000

France - 9:1000

Italy - 7:1000

Canada - 6:1000

Sweden - 6.5:1000

South Korea - 5:1000



HEALTH CARE SCENARIO

STATISTICAL DATA

DOCTOR'S TO PATIENTS RATIO

India -1:1600
No. of Physician – 7,57,377 Nos.

Developed Countries

Japan -1:550
U.S.A -1:375
U.K -1:625
Germany -1:295
France -1:340
Italy -1:180
Canada -1:475
Sweden -1:325
South Korea -1:900

NURSES TO PATIENTS RATIO

India -1:1100

Developed Countries

Japan - 1:135
U.S.A - 1:120
U.K - 1:225
Germany - 1:110
France - 1:170
Italy - 1:180
Canada - 1:110
Sweden - 1:100
South Korea -1:385

HEALTH CARE SCENARIO

STATISTICAL DATA

No. OF HOSPITAL BEDS

India	- 6,23,819
Japan	- 16,60,784
U.S.A	- 10,97,700
U.K	- 2,64,520
Germany	- 7,83,631
France	- 5,08,075
Italy	- 3,44,840
Canada	- 1,54,000
Sweden	- 49,468
South Korea	- 2,09,303

SRI SATHYA SAI SUPER SPECIALITY HOSPITAL, PUTTAPARTHY



INDIA NEEDS TO ADD 80000 HOSPITAL BEDS EACH YEAR FOR NEXT FIVE YEARS

HEALTH CARE SCENARIO IN INDIA

MOST FAVOURED DESTINATION

STRONG ECONOMY

- Trillion dollar economy
- 12th largest economy in the world
- 53% of GDP from service sector
- 29% of GDP from industry sector
- Average growth of 7% even during recession

STRONG ENABLERS

- Economy expected to grow at 8% + annually
- Young employable human resources
- A market of more than a billion population

OVERVIEW

- Indian healthcare market expected to touch USD 77 billion or INR 330,000 crores by 2012
- Annual growth rate of 15% for the next 15 years



Main gate structure, JIPMER, Puducherry



SS Block, JIPMER, Puducherry

HEALTH CARE SCENARIO

OVERVIEW

- Employment for 9 million by 2015
- With rise in income levels & increase in adoption of health insurance, demand for tertiary care hospital is expected to grow
- Share of tertiary care in total healthcare market is around 15%
- Market for tertiary care hospital to grow at a faster rate due to rise in complex ailments
- Use of technologically advanced diagnostic equipment & excellent infrastructure making India a medical travel hub

SHIFT TOWARDS LIFESTYLE RELATED DISEASES

- Occurrence of communicable diseases decreasing & non communicable diseases increasing



MIOT International, Chennai



Night view of MIOT International,

HEALTH CARE SCENARIO

RAPID ADVANCES IN MEDICAL TECHNOLOGY

- Lifecycle of high end medical equipment is becoming shorter due major innovation
- Telemedicine in ophthal, cardiac to meet the demand of rural populace
- Tele-radiology to leverage the time difference advantage with developed countries
- Indian diagnostic industry is expected to grow at CAGR of 30 -40%

CURRENT TRENDS IN MEDICAL TECHNOLOGY

- Robotics in OT, Pathology, Research
- Laser technology in surgery
- Increased usage of advanced instruments
- Biotechnology, genomics, molecular biology and stem cell research



Women & Children hospital, JIPMER



Medical college & Research centre , JIPMER



Nursing College, JIPMER

TYPES OF HOSPITALS:

1. TEACHING / RESEARCH HOSPITALS
2. GENERAL HOSPITALS
3. TERTIARY CARE SPECIALTY HOSPITALS

FEATURES

- Orientation
- Planning of traffic & Circulation
(Patients, Staffs, visitors, Service deliveries, Garbage & Waste removal)
- Easy traffic movement & promote efficiency of operation

SRI SATHYA SAI SUPER SPECIALITY HOSPITAL, WHITEFIELD



ZONING - - - - - factors

- Secondary level of infection
- Separation of dissimilar activities
- Separation movement of clean / dirty material

PLANNING ASPECTS

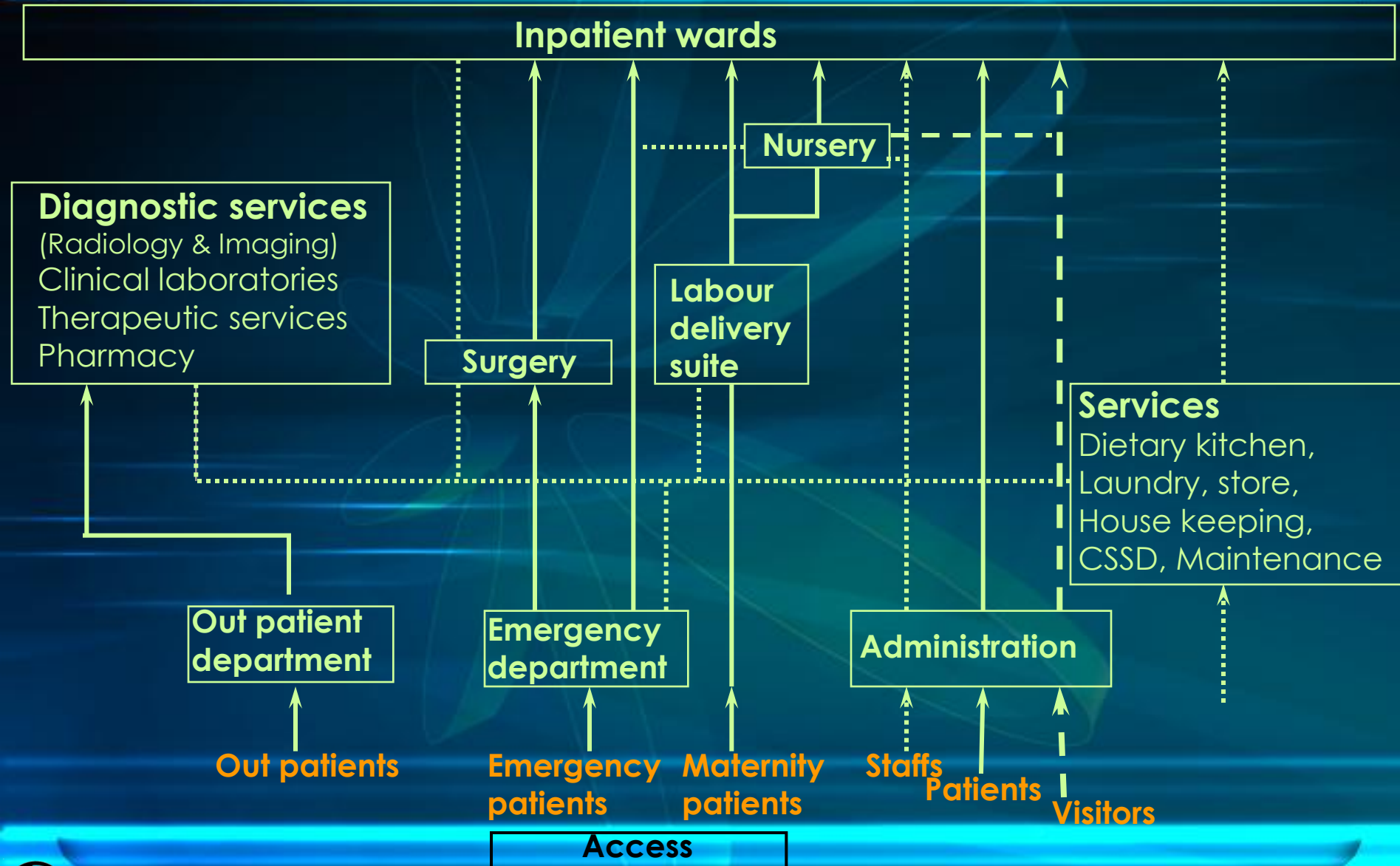
LOCATION

- Quiet environment & Good accessibility
- Away from noise & polluted area
- Dedicated Emergency entrance
- Separate service road
- Zoning – hospital / institutional /residential / service
- Separate parking for visitors / staff
- Separate entry for staff / patients / visitors / material
- Separation of OPD & IPD with negative space between with courtyard / atrium



Master plan of ABMH Pune

HOSPITALS - ZONING



HOSPITALS - ZONING

OUTER ZONE

- Reception, Registration
- Admission, Administration
- OPD / Emergency



INTERMEDIATE ZONE

- Diagnostic/Pathology
- Therapeutical &
- Pharmacy



NUCLEUS

- Surgery suite
- ICU
- Labour & Delivery suite



INNER ZONE

- IPD



HOSPITALS – SPACE PLANNING

3 MAIN AREAS

OPD

- Emergency/ casualty
- Consultancy services
- Diagnostic facilities
- Physiotherapy
- Pharmacy

IPD

- Surgical suites
- ICU/ CCU/ HDU
- Cath lab
- Day care
- Pathology
- Wards

SERVICES

- CSSD
- Laundry & Linen
- Stores
- Diet Kitchen
- Bio-medical



CT SCAN



MODULAR OPERATION THEATRE



Central Sterile Supply Dept.

HOSPITALS – SPACE PLANNING

OUT-PATIENT DEPARTMENT - EMERGENCY/ CASUALTY

FUNCTIONAL AREA	NO	AREA REQUIREMENT IN SQ.MT.		
		NHS	AIA	L&T INDICES
MINOR OPERATION THEATRE	1 Room	36		30
RESUSCITATION BEDS	3 BEDS	14	12.5	12
EXAMINATION / TREATMENT	1			9.
OBSERVATION BEDS	5 BEDS.	11.5	11	9
TRIAGE	1			9
POLICE / COUNCELLING	1 EACH			9 EACH
DIRTY / CLEAN UTILITY	1 EACH	3.6 - 4	3.6	3.6 - 4



HOSPITALS – SPACE PLANNING

OUT-PATIENT DEPARTMENT

CONSULTANCY SERVICES

FUNCTIONAL AREA	NO	AREA REQUIREMENT IN SQ.MT.		
		NHS	AIA	L&T INDICES
CONSULTATION ROOM	1 Room	16.5	12	10 – 11.5
TREATMENT ROOM	1 per 3 C.R.	12 - 16	9 - 10	7.5 - 9
WAITING LOBBY				8 Visitors / C.R.
DIRTY / CLEAN UTILITY	1 per Dept.	3.6	3.6 - 4	3.6



OPD consultancy rooms



Paediatric OPD Waiting area



Main entrance lobby of OPD in JIPMER, Puducherry

HOSPITALS – SPACE PLANNING

DIAGNOSTIC FACILITIES

Proximity to O.P.D, Emergency & I.P.D

X-ray

Fluoroscopy

Mammography

Ultra sound

CT scan

MRI

Gamma camera

Gamma knife

Colour Doppler

-(Space planning to suite the equipment
Manufacturer's specification & AERB guidelines)



HOSPITALS – SPACE PLANNING

SURGICAL SUITE

FUNCTIONAL AREA	NO	AREA REQUIREMENT IN SQ.MT.		
		NHS	AIA	L&T INDICES
MAJOR OT –(1OT / 40-50 BEDS)	1	40	33.45 – 44.39	48 - 54
MINOR OT	1		30	20
SEPTIC / EMERGENCY OT	1	30		36
PRE OPERATIVE BEDS / OT	2 BEDS	12	7.43 with 1.2 clear	10-11
POST OPERATIVE BEDS / OT	4 BEDS	14 - 16	7.43 with 1.2 clear	12- 13.5

- Operation Theatre for teaching hospital shall be as per MCI requirement
- For CTVS OT around 54 sq.mt required
- Above is clear area inside the OT and all supporting facilities are additional
- For modular OT, area to be included to get the clear space as above

HOSPITALS – SPACE PLANNING

IN-PATIENT DEPARTMENT – ICU / CCU

FUNCTIONAL AREA	NO	AREA REQUIREMENT IN SQ.MT.		
		NHS	AIA	L&T INDICES
ICU / CCU (8 Beds / OT or 10% of the total no.of beds)	1BED	24.5	18.58 with 3.96m head wall	15 - 18
NEONATAL ICU	1 BASSINET		11.22	10-11
ISOLATION ROOM	1	24.5	18.58	18 -20



Level 1 Nursery in CMC Vellore



A view of typical NICU



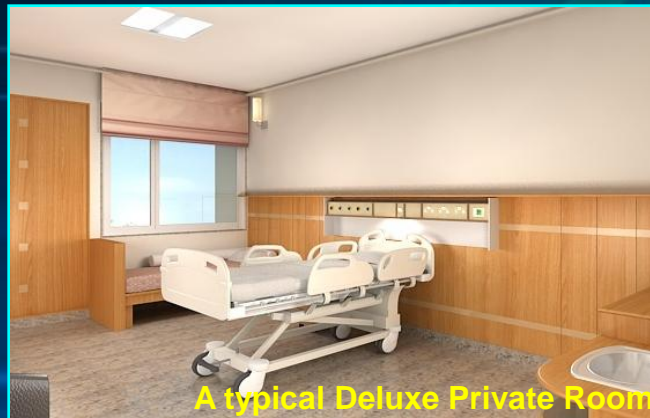
A typical view of ICU complex with nurse station

HOSPITALS – SPACE PLANNING

IN PATIENT DEPARTMENT

WARDS

FUNCTIONAL AREA	NO	AREA REQUIREMENT IN SQ.MT.		
		NHS	AIA	L&T INDICES
DELUXE ROOM	1BED	16	20-22	18 - 20
PRIVATE ROOM	1 BED	16	20-22	18-20
SEMI PRIVATE WARD	2 BEDS		10 - 11 / BED	9-10 / BED
GENERAL WARD	8 BEDS /ROOM	10-12 / BED	10-12 / BED	9-10 / BED



HOSPITALS – SPACE PLANNING

SERVICES

Hospital administration

Laboratories

Medical records department

Library & conference room

Auditorium

Central sterile supply department

Dietary kitchen

Laundry

Housekeeping

Engineering services

Medical gas manifold

Change & lockers

Mortuary



CSSD



LABORATORY



Diet Kitchen in
SSSIHM, Puutapathy

PLANNING ASPECTS

- Isolated from traffic & noisy area
- Away from contamination & cross infection
- At close proximity to Emergency / cath lab
- Dedicated lift & dumb waiter to CSSD
- 100% Air change desirable,
- ACH – 20-22 changes/hour (AIA)
- Laminar flow of conditioned air 19 – 21 deg. with 0.3 micron HEPA filter
- Seamless finish flooring / false ceiling / walls
- Pre operative / post operative & ICU at close proximity apart from change rooms
- Clear ht of 3.0m & 5.4mt total ht incl. service floor



Sterile corridor in JIPMER, Puducherry



Modular Operation Theatre in JIPMER, Puducherry

PLANNING ASPECTS.....

CONSIDERATIONS

- Segregation of clean & dirty traffic
- Sub-zone to ensure sterility
- Triple corridor system
 - **Dirty / Clean/ Sterile**
- Circulation pattern
- Separation of movements
 - **doctors/staff / patients / materials**
- Unidirectional air flow (clean to unclean)
- Selection of good materials
- Sharing of sub sterile /scrub / sluice with other OT with hatch opening

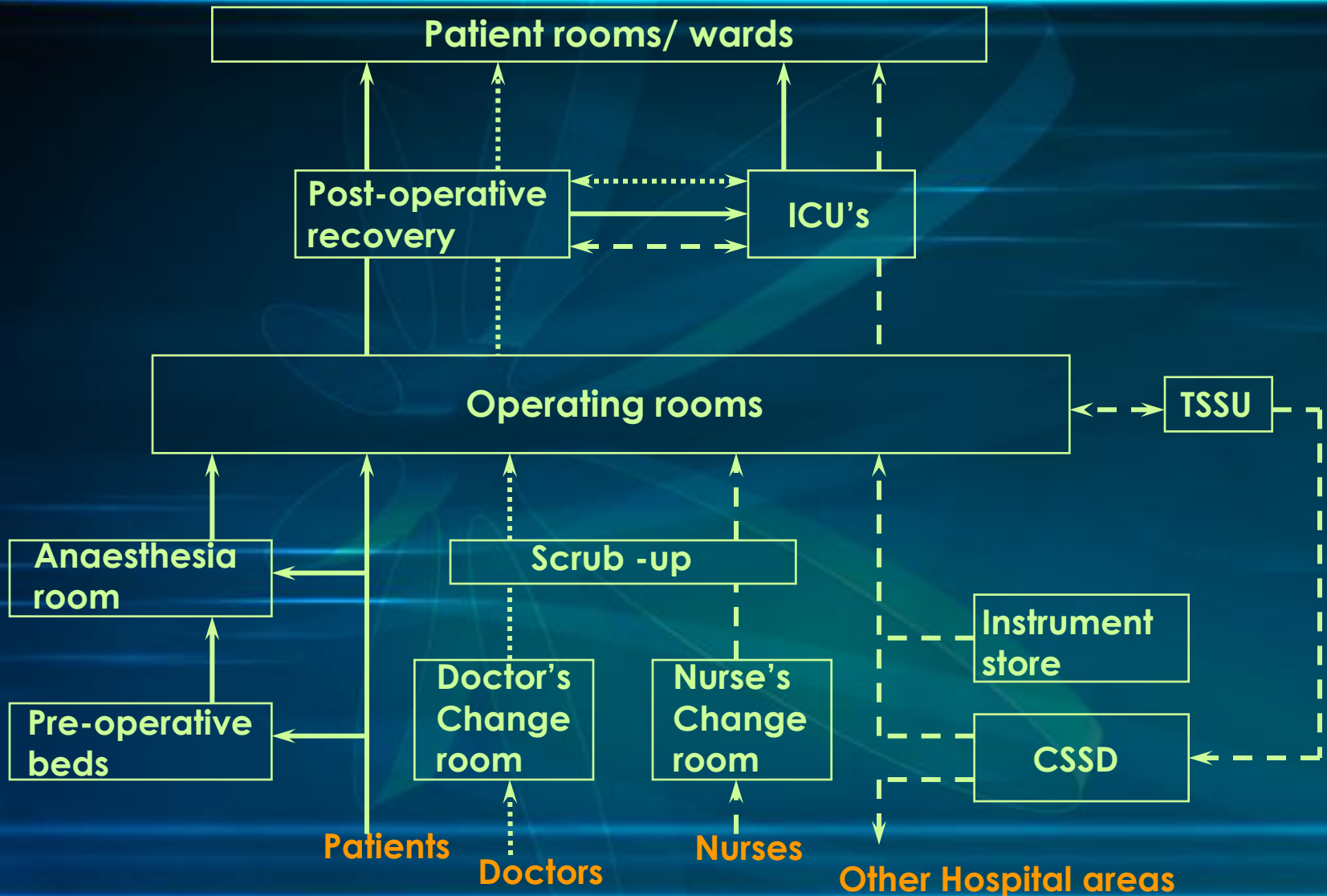


Operation Theatre



Laminar Flow


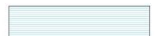


SURGICAL SUITE






SURGICAL SUITE



LEGEND:

	- STERILE CORRIDOR
	- CLEAN CORRIDOR
	- DIRTY CORRIDOR
	- NORMAL CORRIDOR

	- PATIENT MOVEMENT
	- DOCTOR MOVEMENT
	- MATERIAL MOVEMENT

TRIPLE CORRIDOR SYSTEM

PLANNING ASPECTS

LOCATION

- Quiet environment
- Away from traffic
- Away from contamination & cross infection
- Close proximity to Emergency, OT, Recovery rooms, Nursing units
- Closer to vertical transportation

CONSIDERATIONS

- Isolation rooms for air borne diseases
- Step down ICU or HDU
- Double corridor system
 - Outer corridor & Sterile corridor
- Centralized nursing station



Nursing Station, Star hospital, Hyderabad



ICU, JIPMER, Puducherry

CONSIDERATIONS

NICU

- Controlled access from Labour & Delivery areas
- Viewing windows at appropriate areas
- Noise control & sound insulation
- Central control nursing station
- Dedicated space for lactation support/ consultation
- Temp. 22-25deg.c. & ACH-6 changes/hour



ISOLATION ROOMS.....

- Double door system with ante room
- No recirculation of air
- Negative air pressure to be maintained
- Exclusive hand wash station & toilet
- 6-12 Air changes/hour



SELECTION OF MATERIALS IN OT COMPLEX

OPERATION THEATRES - WALLS

- Seamless 1mm thk. Stainless steel sheet cladding (SS316G)
- Polyurethane/ anti-microbial paints finished on plaster
- High Pressure laminates (HPL) 4mm thk. with sealants
- - Dupont make Corean synthetic resin wall cladding with seamless finish

FLOORING

- Seamless flooring to avoid microbial growth
(3mm thk. Self levelling epoxy or cold welded anti static vinyl flooring)

DOORS & JOINERIES

- Stainless steel door with access controlled sliding type
- Double action & Two-leaf type
- Hermetically sealed aluminium glazing with air gap, extruded aluminium frames to ensure sound & thermal insulation
- Sensor operated Hatch Box to Sterile store & Dirty Sluice
- Sensor operated Stainless Steel Scrub

PATIENT TOILET

SIZE

- A clear width of not less than 1550mm for wheel chair movement
- 2400mm x 1550 clear size for bath, WC & Wash basin
- Door shutter width shall not be less than 800mm & shall always open out

ADDITIONAL FEATURES

- Ideal to provide wall hung EWC to avoid junctions
- Grab bars at every sanitary fixtures

FINISHES

- Ceramic tile dado upto false ceiling level
- False Ceiling GI Coil coated
- Wooden flush door



DEFINED CIRCULATION CORRIDORS

Identified corridors for

- staffs/ doctors / patients & materials

STAFFS/ DOCTORS

- a. Shoe change area
- b. Slippers & Dress change room
- c. Air showers

PATIENTS

- a. Separate transfer area (Change over of stretchers)
- b. Transfer zone links Pre-operative areas

MATERIALS

- a. Exclusive transportation route
- b. Handling Clean/ Dirty materials
- c. Connectivity of functions



WASTE MANAGEMENT SYSTEM

CLASSIFICATION OF WASTE

GENERAL WASTE

- Domestic waste
- Waste water from laundry / CSSD

PATHOLOGICAL & INFECTIOUS WASTE

- Tissues, organs, body parts
- Human fetuses, Blood & body fluids
- Infectious agents from laboratories
- Autopsy on patients with infectious diseases
- Waste from Surgery & infected patients
- Dialysis waste from infected patients

CHEMICAL & RADIOACTIVE WASTE

- Discarded solid, liquid & gaseous chemicals
- Solid, liquid contaminated with radio-nuclides

SHARPS - Needles, syringes, scalpels, saws, blades



WASTE MANAGEMENT SYSTEM

DISPOSAL OF WASTES/ WASTE DISINFECTOR

- Incineration
- Recycling or refuse
- Public disposal system
- Chemical disposal system

WASTES FROM DIFFERENT AREAS

O.P.D Consultation rooms

- Waste water Public disposal system

Treatment rooms

- Waste water Public disposal system
- Sharps Incinerator
- Pharmaceutical Incinerator

DIAGNOSTIC SERVICES

- Chemical Incinerator



WASTE MANAGEMENT SYSTEM

CLINICAL LABORATORORIES

- Chemical Incinerator
- Pharmaceutical Incinerator
- Infectious Incinerator

SURGICAL SUITES/ ICU's

- Soiled linen CSSD / Laundry
- Instruments CSSD
- Pathological Incinerator
- Waste water Public disposal system
- Sharps Shredder
- Pharmaceutical Incinerator

I.P.D

- Waste water Public disposal system/ STP
- Pharmaceutical Incinerator

SERVICES

- CSSD Public disposal system
- Laundry Public disposal system



WASTE MANAGEMENT SYSTEM

WASTE MANAGEMENT

- **SEGREGATION** of different classes of wastes at source
- **COLLECTION** from point of generation & transportation
- **TRANSFER** of wastes into different disposable system

COLOUR CODE

Colour	Type of wastes
Yellow	Clinical wastes (incineration)
Light blue	Autoclaving before disposal
White	Soiled linen
White with red band	Foul or Infected linen
Red	Human tissue wastes



FACT

- In India, nearly 60% of the patients get secondary level of infection in the hospital and the recovery process becomes critical.
- Developed countries – 6-10%

CONCLUSION

- With better '**SPACE PLANNING, INFECTION CONTROL & GOOD DESIGN FEATURES**', the designers and medical planners can address the issue very effectively and contribute substantially to mitigate the problem

MERITS & TANGIBLE BENEFITS

- Avoid cross-contamination
- Get accreditation from world renowned bodies
- Achieve international standards
- Optimize patients recovery cycle
- Increase productivity of staff / doctors
- Boost to Health care tourism

BUDDHA SAID ONCE THAT AMONGST ALL OF THE GAINS.....

“ GAINS OF HEALTH ARE HIGHEST & BEST “

