MEDICA Synergie
Redefining healthcare

FINAL REPORT

CAPITAL HOSPITAL, BHUBANESWAR, ORISSA

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Executive Summary

The apex of the healthcare delivery pyramid of the state of Orissa comprises of SCB Medical College Hospital, MKCG Medical College Hospital, VSS Medical College Hospital and Capital Hospital located in Cuttack, Brahmapur, Sambalpur & Bhubaneswar respectively. These hospitals form the epicenter of healthcare delivery to a majority of the population and at present are increasingly being confronted with challenges of high patient flow and severe resource crunch in terms of infrastructure, manpower and equipments. The Government of Orissa (GoO) has taken up the initiative to upgrade the infrastructure of these hospitals to fulfill the healthcare needs of the population. The aim of the current assignment is to develop appropriate master plans for scaling up the infrastructure in each of these facilities.

This report talks about the infrastructure up gradation at Capital Hospital, Bhubaneswar. The study was done in two major components - hospital facilities assessment and architectural, engineering & structural assessment of existing buildings and upcoming plans. Secondary research will supplement primary research.

In order to ensure the development of an up gradation plan that is in line with patients and providers requirements, the hospital facility assessment included the collection of data from three sources:

- Detail assessment of the existing hospital infrastructure to assess the gaps and ascertain future needs. A series of toolkits were developed and used to assess the different functional areas of the hospital.
- Understanding infrastructure related requirements from the patient's point of view through structured interviews of a sample of patients (User perspective study).
- Understanding infrastructure related requirements from the provider's point of view through structured interviews with all the clinical head of department's (Provider perspective study).

The detailed facility assessment revealed certain gaps in the current infrastructure. These were further analyzed and suitable recommendations made. Schematic layout of concept plans has then been prepared subsequently in accordance with the recommended expansion plan and space program.

This report will then be followed by a master plan that would factor in a projection of the healthcare needs in the next 20 years and the present utilization of the healthcare facilities. The design plans would also incorporate the best practices in healthcare facility design including patient friendly infrastructure and internationally accepted safety protocols. For enhancement of skills within the department, training needs of engineers and architects have been assessed to come up with a comprehensive capacity development plan. This will form a separate section that

will include guidance on the application of advanced project management tools and software for monitoring construction works to ensure speedy and timely implementation. In addition a maintenance plan will also be developed based on which will aid in a systematic and timely maintenance of the present hospital buildings.

Since the hospital is a complex functional entity, every effort has been made to propose renovations and scaling up plans in a way that does not become a hindrance to its continued operations. Capital Hospital is spread over 20 acres with different buildings not grouped in one place , every effort has been made to integrate the proposed renovations and scaling up plans in a way that does not become a hindrance to its functioning and also keeping accepted quality norms and cost in mind. Capital Hospital in Bhubaneswar has been recommended with a unique master plan that will enable it to meet the present and future healthcare needs of the population optimally.

A proposal for additional infrastructure has been incorporated to upgrade the hospital to a teaching hospital.

Introduction

The Government of Orissa (Government of Orissa) has developed a comprehensive Orissa Health Sector Plan (OHSP) for the period from 2005-2010. For this purpose, resources are pooled from the Government of Orissa along with that of Government of India and the developmental partners. The aim is to provide quality health care particularly to the vulnerable and marginal group of population. In the Orissa Health Sector Plan, emphasis is laid on accessibility, utilization, accountability and responsiveness of the providers. The health indicators are sought to be stabilized along with addressing the critical health issues.

In order to achieve the goal, making up of deficiency in Healthcare infrastructure is adopted as a strategy by OHSP to meet its objectives of enhancing the capacity of the health system. Up gradation of the infrastructure of the three medical college hospitals located in Cuttack, Sambalpur & Brahmapur and the Capital Hospital in Bhubaneswar is being taken up by the Government of Orissa. These institutions have been developed over a considerable period of time and the present infrastructure is inadequate to meet present requirements of patients, their families and the healthcare providers.

To enable best use of resources for the hospital improvement, the Government of Orissa. has engaged Medica Synergie as an external consultancy for designing facility expansion

The current assignment is to develop appropriate master plans for scaling up the infrastructure in each of these facilities. The proposed master plans needs to take into account a projection of the healthcare needs in the next 20 years and the present utilization of the healthcare facilities. The design plans also incorporate the best practices in healthcare facility design including patient friendly infrastructure, internationally accepted safety protocols and advanced building management systems. In order to meet the objectives of the assignment, the existing hospital infrastructure have to be assessed to ascertain the gaps vis-à-vis the future needs. A series of toolkits have been developed based on some accepted standards to assess different functional areas of the hospital. An architectural, structural and engineering assessment of the existing buildings has also been carried out to assess the present condition of the hospital buildings.
The detailed facility assessment revealed certain gaps in the current infrastructure. These gaps were further analyzed to suggest suitable recommendations for bridging those gaps. Schematic layout of concept plans has been prepared, subsequently, in accordance with the recommended expansion plan and space program.

Patient friendly designs to ensure ease of accessibility and optimal utilization for improvement of health status as well providing an ambience for the providers to deliver quality health care are the key objectives of this facility expansion plan. A user perspective study has been conducted so as to **incorporate** patients' perceived need in the proposed facility design. A maintenance plan has

also been developed which will aid in maintenance of the present hospital infrastructure so that medical care can be delivered unhindered.

For enhancement of skills within the department, training needs of engineers and architects have been assessed to enhance and whet their capacity for project management and subsequent maintenance of the hospital infrastructure.

Since the hospital is a complex functional entity, every effort has been made to propose renovations and scaling up plans in a way that does not become a hindrance to its continued operations. Capital Hospital in Bhubaneswar has been recommended with a unique master plan that will enable it to meet the present and future healthcare needs of the population optimally .

Aim

- To develop an infrastructural upgradation plan comprising of 20 year Master Plans with five years priority plans for 4 major government health institutions in Orissa.
- To prepare Cost estimates for five years priority plans for Government of Orissa to make budget provision.
- To prioritize the activities based on the need, fund availability and commitment for five years from Government of Orissa based on discussion with the task force.

Objective of the Study

- To assess the current status of the existing facilities with respect to infrastructure components such as architecture, engineering, structural stability, functional work areas etc.
- To assess the existing design plans of the hospital buildings and elicit the strengths and weaknesses in the same.
- To do a Gap Analysis based on the assessment findings.
- Understanding patient perspectives for patient centered facilities through a *User Perspective Study* comprising of both inpatient and outpatient respondents.
- Consultation with key clinical and support staff to understand provider perspectives on infrastructure requirements for safe and efficient functioning.
- Suggest models of design plans that are aesthetically appropriate, patient friendly and systems oriented.
- To provide construction designs for easy maintenance of the premises.
- To provide inputs in Operation Theatre design, location and standards.
- To plan for future Telemedicine incorporation in the hospital campuses and the assessment of additional infrastructure needs in institutions where telemedicine is already functioning.

- To plan for Trauma Units in these facilities.
- Provide final architectural plans in line with the Master Plans for three medical colleges and the Capital Hospital after reviews and feedback.
- Training needs assessment and capacity building plan for the government engineers involved in monitoring and supervision of construction work.
- To prepare a budget summary for realizing the suggested scaling up plans.

Methodology

The methodology for executing this assignment comprised of the following stages.

Table No:1: Project Executing Methodology

STAGE	PHASE	ACTIVITIES
Stage I	**Project Design Phase**	• Project Micro Planning • Development of Toolkit • Sampling Methodology • Team Deployment • Secondary Literature Review
Stage II	**Data Collection**	• General Facility Assessment • Architectural Assessment • User Perspective Study • Consultation with Key Providers
Stage III	**Data analysis**	• Documentation of available data • Data Compilation • Gap Analysis
Stage IV	**Architectural Plan Preparation**	• Concept Plans Development

		• Master Plan Development • 5 year Priority Plans Preparation • Master Plan for MEP services
Stage V	**Report Preparation**	

Stage I:

Project Familiarization: Senior experts of Medica Synergie visited the hospitals along with members of the TMST to familiarize themselves with the ground realities in order that the project could be designed keeping these realities at the forefront.

Project Design Phase: This phase consisted of preliminary activities which involved familiarization with the project, the tasks involved and designing of the methodology for project implementation. The key steps to accomplish the goal were identified that led to an understanding of the steps of the assessment. The first step was hospital Infrastructure Audit and Survey assessed against existing hospital standards. The second step involved architectural, engineering & structural assessment of the buildings and building services. At this stage an expert member of the project team was deployed to all the four hospitals to quickly conduct a situational analysis of these hospitals. As required, situational analysis reports for each of these hospitals were submitted to the TMST.
An inception report for conduct of the study was prepared and submitted to TMST for approval.

Project Micro Planning: This step comprised of identifying the micro activities and logistics for implementing the project. The time variable was attributed to each activity, persons completing the activities were identified and travel plans to each of the hospitals were prepared.

Development of Toolkit & Questionnaire: The team deployed for the project developed specific tools to conduct the different aspects of studies required for collecting data for the assignment. Structured and semi structured questionnaires were prepared for the following studies for data collection:

1. Need assessment study (Separate schedule for separate departments focusing on infrastructure)
2. User Perspective Study

3. Providers Perspective Study

Team Deployment: Teams comprised of experts from three different fields of expertise; namely, hospital planning, hospital management and architects specialized in hospital architecture. Hospital

assessment team comprised of hospital planning and hospital management professionals. Building and Facility assessment team comprised of architects and engineers.
The field teams for data collection and facility assessment comprising qualified hospital administrators with a team leader were trained over a period of several days in the methodological aspects of data collection and assessment before they were actually launched in the field. This was done to ensure quality of data to be collected.

Stage II:

Data Collection: Data Collection has been done through hospital visits for general facility assessment and architectural assessment. Provider and user perspective has been elicited from the provider's interview and user perspective study to assess present and future requirements of the hospital.

The leaders of the field teams were in constant contact through e-mail and voice communication with the project leader at the back office at the Medica Synergie Headquarters so that the progress of work could be closely monitored and advice rendered whenever found necessary.
Separate architectural and engineering teams visited the hospitals and collected relevant data and made detailed assessment of the existing infrastructure and building services.
Another architectural team along with engineering component collected the measurements of all existing buildings to prepare Auto Cad drawings of the floor plans to facilitate preparation of the master plan.

Stage III:

Data Analysis: Different sets of data were analyzed adopting various accepted management and statistical tools with the help of experts to ensure correct processing and derivation of meaningful information. Through this analysis an understanding of the prevailing reality situation was made identifying the gaps against the needs and deviations from accepted norms. This helped in designing the infrastructure up gradation plan of the concerned hospital.

Data Source: Secondary ***data collection*** *was done* based on the Census of India, Bureau of Indian Standards**(BIS**) standards for hospitals, Indian Public Health Standards **(IPHS)** guidelines for district hospitals, Medical Council of India **(MCI**) guidelines for Medical Colleges and other documents pertaining to infrastructure.

- Copies of all available architectural and engineering drawings were collected to facilitate master plan preparation.
- Hospital utilization statistics were collected from the available hospital records in order to determine the trend and for projection of future need

- ***Primary data collection*** based on the toolkit prepared for data collection, questionnaires for patient feedback through observation and discussion with the key functionaries of the hospital to understand their expectations and develop common understanding of the existing scenario and future requirements.
- Statistical data which were not available in hospital records were collected through observation, interview, questionnaires and measurement.

Tools

- Facility assessment toolkit.
- Interviews with various stakeholders of the organization like the Principal, Medical Superintendent, HOD's of respective clinical specialties, Nursing Staff, Hospital Manager & other key functionaries and administrative personnel at all levels of management hierarchy of the hospital were done to elicit the required information regarding the present state of functioning and the problems faced by them in smooth execution of their roles and discharging their responsibilities due to infrastructural constraints.
- Secondary literature review: This was done in order to familiarize with the local situation, geographic characteristics, demographic parameters, previous such studies elsewhere etc.

Stage IV:

Architectural Plan Preparation

The architectural plan preparation was the most important component of the assignment which essentially comprised of the following:

- Concept Plans of the Proposed Expansion and Reorganization of the each facility
- 20 year single line Master Plans and 5 year priority Plans

Stage V:

Report Preparation

An interim report has been prepared to document the activities of the entire assignment. This constitutes the last stage of the same.

User and Provider Perspective Study

In compliance with the objective of developing patient centric infrastructure master plans for SCB Medical College Hospital, a user and provider perspective study has been carried out to elicit their perceptions about the facility. A cross sectional study was conducted separately for the inpatients and outpatients using structured questionnaires comprising of separate set of questions for IPD and OPD respondents.

Limitations of the Study

Data collection through facility assessment has been the most challenging component of this assignment. The same has been carried out by three assessment teams one of which comprising of experts in hospital planning and management while the others comprised of architects and structural engineers. Major hurdles encountered during the study have been enlisted below:

- Non availability of vital and relevant utilization data such as ward wise occupancy rates, average length of stay (ALOS), inpatient caseloads etc.
- Respondents of the user perspective study were reluctant to give vent to their real feeling about the hospital which needed allaying their apprehension resulting in slowing down of the process of the study
- Cooperation of some hospital staff was not whole hearted which delayed the study.
- Due to restricted hospital timings, availability of clinical staff & HOD's delayed the process of the study.
- All relevant architectural inputs such as plans and drawings were hard to be access.
- Soft copies of the floor plans, layout plans and plan of building services needed for planning reorganization of the facilities and development of master plans were not available necessitating deployment of additional survey teams with severe time and other implications.

Capital Hospital: An overview

Overview

Capital Hospital is a multi specialty Government Hospital. This Hospital was set up by the Government of Orissa in early 1950's when Bhubaneswar was made the Capital of Orissa to cater to the medical needs, initially for the residents of Bhubaneswar and its adjoining areas, and later to the whole of Orissa.

The hospital is the oldest of all the hospitals in the City of Bhubaneswar. The access to the hospital complex leads from National Highway No.5 through a straight road named as Sachivalya Marg, Pt. Jawaharlal Nehru Marg and forest Park Road in the different parts of its entire length. The distances of the hospital from the different landmarks in the city are 6 K.M from the N.H.5, 5 K.M. from the railway station, 9 K.M. from the Baramunda Bus Stand and 3 K.M. from the airport.

The Hospital has two entrances. The main entrance is located opposite the forest park and the other is at the north end of the hospital.

Building Plan

Capital Hospital is primarily housed in a double storied building. Majority of functional areas have been accommodated in the ground floor while the remaining facilities are located in the first floor, which has been detailed out as follows. There is a Regional Diagnostics Centre (RDC), which has the laboratory and radiology sections in it.

Table No: 2: Floor wise available services

Floor	Functional Areas
GROUND FLOOR	Out patients department
	Administrative Block

	Police Out-post
	Medicine ward, Pediatric ward , Maternity ward, Cardiology ward, Orthopedic ward, Surgery ward, Ophthalmology ward, Pathology ward
	Morgue & Post Mortem Service
	Intensive Care Unit
	Kitchen and Laundry
	Electric Sub Station
	Burn unit
FIRST FLOOR	Medicine ward, Surgery ward, Obstetrics ward , Pediatric ward, Cabins & Special Cabins
	Doctors Chamber of Physiatrist, Dental , Dermatology & V.D. Chest & Tuberculosis
Regional Diagnostic Cer (RDC)	X-Ray
	TMT and Holter Monitoring
	ECG
	Ultrasound
	2D Echo
	Colour Doppler

	CT Scan
	Biochemistry
	Microbiology
	Clinical Pathology and Hematology
	Serology(Only test related to HIV like Elisa are done)

Table No:3: Existing bed distribution, Capital Hospital

Existing Bed Distribution: Capital Hospital, Bhubaneswar	
Department	**Existing Bed Strength**
Casualty	11
Cardiology	14
ID Ward	21
Medicine (Male)	56
Medicine (Female)	32
Obstetrics and Gynecology	100
Ophthalmology	20
Orthopedics	26
Laparoscopy	5
Paediatric	150
Surgery (Male)	42

Surgery (Female)	30
Cabins	40

Catchment area - Review

Catchment Area Overview: Capital

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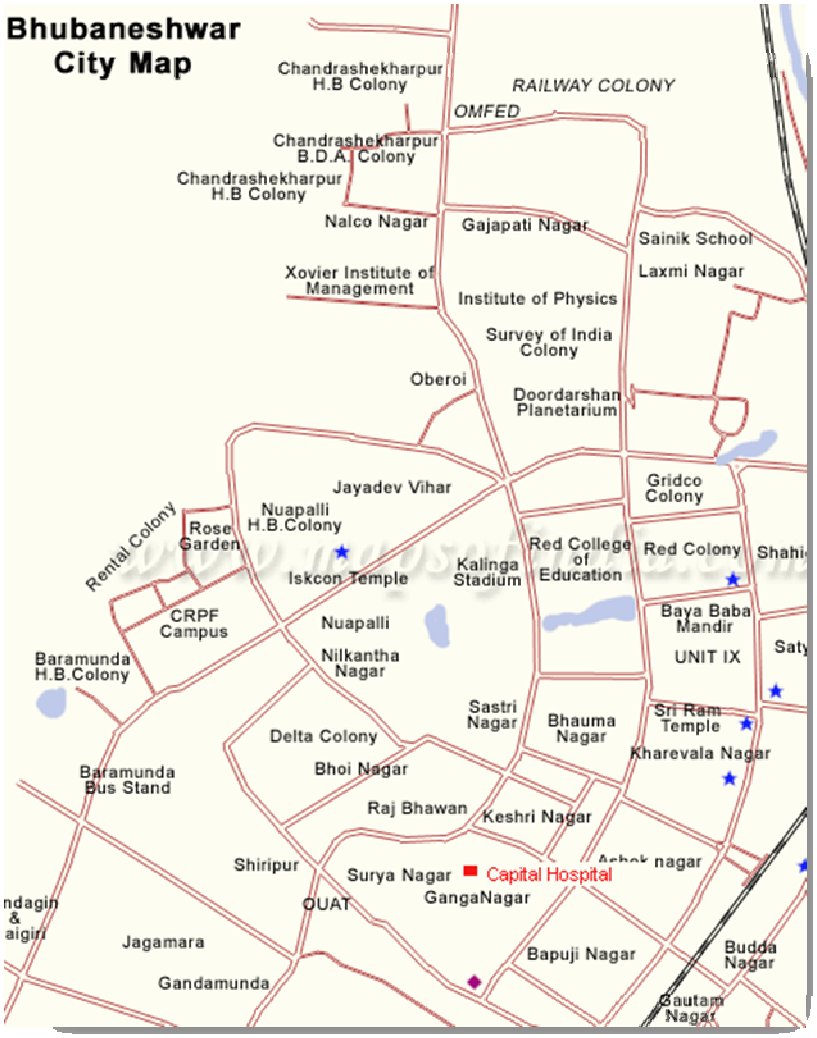


Fig 1: Bhubaneswar City map and the location of Capital Hospital

Capital Hospital is a secondary level public hospital serving western and coastal Orissa. Majority of the patients (68%) come from the Bhubaneswar City alone. This constitutes the primary catchment area of the hospital

About 18% patients come from adjoining districts such as Nayagarh, Khurda (other than Bhubaneswar City), Puri, Sambalpur, and Brahmapur. This is the, secondary catchment area of the hospital

Patients from neighboring district such as Cuttack also comprise a considerable proportion of the clientele of the hospital.

Fig 2: Catchment Area for Capital hospital, Bhubaneswar

Based on our study findings, the catchment area for the Capital Hospital has been defined in the following manner:

Table: 4: Catchment Area Population

Catchment Area	Population (in Lacs)*
Bhubaneswar City	**6.48**
Other District (Nayagarh, Khurda, Puri, Sambalpur, Brahmapur)	**35.65**
Cuttack (Barang, Niali)	**14.61**

*(*Source: Census of India 2001)*

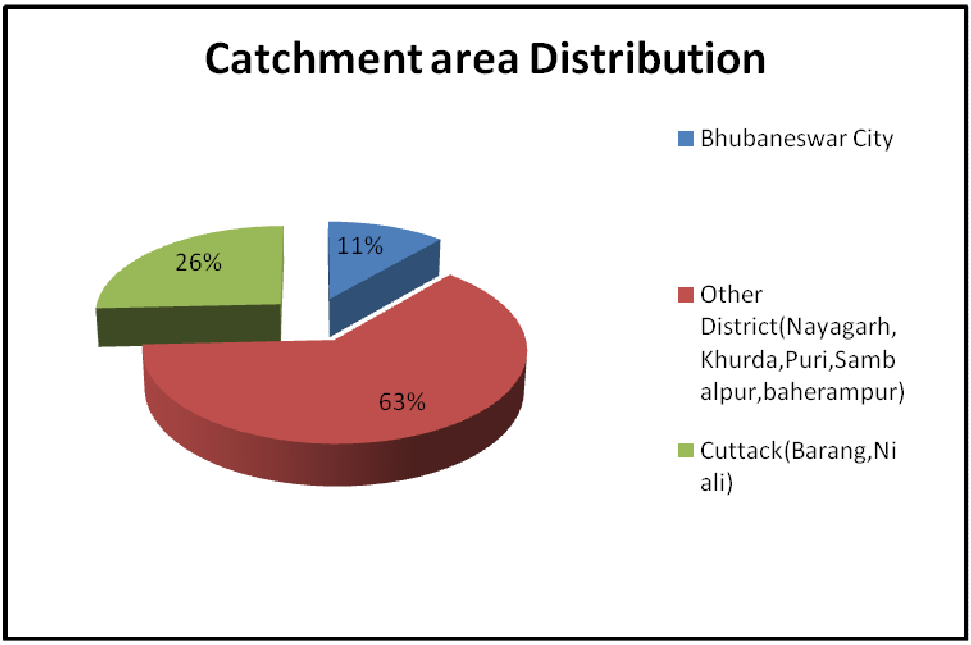


Fig 3: Catchment area distribution

Individual Department's Assessment, Gap identification and Analysis

Clinical Services

Out Patient Department (OPD)

Seventeen specialties run their OPD in the Capital Hospital like a polyclinic. OPDs are decentralized, located mainly in the ground floor with approach through narrow corridors. The available space is crowded and is not sufficient to accommodate the present patient load. There is a central registration counter where registration is done manually. Average OPD registration per day is around 650. Details of the Out Patient Departments are as follows:

Decentralized OPD: The OPDs of the following specialties are scattered all around the hospital. Some of the OPD's as Cardiology, Obstetrics & Gynecology, Ophthalmology and Pediatrics are being conducted from their respective departments.

- Medicine
- Surgery
- Obstetrics & Gynecology
- Pediatrics
- Orthopedic
- Cardiology
- Ophthalmology
- Psychiatry
- Neurosurgery
- Casualty

Centralized OPD: OPDs for the following specialties are grouped together in the first floor adjacent to the Telemedicine wing.

- Skin & VD
- Tb & Chest
- Dental

Special Super Speciality OPD: Doctors from S.C.B. Medical College visit Capital hospital periodically and conducts following OPD on regular basis:

- Neurology
- Cardiology
- Neurosurgery
- Endocrinology
- Gastroenterology
- Nephrology

Table No: 5: Gap Analysis Matrix-OPD

Criteria	Observation
In general	
Location and Accessibility	▪ Medicine OPD is located near the casualty & Emergency department ▪ Surgery OPD is conducted near the Reception and pharmacy outlet. ▪ In the Obs & Gynae building, Obstetrics OPD is conducted in the ground floor and Gynecology OPD at the First Floor ▪ Orthopedics, Cardiology, Ophthalmology, Pediatric & Neonatology OPD is done at Orthopaedic dept ▪ Dental, Skin & VD, Chest & TB OPD share same floor above ENT OPD ▪ ENT OPD is conducted near main entrance
Registration	▪ One central registration is present with two counters and approximate area of 250 Sq.Ft.

No of consultation rooms earmarked for each discipline	▪ For each discipline one room is designated for conducting OPD
The size of a typical consultation room	▪ All the consultation rooms are approximately of 200 Sq.Ft.
Are the consultation rooms provided with attached toilets	▪ Toilets are attached to the Medicine, Pediatric, Obs & Gynae, Casualty and Ophthalmology consultation room. ▪ ENT, Cardiology, Orthopaedic, Surgery, Dental, Skin, Chest & TB, Psychiatry consultation rooms do not have attached toilet.
Discipline-wise OPDs having sub-waiting areas	▪ Obs & Gynae, Paediatrics, Ophthalmology ,Medicine, Dental, Skin & VD, Chest & TB, Cardiology discipline have a sub-waiting area ▪ Orthopedic Surgery, ENT, Casualty do not have sub waiting areas
Public Area	
Entrance: Accessibility	▪ The entry to registration area is closed, presently existing entry is through casualty and CMO office
Reception and information	▪ One reception counter is present but there is no information counter. One person from reception gives the information regarding location of the facilities
Registration and Records area	▪ There is no record area in the OPD ▪ This facility is common for IPD and OPD

Public toilets and washrooms	▪ There are no public toilets in the OPD area ▪ One toilet is present adjacent to the medicine OPD and Gynecology OPD but the condition is very poor ,no sanitary attachment is there, floors are overflowing with urine and accumulated water ,broken doors, windows. Patients and attendants are using open hospital ground as public toilet
Drinking water	▪ There is no provision for drinking water facility in the OPD. ▪ Four Cold-water dispensing units are placed near the wards.
Snacks bar	▪ There is an outsourced snacks bar in the hospital campus
Telephone Booth	▪ Telephone booth is also present in this snacks bar
Ancillary Facilities	
Injection Room	▪ There is an injection room but due to lack of adequate space it is always overcrowded
Treatment Room/Examination Room	▪ Treatment room facility is available ▪ Examination room is there only in Gynecology clinic
Dressing Room	▪ This facility is present in the OPD in front of Surgery clinic

Pharmacy	There is a pharmacy dispensing unit in the OPD adjacent to the Emergency department.
Immunization Clinic	▪ Immunization clinic is present
State of maintenance	▪ All the ceiling, walls and floors are cemented and plastered ▪ Seepages are seen on the walls of Medicine, Cardiology OPD

Analysis:

- In OPD patients are unable to locate the present OPD reception counter due to absence of appropriate signage creating unnecessary delay and confusion among patients and their attendants.
- . The registration and enquiry are located far from the main OPD chambers and the approach to it is not direct, therefore the hospital registration counter and corridors are always overcrowded.
- Long queues were observed in front of every consultation room due to lack of sitting arrangements.
- Due to non availability of examination room doctors examine the patient in their consultation room without any privacy for patients.
- As trolleys & wheel chairs are not available, transportation of serious and old patients becomes very difficult.
- Adequate number of public amenities like toilets, drinking water facilities, sitting arrangements is not there in the OPD areas.

Operation Theatres (OT)

There are nine operating rooms in this hospital located in different areas in a decentralized manner. Some operating rooms have more than one OT table placed in them.

Ophthalmology OT is located in the Ophthalmology block and approach is through ward. Gynecology & Obstetrics OT is distantly located from the main building blocks on the first floor of the Obstetrics & Gynecology Block. There are two Gynae. & Obstetrics OT's out of which only one is functional.

Dental O.T is located on the first floor of the main hospital building adjacent to Laparoscopic O.T. The other O.T. is located on the first floor opposite to the Dental O.P.D.

Table No: 6: O.T. Distribution Matrix

Operating Departments	Location	Nos. of Operating Rooms	Nos. of Tables per Operating Room
Surgery			2
Orthopedics	In the ground floor of the main hospital building.	1	1
Ophthalmology	In the ground floor of the main hospital building.	1	2

Gynecology & Obstetrics	First Floor of the Obstetrics & Gynecology Block adjacent to Pathology and Laboratory.	2 (1 OR is not functional)	2
Dental Surgery	In the first floor of the main hospital building	2	3, (2 Dental Chairs in 1 O.T., & 1 Dental Chair in the other O.T.)
Laparoscopy	In the first floor of the Main Hospital Building Block.	1	1
Minor	Ground Floor of the main hospital building to the left of the main entrance. .	1	1

Table No: 7: Gap Analysis Matrix-Operation Theatre

1	Access Zoning	None of the OT is having access zoning of protected zone, clean zone, and aseptic zone in ascending order of degree of sterility. There is no disposal zone also.
2	Ventilation System	In none of the operating rooms, there is any controlled ventilation system with control of temperature, humidity and air filtration. Cooling and ventilation are done through window air conditioners.
3	Ancillary Rooms	Standard ancillary rooms in the OTs are not provided. These main deficient ancillary rooms are as under: • Reception

		• Pre-Operative Room • Post-Operative Room • Change Rooms • Waiting Rooms • Doctors' examination Room • Anesthesia Room • Trolley Lay-up Room

Analysis:

- Design and layout of an operation theatre is based on two major considerations – one is prevention of surgical site infection and the other is efficiency of operation.
- Access zoning is an important consideration. All functionaries working in the OT are required to change into OT clothes before they enter the clean zone. Location of scrub room is also critical in this regard. Those who are taking part in the actual OT procedures should be able to scrub-up and don sterile gown etc before they actually enter operating room proper.
- Ventilation system of an OT may have a major impact on prevention of surgical site infection. This has not been designed appropriately as per the accepted norms. Higher incidence of surgical site infection, therefore, cannot be ruled out. This will be of more serious concern in OTs like orthopedic OT. The arrangement of disposal of used and dirty items through the clean area is not an acceptable proposition. Perforce, this is being done in absence of a disposal corridor in the OT.
- It was observed that the flow of the patients, hospital staff and materials in all the OTs is through only one entry and exit. Chances of contamination increases with this kind of arrangement.
- Decentralization of OTs is not commensurate with efficiency. Management of the OT, quality control, economization in the use of staff, equipment and materials cannot be done in decentralized layout.

Intensive Care Unit (ICU)

There are two intensive care units in Capital Hospital. One is Intensive Coronary Care Unit (ICCU) situated inside the Cardiology ward and another is Neonatal Intensive Care unit (NICU) located in the Infosys Pediatric Hospital.

Medical pipelines are installed in both the Intensive care units but this facility is not functional due to non-availability of trained manpower and suppliers.

Ancillary room like dress change room, attached nursing station is not there to provide infection free environment and effective patient monitoring.

It was observed that traffic flow in these areas is unrestricted. There is no restriction of entry to these areas to the patient attendants and outsiders. Moreover most of them enter in these facilities to meet the patient without proper precautions like disinfecting hands, putting shoe covers, etc.

Table No: 8: Gap Analysis Matrix-ICCU,NICU

	Bed Space	Ventilation	Circulation	Ancillary rooms/Support Area
ICCU (Intensive Coronary	▪ This facility has 8 beds in two separate rooms	▪ 4 split AC's having 1.5 TR capacity each	▪ One entry and exit for Hospital staff, patients,	▪ Waiting area for patient attendants are provided

Care Unit)	each containing 4 beds. Presently, it is non functional ▪ Per bed approximate area available is 110 Sq.Ft ▪ Inter bed distance from center to center is approximately 6 ft	are installed in the ICCU	both for clean and dirty items. Hospital staff enters the ICCU directly without changing their street clothing.	but without toilet ▪ Trolley bay is present outside the ICCU ▪ Provision for a nurses duty room is there with toilet ▪ One store is provided for storing clean utility, medicines and consumables ▪ Nursing station is located outside the ICCU area ▪ There is no doctor's duty room ▪ There is no provision for dress change room and hand washing facility ▪ Pantry is not there ▪ There is no janitor closet
NICU (Neonatal Intensive Care Unit)	▪ This facility has 8 beds. Per bed approximate area is 110 Sq.Ft ▪ Inter bed distance center to center is approximate 6 ft	▪ There is no mechanical ventilation system in this facility	▪ One entry and exit for Hospital staff, patients, Clean items, and dirty ▪ Hospital staff go to the NICU directly without changing the clothes and footwear	▪ There is no provision for trolley bay, reception, waiting room with toilet, shoe change room, change room , store, pantry, clinical test room, feeding area, formula room, septic case area ,hand washing facility janitor closet, toilet ▪ Nursing station located

				outside the NICU ▪ There is a doctors duty room ▪ Windows are kept open all the time

Analysis:

Although Capital Hospital is a multi specialty hospital, provision for Intensive care beds for specialities like Medicine, Neurology, Surgery etc are not present.

- The ratio of Intensive care beds (accepted percentage is 10% of the hospital's total bed strength) to the total bed strength needs to be looked upon and accordingly the total number of intensive care beds need to be re planned.
- Nursing station in the ICCU is located outside the ICCU but all the 4 beds are not visible simultaneously due to which proper monitoring of patients cannot be done.
- The nursing station in NICU is positioned outside the NICU room without any view of the patients inside.
- The present ventilation system in ICCU and NICU is not proper; windows are kept open which may lead to cross infection among patients.
- The entry and exit of people, inventory and other materials (clean & dirty) is through a single point in the ICCU as well as NICU. The hospital staff enters the Intensive care unit directly without washing their hands or changing their clothes and shoes.
- In present scenario due to absence of separate store for clean utility and dirty utility clean and dirty linen are getting mixed comprising hospital infection requirements and exposing patients to various infections.
- The food trolleys used for supply of patient meals are being parked in the corridors by the kitchen staff causing interruption in the traffic movement.
- There is no provision for ancillary area like trolley bay, reception, waiting room with toilet, shoe change room, change room, store, pantry, clinical test room for both the intensive care units and special room like feeding area, formula area, septic care area, hand wash area, janitor closet, in NICU.

- Presently the windows and doors of the Intensive care units are not closed properly. The condition of the doors, windows, walls, false ceiling and floor is poor due to lack of proper maintenance.
- There is no separate medication area with a refrigerator for medicine storage, a double locking safe for controlled substances, and a tabletop for preparation of drugs and infusions.
- There is no isolation unit for both the intensive care units as per the standard i.e. One isolation bed for every ten Intensive care beds.
- Due to non-functionality of medical gas pipelines, critically ill patients are not admitted here.

Maternity and Delivery Unit

In Capital Hospital Maternity & Delivery unit is located at the extreme end of the main corridor, at the backside of Infosys pediatric hospital. The delivery room has five delivery tables all in one room. The general civil maintenance of the labour room is poor with inadequate illumination and ventilation. Unrestricted traffic flow in the labour room leads to unavoidable congestion and interferes with the smooth functioning of the delivery room.

Analysis:

- The ancillary rooms like clean utility, dirty utility, reception, relatives waiting, change rooms and baby resuscitation rooms are not available. Appropriate ventilation system is also not available.
- The labour and delivery rooms should have its associated ancillary rooms with appropriate ventilation system.
- The delivery room should be so designed that it facilitates functioning, minimizes chances of hospital-acquired infection and promotes efficiency. The design requirement for the labour and delivery rooms should follow more or less the similar standards as that of an operation theatre.
- Placement of five delivery tables in one room is fraught with danger of contacting hospital-acquired infection besides compromising with privacy; modesty and dignity of would be mothers.

In Patient Department (IPD)

Capital hospital houses twelve inpatient wards of various disciplines. Wards are located along both the sides of the main hospital corridors. These wards are accommodated in two-storied hospital building. The details of the wards are mentioned below.

Table No: 9: Ward - Bed distribution Matrix-In Patient Ward

S. No.	Department	Actual bed strength	ALOS	BOR
1	Casualty	11		
2	Cardiology	14	4	116
3	ID Ward	21	15	271
4	Medicine (Male)	56	5	145
5	Medicine (Female)	32	5	145
6	Obstetrics and	100	5	145

	Gynecology			
7	Ophthalmology	20	2	82
8	Orthopedics	26	8	232
9	Laparoscopy	5	2	58
10	Paediatrics	150	4	116
11	Surgery (Male)	42	8	232
12	Surgery (Female)	30	8	232
13	Cabins	40	7	203

Table No: 10: Wards' detailed matrix

Departments / Observation	Orthopedics	Medicine (M)	Medicine (F)	Surgery (M)	Surgery (F)	Cardiology	Ophthalmology	I.D.H	Obs & Gynae	Paediatric	Observation
Location	Ground Floor	First Floor	Ground Floor	Ground Floor	First Floor	Ground Floor	Separate Building	Separate Building	Separate Building	Separate building	Ground Floor
Access to the Department	▪ Male Medicine ward, Male surgery ward, Cardiology ward, Ophthalmology ward and Observation wards can be accessed through corridors, with approximate width of 6 ft. ▪ Obs & Gynae wards are located in the main hospital block but a little far from main hospital										

	building. Both the floors are connected through ramps and stairs. ▪ Both the surgical blocks and medicine blocks (male and female) are inter connected through ramp and stairs ▪ Pediatric wards are housed in a separate hospital building which is linked to the main hospital block through a corridor and all the floors are connected through ramps and stairs ▪ IDH ward is located within the hospital complex but far from the main hospital building.
Ward Design	▪ **In every ward, there are 4 - 5 cubicles with 6-8 beds in each cubicle.**
Distance between two beds (centre to centre - in multi bed rooms)	▪ All the wards are crowded; more beds are adjusted in the ward to accommodate more patients. Average distance between two beds (centre to centre) is approximately 5 ft
Support Facility / Rooms	
Nursing station/Duty room	▪ Nursing Station is situated outside the wards hindering visualization of the patients ▪ No toilet is attached with the nurses' duty room
M.O's Room	▪ Male medicine, Obs & Gynae, Surgery male, Surgery female and Paediatric wards have Medical Officers' rooms ▪ IDH, Ophthalmology, Cardiology, Female medicine and Orthopaedic wards do not have this facility.
Ward Store	▪ There is no store in the Ophthalmology ward ▪ In Other wards one store is available for clean utility and medicine

Pantry	▪ There is no provision for pantry in any of the wards.
Dirty utility	▪ There is no provision for dirty utility in any of the wards ▪ Dirty items are stored in the respective wards, in one corner of the store
Janitor Closet	▪ There is no provision for a janitor closet in the hospital
Trolley Bay	▪ Paediatric and IDH wards have trolley bays. Other departments like Medicine(M/F),Surgery(M/F),Ophthalmology, Cardiology, Obs & Gynae) do not have this facility

Table No: 11: Ward wise Gap Analysis Matrix: Sanitary Annexes

Sanitary Annexes											
Bath	1	2	4	3	4	1	1	3	4	6	N.A
Urinal	N.A	N.A	N.A	4	2	N.A	N.A	N.A	4	N.A	N.A
Water Closet	2	2	4	4	4	3	2	4	4	6	1
Wash Hand Basin	N.A	N.A	N.A	4	4	1	1	1	N.A	6	1

Table No : 12: Provided additional facilities for special care area

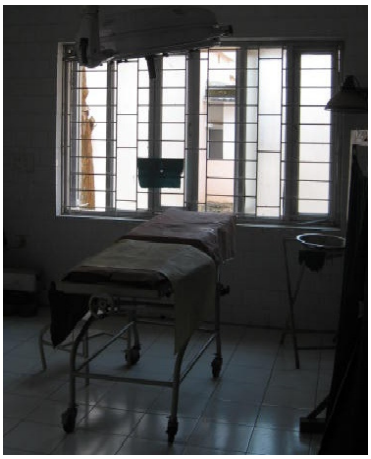
1	Orthopaedics	Plaster Room
2	Burns Unit	Air conditioning
3	Head Injury and Convulsive Unit	Air Conditioning
4	Cardiology	Intensive Cardiac care Unit
5	Infectious Disease Hospital	Waiting Area for attendants

Analysis:

- Shifting of serious patients from first floor post operation to the wards is a problem due to non existence of lifts in these wards as presently inter departmental connection is through ramps and stairs.
- All the wards are overcrowded with patients. In order to accommodate the excess patient load extra beds are placed in the wards compromising the distance between two beds (centre to centre), making patients prone to cross infection. In Capital Hospital distance between two beds center to centre is approximately 5 ft, which is reasonably low, compared to the accepted standard of 8 ft.
- Nursing station is present outside the wards, without any proper view of the wards, which leads to inefficient patient monitoring and intervallic care. Medicine trolleys found deserted in the corridors, which will lead to pilferage of drugs and other consumables.
- There is no duty medical officer room to address emergency needs of the ward patients.
- In Capital Hospital, except Ophthalmology ward all other wards have a common store for storage of linen and ward consumables. Dirty linen is also kept in the ward store increasing chances of infection among staff and patients.

- In absence of ancillary rooms like janitors closet, the house keeping staff keeps their materials in the ward toilets and corridors, which creates unnecessary clutter in the wards.
- The food trolleys used for supply of patient meals are found parked in the corridors and nursing station by the kitchen staff creating unnecessary clutter and confusion in these areas.
- Provided public amenities are insufficient in the wards. The hospital complex has six drinking water facilities none of them is placed in the wards.
- Sanitary arrangements in the wards are inadequate and the existing facilities are in a bad shape as most of the toilets are broken and water closets are chocked.

Emergency & Casualty Unit



The Emergency and casualty department is located in the ground floor of the main hospital building. There is a separate access point for the emergency patients, which lead to the consultation area of the casualty unit. There is an observation ward consisting of 11 beds along with a minor procedure room for managing emergency patients. Though the casualty department caters to about 1-lakh patients annually, there is no triage area for prioritizing the emergency patients. The consultation area is overcrowded as it is also used as a nurses' duty station for the observation ward. There is a minor OT present but ancillary facilities are not present such as change rooms, utility areas, and sterilization areas.

Table No: 13: Gap Analysis Matrix-Emergency & Casualty

Particulars	Remarks
a) Reception	NA
b) Triage	NA
c) Resuscitation Area	NA
d) Acute Treatment Area	NA

e) Consultation Area	There is a consultation area of about 400 Sq.Ft. where two/three doctors sit.
f) Procedure room	NA
g) Plaster room with storage for plaster, bandages, splint and crutch store	NA
h) Treatment room	NA
i) Administrative area	NA
j) Storage	There is a store behind the consultation room, which serves as a multipurpose store for the casualty/emergency.
k) Clean Utility	NA
l) Dirty Utility	NA
m) Cleaners' room	NA
n) Diagnostic Area (Imaging / Laboratory)	NA
o) Doctor's room	NA
p) Nursing station	NA
q) Security room	NA

r) Room for police personnel	Yes
s) Disaster equipment store	NA
t) PMGV supply	NA
u) Relatives' waiting area with toilet	NA
v) Nurse staff room with toilet facility	NA

Clinical Support Services

Imaging Department

The Imaging department at Capital hospital comprises of X-Ray, Ultrasound and the CT scan facilities. As these facilities are not grouped in one-place, patients face problem in locating these facilities.

Non-invasive cardiology investigation modalities such as the ECG, TMT & Holter Monitoring are also located in this department adjacent to the Ultrasound room. Some ancillary facilities such as changing room and toilets are being shared among these facilities.

The registration for these diagnostic procedures is done in their respective rooms but billing for all diagnostic services is done from a centrally located billing counter in front of X-ray room.

Presently the hospital possess has a 500 mA X-ray machine along with three 60 mA X-rays machines. There is only one radiography room, which accommodates all these machines thereby increasing chances of radiation hazards. There is a Color Doppler room located in the main building beside the special cabins on the ground floor. There is only one toilet, which is not functional as it is under repair.
The CT scan facility lacks some of the important facilities such as trolley bay, patient changing cubicle, technicians' room and a proper console unit etc.

Analysis:

- The rooms are not being constructed as per guidelines laid down by the Atomic Energy Regulation Board (AERB). As per the Radiologist, the walls and doors (lead shielding of doors and windows) of this unit is not as per the guidelines of AERB for radiation protection for establishments providing clinical radiology services.
- Long queues are seen in front of all the facilities due to lack of sub waiting areas

- Required ancillary rooms are not present to facilitate the departmental functioning. The Matrix below presents present status of ancillary rooms.

Table No:14: Gap Analysis Matrix-Imaging Department

Particulars of Ancillary Rooms	Current Status
X-Ray	
a) Reception and Registration counter	Needs to be provided
b) Waiting room with toilet	Needs to be provided
c) Fluoroscopy and radiography rooms	There is one room, which accommodates the 500 mA X-ray machine. There are three 60 mA mobile X-ray machine. All these machines are located in one room
d) Attached changing cubicle with toilet	Needs to be provided
e) Film developing and dark room	There is a dark room consisting of the developing and fixing tank but it needs immediate repair and maintenance.
f) Film drying room	There is a drying room adjacent to the developing room. The same can be accessed from the developing room.
g) Office, Record and computer room	Needs to be provided

h) Radiographic work room	Needs to be provided
i) Stores	There is no designated store for storage of X-ray films, chemicals and reagents and other materials. Presently these are dumped either in the X-ray room or in the developing room
1) Radiologists' rooms	There is one Radiologist room
2) Injection and Barium meal preparation room	Needs to be provided
3) Trolley Bay	Needs to be provided
4) Observation room	Needs to be provided
5) Room for lying patients on stretcher	Needs to be provided
Ultrasonography : The USG area is located in the main building beside the special cabins on the ground floor	
a) Sub waiting room	Needs to be provided
b) USG room (Black & White)	Needs to be provided
c) Colour Doppler room	One Colour Doppler room
d) Toilet	Toilet present but not functioning

6) Mammography room	Needs to be provided
a) Change room	Needs to be provided
7) Film Library	Needs to be provided
8) Seminar room	Needs to be provided
CT Scan	
a) Trolley Bay	Needs to be provided
b) Patient Change Cubicle	Needs to be provided
c) Radiologist's room	There is a radiologist room in the CT scan department
d) Technician room	Needs to be provided
e) Gantry room (=>25 M^2)	Present
f) Console room	Present
g) Record room/Computer room/Reporting room	Needs to be provided
h) Dark room	Needs to be provided

i) Toilets	One toilet
j) Store room	Needs to be provided

Hospital Laboratory

Laboratory services are located in a separate (newly constructed) building, called Regional Diagnostic Center (RDC).It is a two storied building located little away from main hospital building. Interconnectivity between two floors is through stairs and ramp.

Table No:15: Gap Analysis Matrix- Hospital Laboratory

Particulars	Availability
Reception & registration	NA
Specimen collection and distribution	NA
Examination cum sample collection room	Available
Waiting Room with Toilet	
Pathologists' Office	
Stores	There is store for storage of chemicals and general items.
Stores-in-charge's room	N.A.
Staff changing with toilets	N.A.
LPG Bank	N.A.
Histopathology Section	There is no histopathology section.
Hematology Section	There is a Hematology lab but no

	hematologist's room.
Biochemistry Section	There is a Biochemist's room and a biochemistry laboratory.
Microbiology Section	There is a Microbiologist's room, bacteriology laboratory, media room that also functions as media kitchen and media storage, sterilizer room and incubator room. There is no mycology laboratory and cold storage.
Immunology Section	No immunology section in the hospital.
Clinical Pathology Section	Only stool / urine examination provision.
Virology Section	There is no virology section.
Equipment Cleaning Section	There is an equipment cleaning section consisting of a wash up room, preparation room, and sterilizer room and storage area.
Photography & Illustration, Pathology Museum and other facilities	No such provision.
Computer and reporting room	There is a reporting room with computer.

Analysis:

- Specimen collection and report distribution are clubbed together in one room, which leads to crowding in the microbiology room.
- There is no acid, LPG store room with store in-charge room; presently these highly corrosive and explosive items are kept in an open area of Laboratory.
- Separate media room, media kitchen, media storage, plate pouring room, sterilization room, Incubation room, cold storage and serology rooms need to provide.
- Specimen cubicle, photometry, chromatography and electrophoresis rooms in Clinical Pathology section need to be added.
- Equipment cleaning section should be segregated.
- Photography and illustration section should be provided.

Blood Bank

The blood bank at Capital Hospital is located in a separate building dedicated for this purpose. The same is located opposite the entrance of the casualty department. All mandatory requirements for a state of the art blood bank are present within the facility. Hospital authorities claim that this blood bank has Eastern India's only apheresis facility.

Table No: 16: Gap Analysis Matrix-Blood Bank

Particulars	Availability
Room for registration and Medical Examination	Available
Lab for blood group serology (A/C)	Available
Lab for blood transmissible diseases (Syphilis, Malaria, HIV-antibodies, Hepatitis-antibodies) (A/C)	Available
Blood collection room (A/C)	Available
Blood component Preparation (Shall be A/C) – 50 M^2	Available
Sterilization cum washing	Available
Blood storage Area	Available
Area for quarantine of blood and reagents not suitable for use	Available

Store cum Records Room	Available
Staff Room	Available
Blood Bank In charge room	Available
Patient waiting area	Available
Patient refreshment/ rest room	Available
ICTC Counseling Room	Available
PPTCT Counseling Room	Available

Analysis:

- Seating arrangements in the blood bank is only for 10 people, which leads to overcrowding during peak hours.

Support Services

Bio Medical Waste Management

Capital Hospital has a Bio Medical Waste Management Committee, which is represented by all key hospital functionaries and health authorities of the region. Though segregation, collection and temporary storage of the waste is done in house, the disposal of waste is outsourced to a private vendor named as **"Sani Clean"**.

Color coded bins have been provided throughout the hospital as per statutory guidelines but segregation of waste at the point of generation is not done appropriately due to lack of training. There is a temporary waste storage facility from where the waste is disposed off every 24 hours. There is a separate room located outside the main building for all BMW activities. The hospital has a shredder and autoclave facility but none of these equipments are used.

Analysis:

- The process of collection and segregation of waste takes a long time because the service is out sourced and none of the in-house personnel has been given any training for the same.
- There is no change room facility available for the personnel who are responsible for collection & segregation of biomedical waste because of that all staff change their dress in the ward toilet, hence it may lead to infections.

Fire Protection Facilities

The hospital does not have any smoke detector, sprinkler system, fire alarm, fire shield doors as well as fire signage. Underground water storage tanks, fire hydrant and wet risers are not available. No fire training has been given to the staff of the hospital.

Seven sets of fire extinguishers are placed in the main O.T complex, C.T Scan complex (CT, 2D Colour Doppler, Ultrasound), Pediatric ward, Medicine ward and Gynae ward.

Analysis:

- Fire extinguishers are present only in limited areas within the hospital building complex.
- In the absence of any designated fire escape route, the ramp can be used for the same since it is centrally located form all patient rooms.
- There are no smoke detectors, sprinkler system, fire alarm, fire shield doors as well as fire signages. There is no underground water reservoir in the hospital to combat fire. .

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Central Sterile & Supply Department

Capital Hospital does not have a Central Sterile Supply Department (CSSD), which is very essential for a hospital of this stature. CSSD ensures sterile supplies of equipments, linen and consumables to the entire hospital.

Presently in the OT complex , there is an autoclave for sterilizing the instruments used in main surgical OT and Orthopedic OT. Apart from that the gynecology OT, minor OT, laparoscopy OT and ophthalmology OT have their own dedicated small sterilizers used for the sterilization of instruments and linen.

Analysis:

The CSSD should ideally comprise of the following functional areas as detailed below:

Table No: 17: Components of CSSD

Components of an Ideal CSSD
Receiving area for soiled articles
Sorting area

Cleaning area
Packing area
Sterilizing and cooling area
Storage area for clean stocks (not sterile)
Storage area for sterile stocks
Dispatch area for the sterile packs
CSSD supervisor's room
Staff change room with toilets and lockers

Ambulance Services

The hospital has two tempo traveler ambulances to carry patients in and around the city, out of which one is not being used while other ambulance is used to service VIP patients. Apart from these two big ambulances, there are three van ambulances used for patient transport.

None of these ambulances is equipped to support patient life during emergencies.
An ambulance driver's rooms is present adjacent to Emergency department.

All the ambulances are parked in open, as there is no provision of a garage to park these vehicles.

Medical Record Department (MRD)

There is a centralized medical record department in the Capital Hospital. It consists of one room of about 500 Sq.Ft. located at the left side of the main corridor in front of the ECG room. There is no computerization of medical records department. The MRD room was found to be heaped with records since the available space is inadequate. Appropriate storage facilities such as racks and cabinets are also not present in sufficient quantity. There is no separate room for the MRD in charge and other staff. The ventilation and illumination of the room is very poor. There is also no pest control and fire fighting measures present in the MRD.

Analysis:

- No proper archiving system of medical records.
- No computerization of medical records.
- An ideal manually operated medical record department should have the following ancillary areas none of which was found to be in existence.

Table No: 18: Components of Medical records Department

Vital Statistics desk
Admission Check Desk

Census Desk
Assembly and Deficiency Check desk
Incomplete Record Control Desk Discharge Analysis and Administrative Statistics desk
Coding and Indexing Desk
Complete Record Control Desk

Linen & Laundry Services

The laundry at Capital Hospital is operated from a separate building located in front of the IDH Block. The building, with a floor area of about 500 Sq.Ft, is in a dilapidated condition due to poor maintenance. Though the space is owned by the hospital, the washing of clothes is outsourced to a private agency called “Sulabh” laundry contractors. The laundry operation is not mechanized. A few washing machines are available but these are not functional for the past two years.

Analysis:

- There is also no proper sewerage system for waste water discharge,
- The present space is also not adequate for carrying out basic activities in laundry like sorting, washing, drying and ironing of the linen.
- An ideal mechanized laundry should have the following functional areas none of which is present.

Table No: 19: Components of Mechanized Laundry

Functional Areas of a Mechanized Laundry

Reception/Collection and Sorting
Change Room
Sluicing and autoclaving
Mending
Washing machine /Driers/ Hydro extractors/ Calendaring and pressing
Mattress sterilizing
Boiler House
Stores
Janitor Closet
Sanitary
Manager's Office

Kitchen and Dietary Services

The Kitchen & Dietary department supplies diet for patients at the hospital. This department is located in the ground floor of the main building with adequate space for ancillary areas. The cooking area, where food is prepared is about 450 Sq.Ft. Water supply in the kitchen is sourced from the municipal supply. Covered drainage is available for wastewater discharge. There are separate storage areas for egg, milk, biscuits and utensils.

All major functional areas, which should be a part of an ideal dietary department, are present with a few exceptions.

Table No: 20: Gap Analysis Matrix-Kitchen and dietary services

Particulars	Current status
Reception of kitchen stores	**Available functional work areas.**
Dietician's room	
Kitchen Manager's office	
Preparation area	

Cooking Area	
Pan Wash	
Food Trolley and container wash	
Servery	
Pot / utensil wash area	
Storage facilities	
Refrigeration facilities	
Disposal of kitchen waste	
Toilets	
Hand washing facilities	
Staff Change/ Rest Room	**Not Available**
Therapeutic Diet Preparation and Cooking Area	
Food trolley bay	

Analysis:

- Ventilation is through two exhaust fans but no exhaust chimneys available that leads to oil strains on the walls that give a shabby look to the kitchen.
- There is seepage on the walls of kitchen, materials store and the utensil store, which may spoil the kitchen material, stored in store.

Mortuary

As per information provided by hospital authorities, the mortuary facility of Capital Hospital is one of the best of its kind in the state of Orissa. It is situated on one corner of the hospital campus between the Regional Diagnostics Centre and the Bio-medical Waste Management Room adjacent to the Post- Mortem room. This Mortuary caters to the need of Puri, Khurda, Cuttack and Bhubaneswar. Mortuary and Post - Mortem room are both separately located. There is a body storage facility for six corpses in three refrigerated double-bodied storage units. No other ancillary rooms are present within the mortuary. The surrounding areas are not cleaned properly presenting a shabby appearance.

Table No: 21: Gap Analysis Matrix-Mortuary

Particulars	Current Status
Body Store	3 Refrigerated double storied storage units
Autopsy Room	Post Mortem room available
Doctor's Change room with toilet	**Not Available**

Viewing room	
Relatives' waiting room	
Janitors' closet	

Analysis:

- There is no doctor's change room with toilet, viewing room, relatives' waiting room and Janitors' closet for smooth functioning in the mortuary.
- Proper approach road to mortuary and connecting road to autopsy room not there.
- Less number of water outlets is present along with improper illumination.
- Provision for mechanical boiler is not there.

Vertical Circulation

There is only one elevator situated between male surgical ward and female surgical ward. The lift is functional but no one uses it. There is no service lift in the whole hospital building for carrying patients in stretchers, wheelchairs, portable x-ray machine, food carts etc

Staircases & ramps are provided for patient movement. Capital Hospital is a two storied building inter-connected through ramps. Ramps are located in the building at the side of medicine ward, surgery ward, Obs. & Gynae ward, pediatric ward. No level landing provided at each door opening in the direction of travel.

Due to perpendicular grooves in the floor surface of the ramp wheel chair bound patient can easily move up. The ramp is covered for protection during rainy seasons.

Analysis:

- There is no service lift in the hospital therefore hospital waste, soiled linen and other service related circulation (medicine supply, food trolleys, etc.) is done through provided ramps and stairs, which may lead to cross infection and also create bottlenecks in the general traffic.

Engineering Services

The engineering services at Capital Hospital include electric supply, water supply, and PMGV systems in the hospital. CESCO and GED are main suppliers of electricity to the hospital .The Hospital has five electrical generators.

The external and internal lighting of the hospital campus is provided by Bhubaneswar Municipal Corporation (BMC) and General Electric Department (GED) respectively. Pediatric ward has Central Air Conditioning, which is not functional at present.

Four bore wells and Bhubaneswar Municipal Corporation are the main source of water supply to the hospital. Piped medical gas & vacuum system is present throughout the hospital along with one manifold room, which is not functional.

There are a few pipes, which carry waste water from the hospital to the sewerage dumping yard. The Bhubaneswar Municipal Corporation has been entrusted the job of cleaning the roads and take the garbage in and around the hospital. There is no sewage treatment plant in the hospital.

Analysis:

- The present available generator sets are not sufficient to provide backup power supply during electrical outage, which can have adverse effect on patient care especially in critical areas.
- At present the there is no provision for power backup facility during power failures in critical areas like Operating rooms, Intensive Care Units etc.,
- Even high end medical equipments and other equipments run in other key departments, computers etc., are found without uninterrupted power supply (UPS) backup.
- There is no water treatment plant and sewage treatment plant. Quality of water supplied to the hospital may affect hospital operations. Without proper water treatment water born disease can spread, drinking water quality can decrease.
- In Capital Hospital campus, sewage pipelines are found choked and sewage is overflowing. This is a cause of environmental pollution in Capital Hospital; medical gas pipeline system is not functional affecting functionality of critical care units like ICCU and ICU.

Note: For more details please refer to the Engineering services content under the chapter Architectural findings and Concept Plans

Central Stores

The central store is situated at the end of the corridor of main hospital building adjacent to surgery ward.

Analysis:

- The store has no separate technical store (for pharmacy items) and a non technical store (for instruments, equipments, linen, and stationeries).

Table No: 22: Gap Analysis-Store

Central Store	
Particulars	Store house for pharmacy & other materials
Location	Backside of the dietary department
	Store is not divided into technical store & non technical store
State of maintenance	Renovation of Civil, Plumbing & Electrical outlets is required
Ventilation	All the rooms are provided with fans.

Signage

Signage facility is found to be in a poor state in Capital Hospital without directory of services and proper signage system.

Analysis:

- A reference map with appropriate color contrast, size and clear definition of the entire hospital campus can help people locate departments easily.
- The present reference map requires repairing and renovation for better visualization. Presently there are signages depicting the departments and the main OPD.
- Presence of information signages across all areas of the hospital would help in sharing information with the patient/visitors.
- Safety, regulatory, prohibitory and advisory signages need to be installed at various crucial areas for better safety of the people.
- Numbering of all the concerned rooms to a directory board in each floor will help in locating them.

Parking

There are six areas where vehicles were parked out of which Hospital Authority has earmarked only one place, in front of the OPD (for two wheelers and four wheelers of hospital staff). Other areas are-

1. In front of the OPD

2. In front of the emergency

3. In front of the Paediatric Hospital

4. In front of the RDC

5. In front of Obs. & Gynae building

6. Back side of the Paediatric hospital

User Perspective Study Report

User Perspective Study of Capital Hospital

The success of a hospital is generally measured by the quality of patient care it provides and the efficiency with which it operates. The healthcare facility planning should be conducive enough for both the users and the providers so as to ensure delivery of effective and efficient patient care. A user perspective study has been conducted for patients receiving treatment at Capital Hospital to envisage the patient's inputs in the expansion plan for the facility. The sole objective of the study was to feel the patients' pulse while determining the future needs of this hospital.

The user perspective study has been carried out through a structured questionnaire. Two different sets of questionnaire have been prepared for OPD and IPD respondents. The same is based on various criteria upon which patient's perception of a healthcare facility depends. Since OPD and IPD are the key patient care area in hospital, respondents of this study primarily comprises of people using this services.

A cross section of patients have been chosen consisting of about 50 outpatients and 50 inpatients. Among the outpatients, samples from all the OPD clinics and specialty OPDs have been included. The inpatients also have been distributed into respondents of different specialty wards. The findings of the study have been detailed out as follows.

Criteria for selecting Facility:

The most pertinent reasons for selection of Capital Hospital as a preferred healthcare facility can be attributed to its competent team of doctors, inexpensive treatment and good infrastructure. The above graphical representation is based upon the combined responses from the respondents in the OPD & IPD.

The basic criteria for selecting a healthcare facility are largely confined to fulfillment of some basic needs such as affordability and feature on their wish list but ranks low in priority. Since good infrastructure, ranks high on the patient priority, improvement and up gradation of the same can lead to increase in the patient satisfaction availability of doctors and services**.** Other factors such as accessibility, behavior of staff, cleanliness, and drugs availability among others which plays significant role for selecting the hospital services.

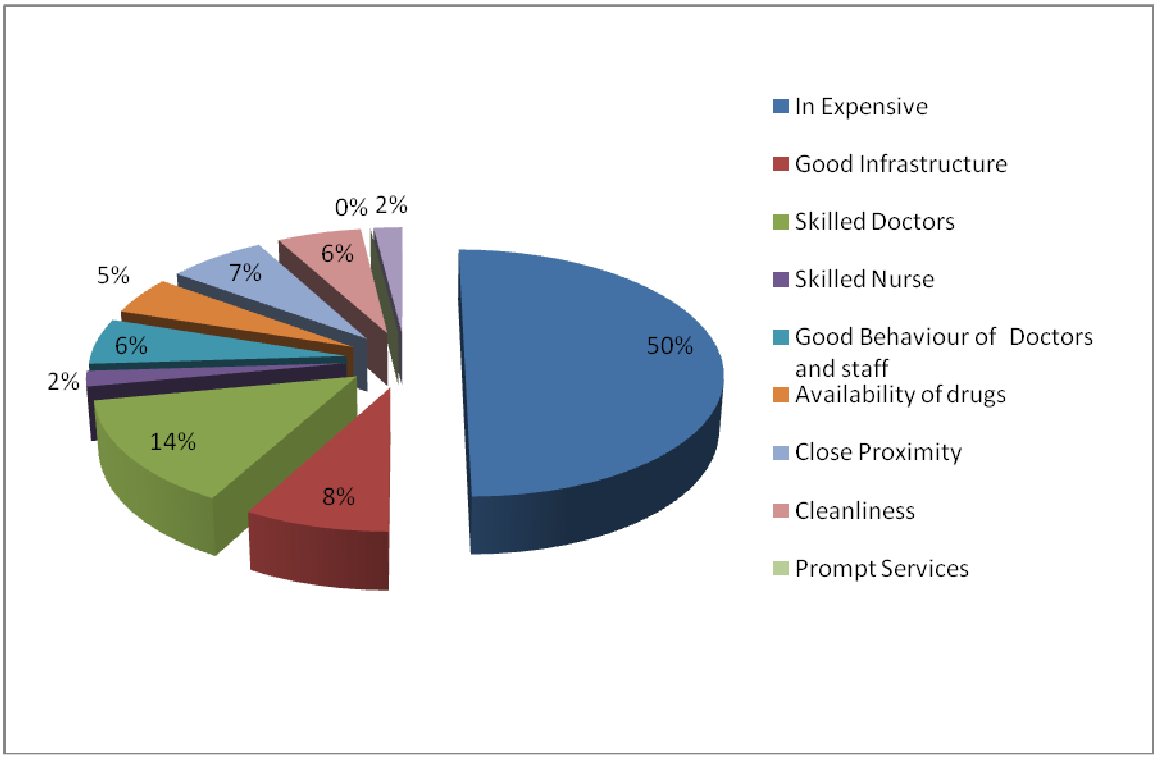

Figure No:4 Criteria for selecting Capital Hospital

Outpatient Department Users' Survey and Analysis

OPD Users' Survey: Key Findings & Analysis

The Outpatient Department is a key patient care area in a hospital catering to the majority of ambulatory patient caseload. Though the span of stay for patients is less in the OPD rather than the inpatient wards, yet patient satisfaction is greatly influenced by the services and facilities provided in the OPD and other related ancillary areas. A cross section study has been conducted for OPD patients of Capital Hospital based on certain predetermined criteria to elicit patient perspective about the same. The criteria have been enlisted as follows:

- **Criteria for selecting the facility**
- **Facilities, Amenities & Conveniences for patients in the OPD**
- **Availability & Adequacy of service provision**
- **Feedback about general quality parameters**
- **Patient Friendliness**

A series of questions under each of the above heads were asked to the patient respondents to infer a holistic view of the patient perspective of the OPD at Capital Hospital, Bhubaneswar. The feedback thus received has been compiled and analyzed through statistical techniques. Key findings of the same have been illustrated below. These findings will be an essential ingredient in planning patient friendly reorganization and expansion plans for the hospital.

Feedback about the facilities, amenities & conveniences

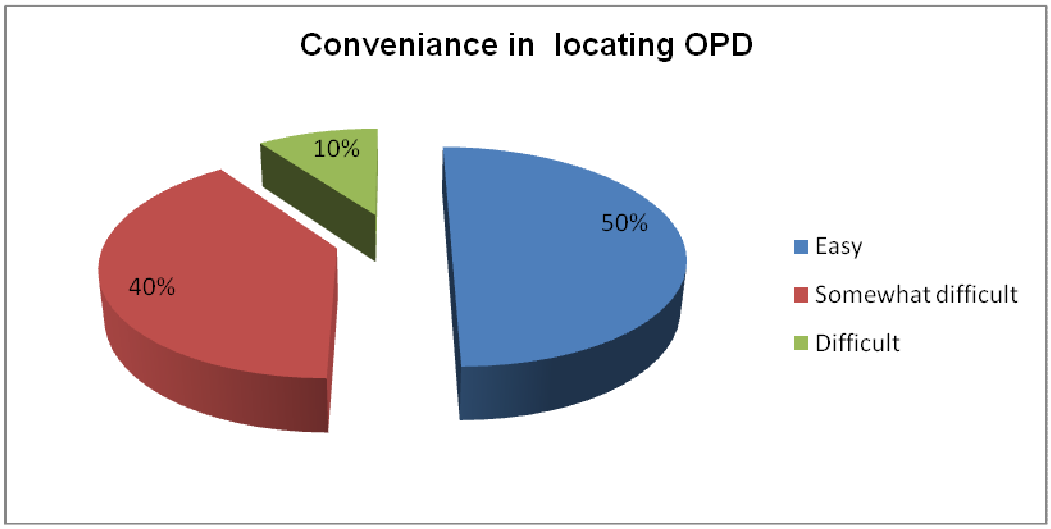

Figure No:5 Feedback about the facilities, amenities & conveniences

This Diagram is a pictorial representation of the responses of the respondents on difficulties in locating the different Out Patients Departments (OPD). 50% OF the respondents felt that locating OPDs is not difficult. 40% respondents have faced some sort of difficulty, whereas, 10% of respondents have found this difficult.

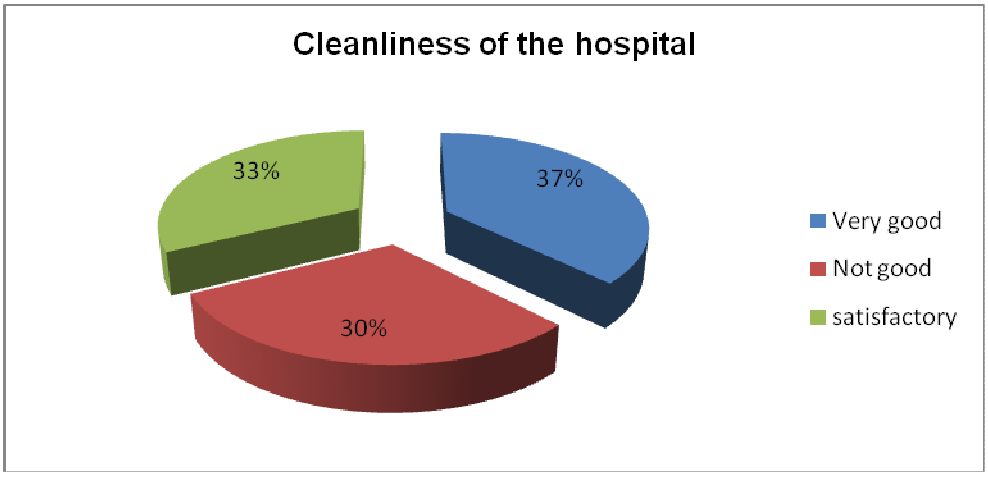

Figure No:6 Cleanliness of the hospital

The above diagram shows how the respondents have felt about the cleanliness in the hospital. Quite alarmingly, 30% felt that it is not good, and 33% have said it to be satisfactory. Only 37% have liked the standard of cleanliness in the hospital.

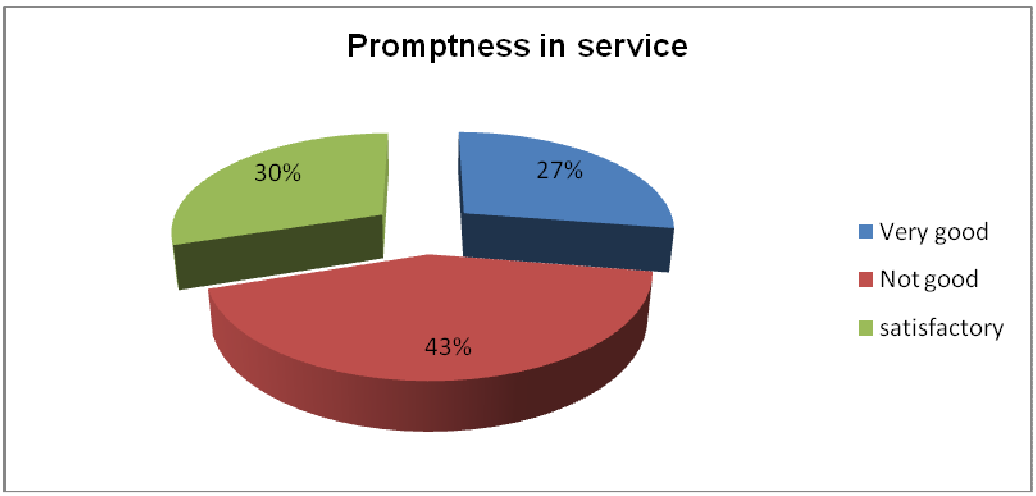

Figure No:7 Feedback about the promptness of the service

This diagram depicts promptness in service provision in the hospital, as perceived by the respondents. A huge part of the respondents (43%) are not satisfied with the pace of services. 30% have found it to be of satisfying standards, while 27% have found the services to be of very good quality.

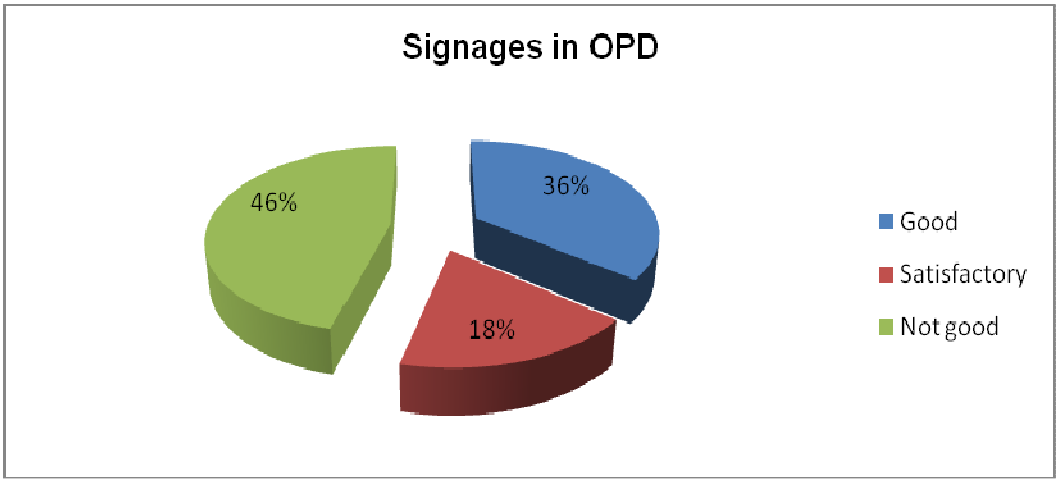

Figure No:8 Feedback about the promptness of the service

The above diagram shows how the respondents have felt about the signage system in the hospital. Quite alarmingly, 46% felt that it is not good, and 18% have said it to be satisfactory. Only 36% have liked the signage system in the hospital.

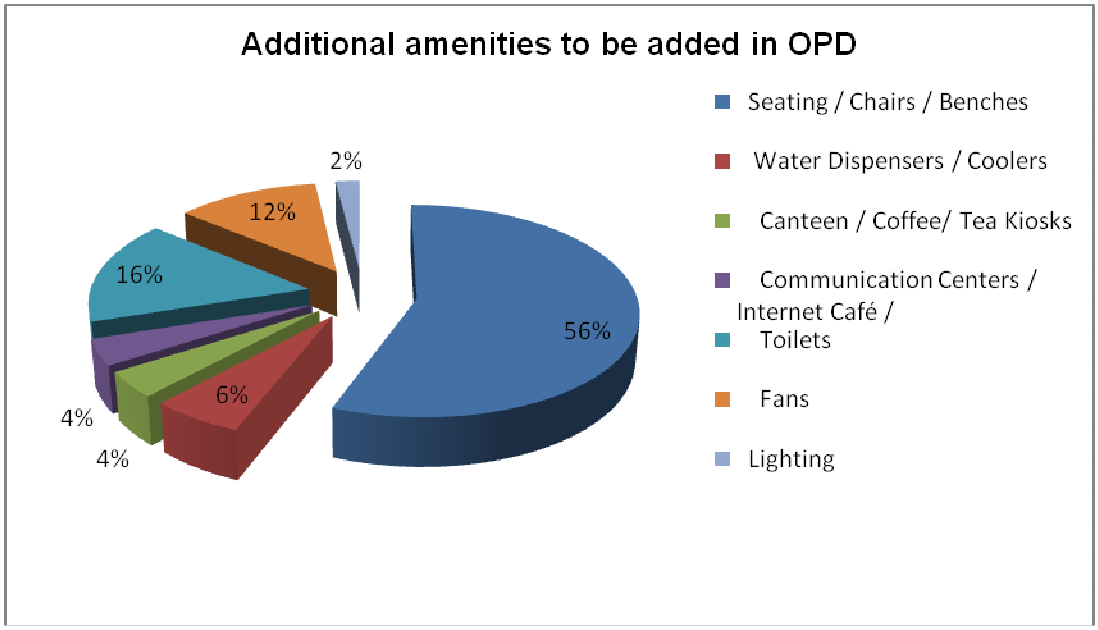

Figure No:9 Feedback about the additional amenities to be added

The above is the pictorial presentation of amenities that need to be incorporated in the OPDs. The highest demand (56%) has been for seating arrangements. The next demand (16%) is for Toilets, followed by fan (12%) and water dispensers (6%)

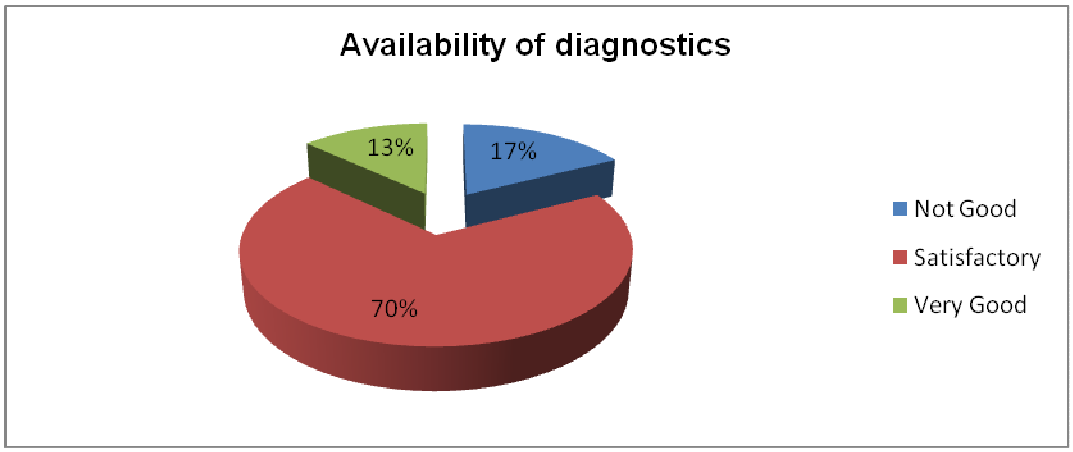

Figure No:10 Feedback about availability of diagnostics

This illustration depicts availability of diagnostics service provision in the hospital, as perceived by the respondents. A huge part of the respondents (70%) are satisfied with the availability of services. 17% have found it to be not satisfying in standards, while 13% have found the services to be of very good quality.

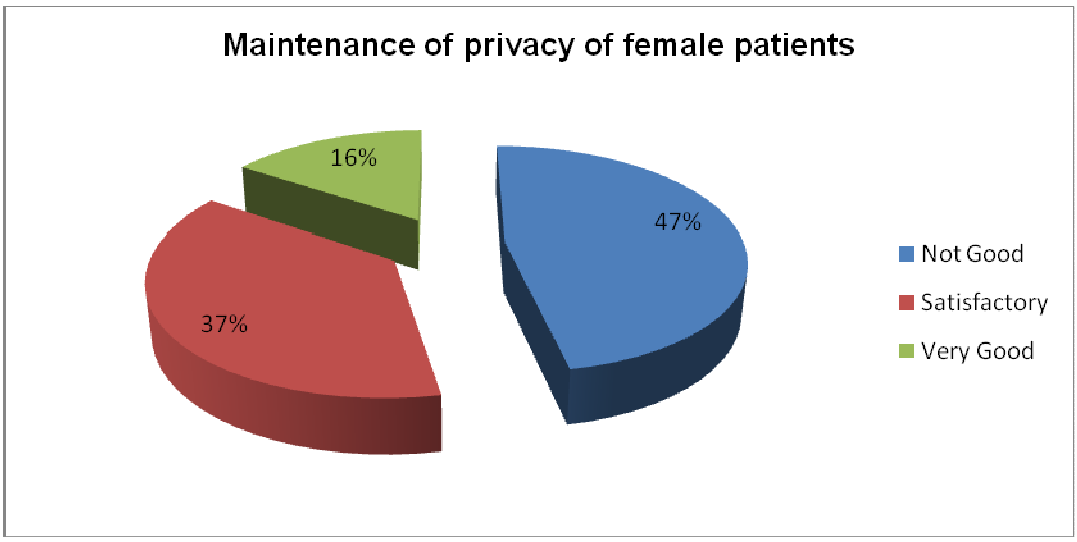

Figure No:11 Feedback about maintenance of privacy of female patients

This diagram is a pictorial representation of the responses of the respondents on maintenance of privacy of female patients in OPD. Alarmingly 47 % of the respondents felt that provided facility is not sufficient to give them much shouted privacy in OPDs. 37 % respondents have expressed some sort of satisfaction, whereas, 16% of respondents have found the privacy is maintained very good.

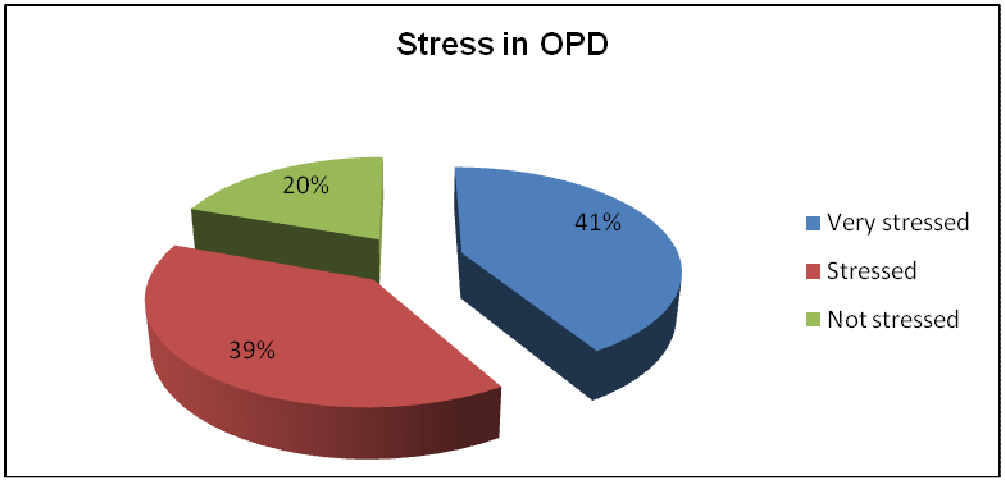

Figure No:12 Feedback about stress in the OPD

This illustration depicts the stress level in the OPD in the hospital, as perceived by the respondents. A huge part of the respondents (41%) are very stress in the OPD during their consultation period. 20% have found their stay at OPD is not stressful, while 39% have found their stay at OPD is reasonably stressed.

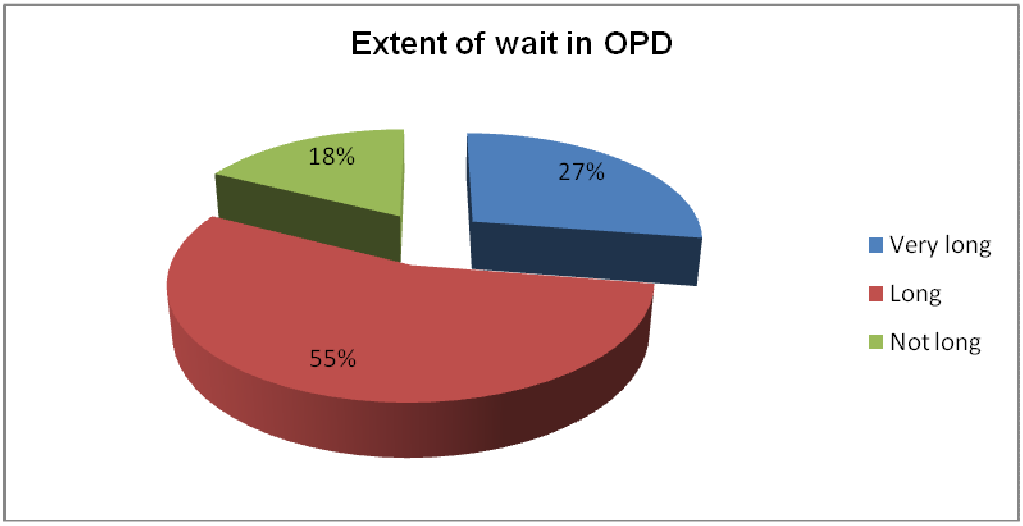

Figure No:13 Feedback about waiting time in OPD

This illustration represents the waiting time in the OPD in the hospital, as make out by the respondents. A vast part of the respondents (55%) has found the waiting time in OPD is long while 27% respondent has found the queue is very long and time consuming . 18% have found their waiting time in OPD is not long.

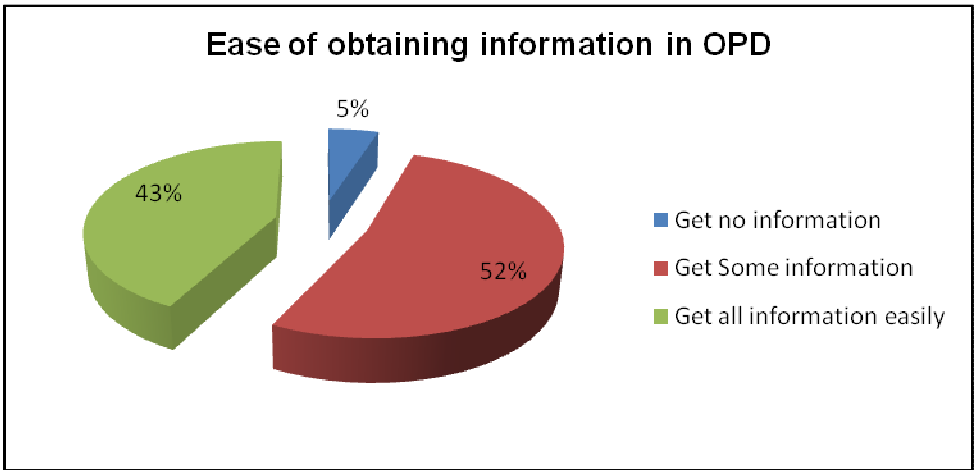

Figure No:14 Feedback about obtaining information in OPD

The above diagram shows how the respondents have felt regarding the ease with which they can obtain the information in the OPD. 52% of respondents have got some of the information they need where as 43% of the respondents have said that they get all the information, as they require. Only 5% have adverse experience getting information.

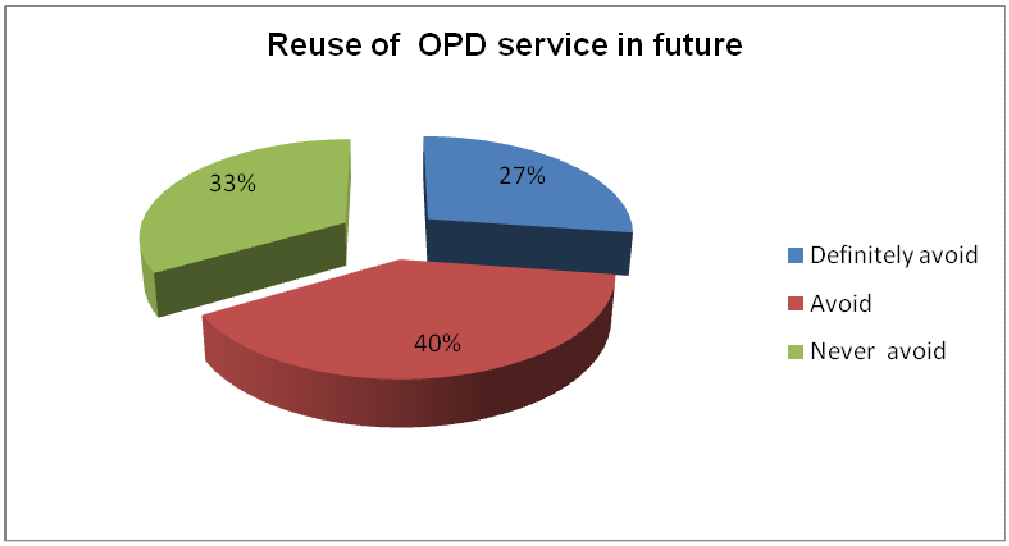

Figure No:15 Feedback about reuse of OPD service in future

The above figure gives an idea about how the respondents have felt regarding the reuse of OPD service in future. Alarmingly 40% of respondents have choosen not to avail the services in future while 27% of the respondents have enlightened that they are not at all going to avail these services in future. 33% respondents said that they would avail the services only from this hospital in future.

Inpatient Department Users' Survey and Analysis

IPD Users' Survey: Key Findings & Analysis

The inpatient unit of Capital Hospital consists of 547 beds spreading across departments. A cross section study has been conducted for in patients of Capital hospital based on certain predetermined criteria to elicit patient perspective about the same. Respondents for the same have been drawn from patients of different specialties. The criteria have been enlisted as follows:

- **Criteria for selecting the facility**
- **Facilities, Amenities & Conveniences for patients in the OPD**
- **Availability & Adequacy of service provision**
- **Feedback about general quality parameters**
- **Patient Friendliness**

A series of questions under each of the above heads were asked to the patient respondents to infer a holistic view of the patient perspective of the IPD at Capital hospital, Bhubaneswar. The feedback thus received has been compiled and analyzed through various statistical techniques. Key findings of the same have been illustrated below. These findings will be an essential ingredient in planning patient friendly reorganization and expansion plans for the hospital.

Feedback about the facilities, amenities & conveniences

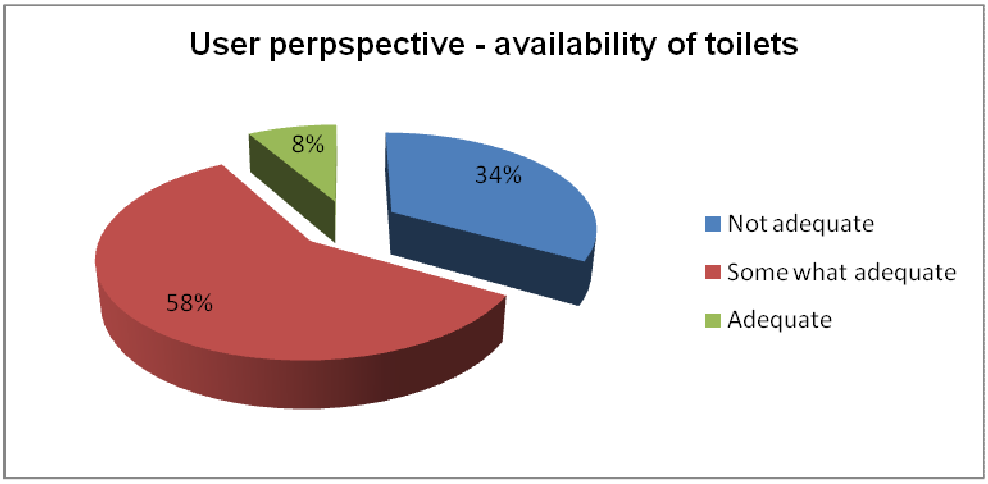

Figure No:16 Feedback about availability of toilet

This diagram is an illustrative representation of the responses of the respondents on availability of toilets in the wards. 34% of the respondents said that provided toilet facility is not adequate at all whereas 58% of the respondent has satisfied somehow their need and 8% of respondents have found the provided toilet facility is adequate.

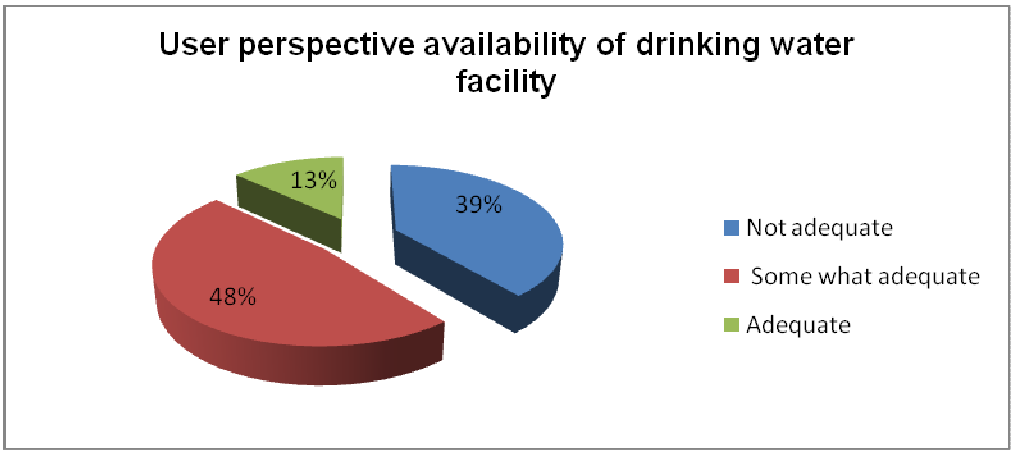

Figure No:17 Feedback about availability of drinking water facility

The above figure gives an idea about availability of drinking water facility in IPD wards. 48% of respondents have told provided drinking water facility is somewhat adequate whereas 39% expressed their utter dissatisfaction regarding no adequacy of drinking water facility. 13% respondents said that provided drinking water facility is adequate.

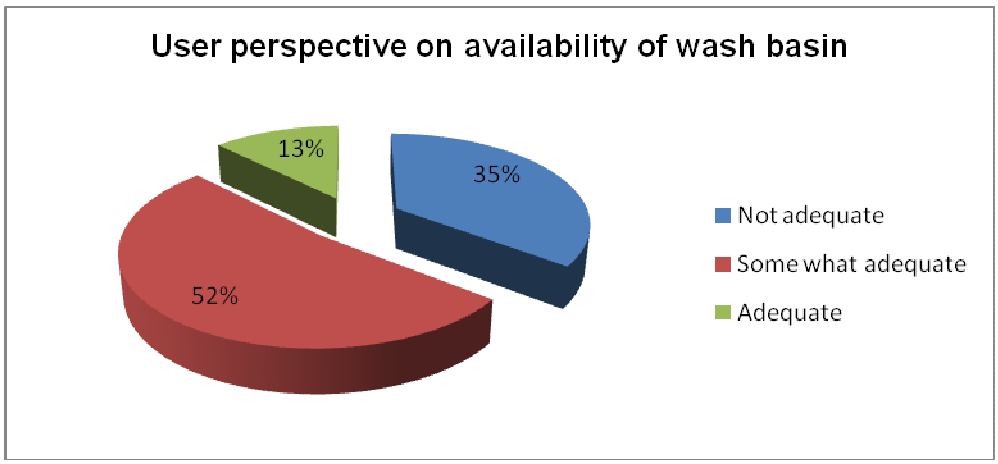

Figure No:18 Feedback about availability of wash basin

The above figure gives an idea about availability of washbasin in IPD wards. 52% of respondents have told provided washbasin is somewhat adequate whereas 35% expressed that provided number of washbasin is not adequate. 13% respondents said that provided no of washbasin is adequate.

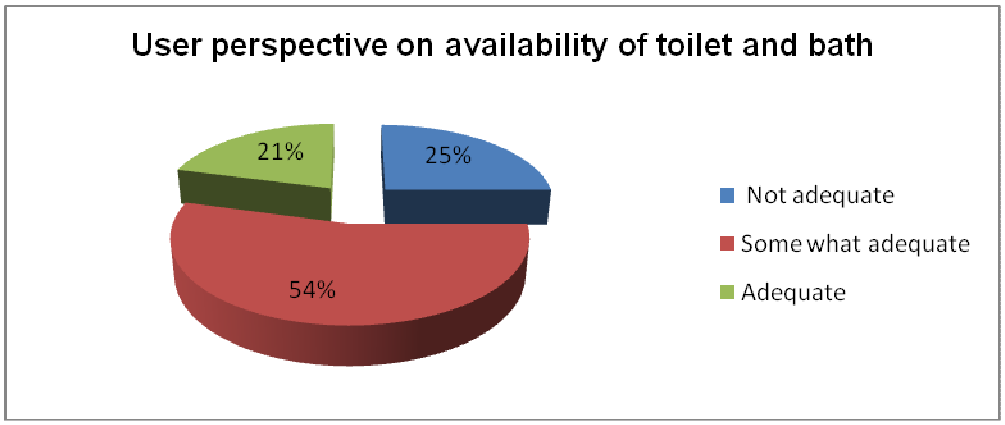

Figure No:19 Feedback about availability of toilet & bath

The above figure gives an idea about availability of toilet and bath in wards. 54% of respondents have told provided toilet and bath facility is somewhat adequate whereas 25% expressed that provided number of toilet and bath is not adequate. 21% respondents said that provided no of toilet and bath is adequate.

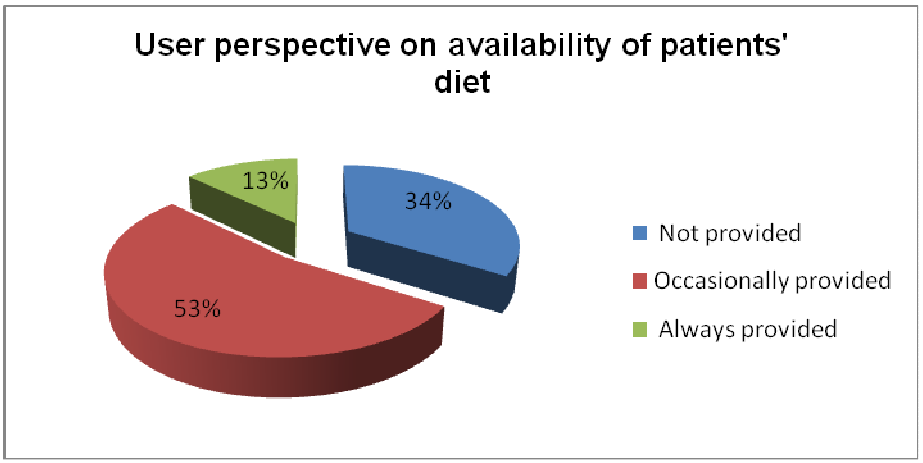

Figure No:20 Feedback about availability of patient toilet

This diagram is an illustrative representation of the responses of the respondents on availability of patient diet in wards. 53% of the respondents said that food is served occasionally while 13% respondent said that always diet is provided to them, 34% of the respondent has told that they are not served with food

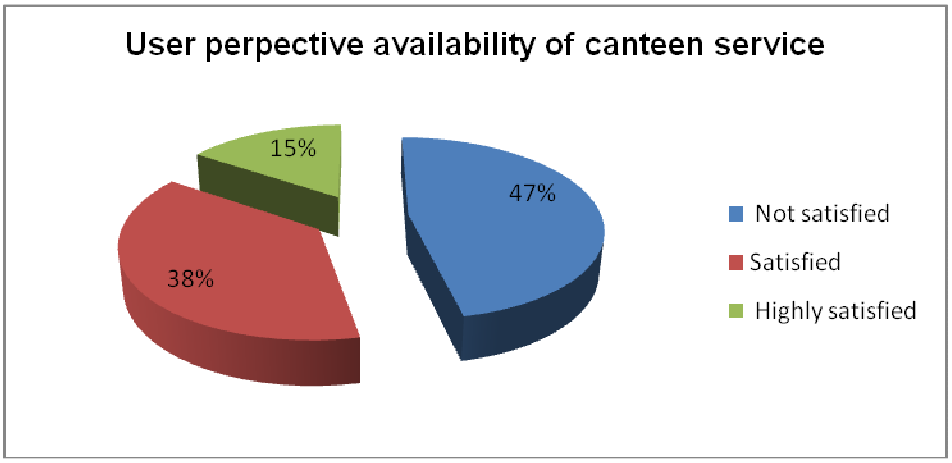

Figure No:21 Feedback about availability of canteen service

This pie chart is an illustrative representation of the responses of the respondents on availability of canteen service. 38% of the respondents are satisfied with provided canteen facility whereas 15% of the respondent is highly satisfied and 47% of respondents have found the provided canteen facility is not satisfactory.

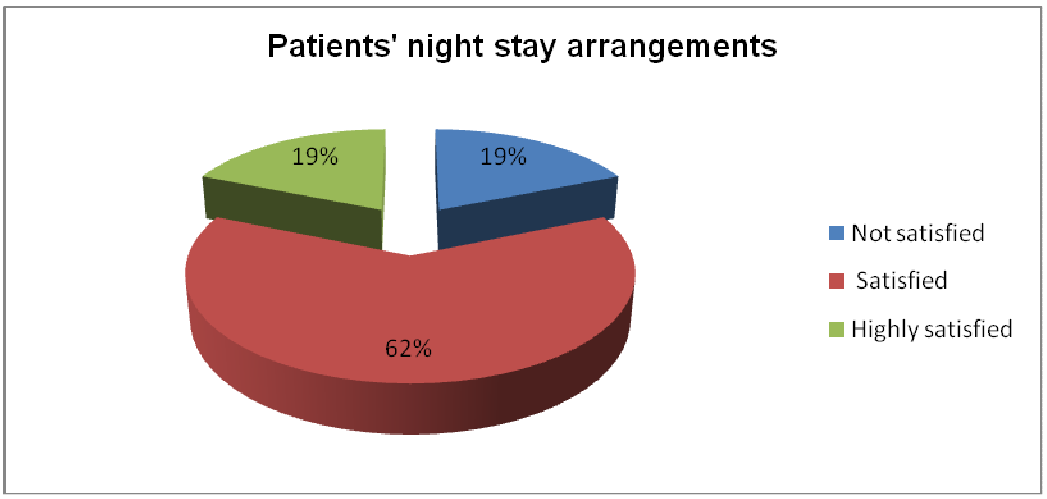

Figure No:22 Feedback about patients' night stay

This diagram is an illustrative representation of the responses of the respondents on patients' stay in the hospital. 19% of the respondents said that provided facility is not adequate at all whereas 62% of the respondent is satisfied and 19% of respondents have found the provided night stay arrangement facility is adequate.

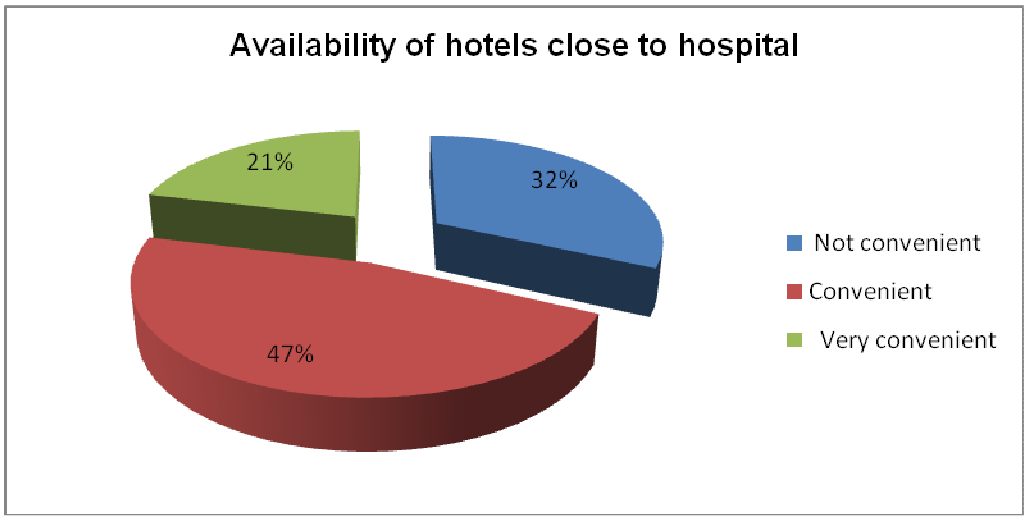

Figure No:23 Feedback about availability of toilet & bath

This pie chart is an illustrative representation of the responses of the respondents on availability of hotels close to hospital. 32% of the respondents said that available hotel facility is not adequate at all whereas 47% of the respondent has told that availability of hotels are convenient followed by 21% responses for very convenient location of the hotel close to hospital.

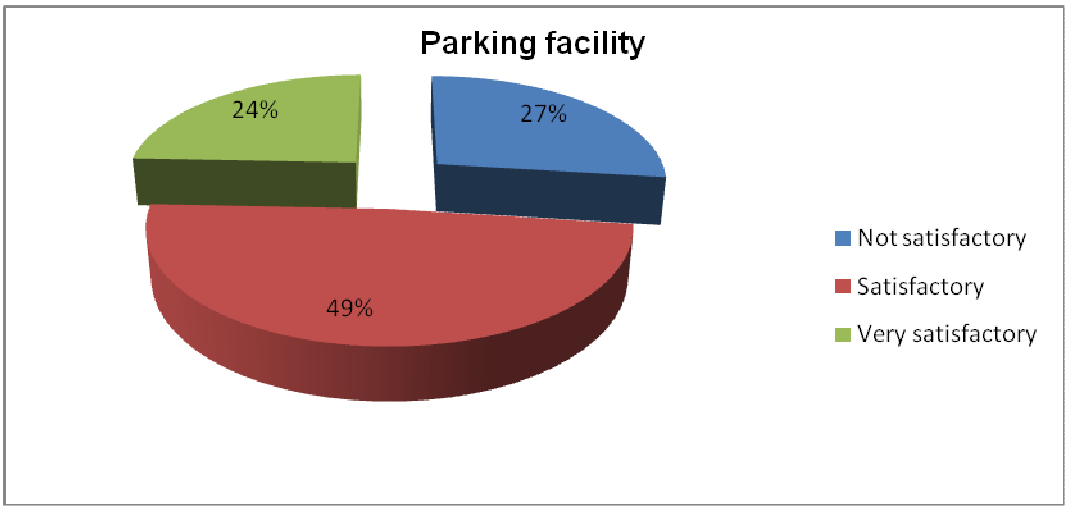

Figure No:23 Feedback about availability parking facility

This pie chart illustrates 27% of the respondents said that available parking facility is not satisfactory at all whereas 49% of the respondent has told that provided parking facility is satisfactory followed by 24% responses for high satisfaction on parking facility.

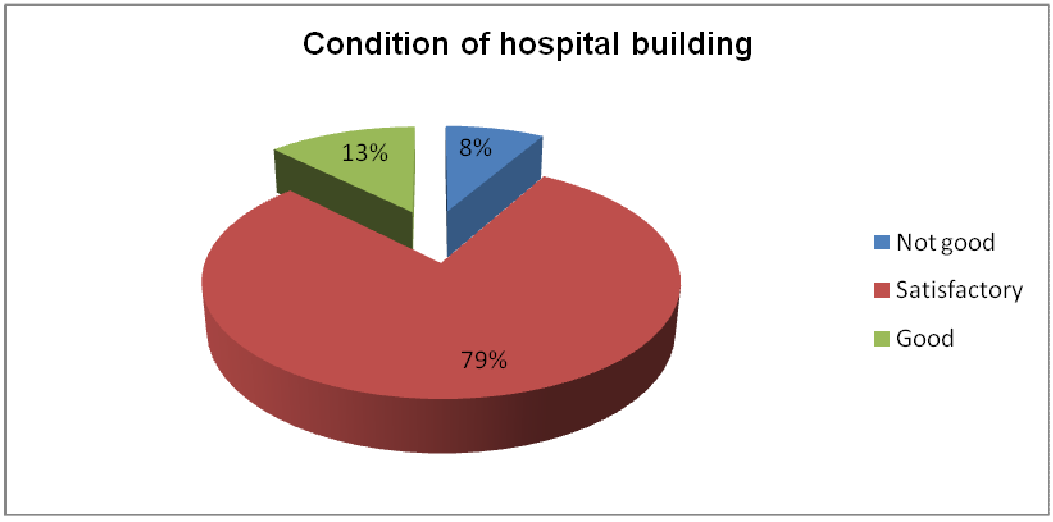

Figure No:24 Feedback about condition of hospital building

This pie chart represents that 79% of respondent told that condition of the hospital building is satisfactory while 13% of the respondents said that building condition is good and 8% respondents expressed their not satisfaction regarding hospital condition.

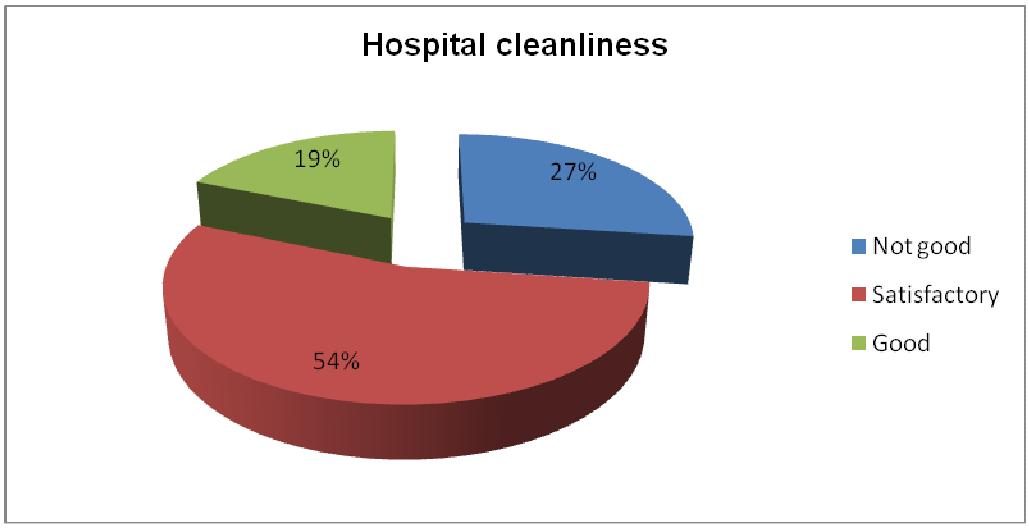

Figure No:25 Feedback about hospital cleanliness

This pie chart signifies that 54% of respondent told that hospital cleanliness is satisfactory while 19% of the respondents said that hospital cleanliness is good and 27% respondents expressed their not satisfaction regarding hospital cleanliness.

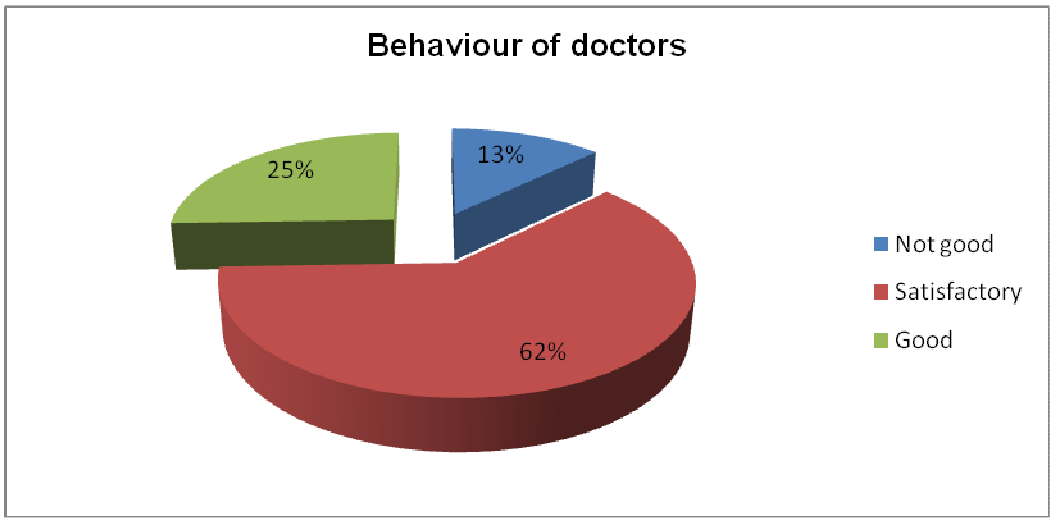

Figure No:26 Feedback about behaviour of doctors

This diagram is a pictorial representation of the responses of the respondents on behaviour of doctors in the wards. 62% of the respondents felt that doctors' behaviour towards them and their query is satisfactory. 25% respondents have told that doctors' behaviour is good whereas, 13% of respondents have found doctors' behaviour towards them and their query is not good.

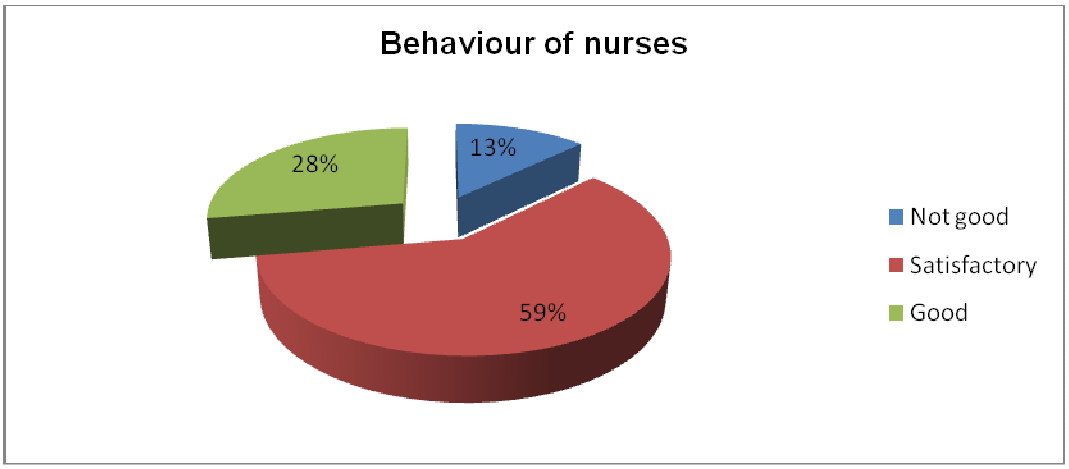

Figure No:27 Feedback about behaviour of nurses

This diagram is a pictorial representation of the responses of the respondents on behaviour of nurses in the wards. 59% of the respondents felt that nurses' behaviour towards them and their query is satisfactory. 28% respondents have told that nurses' behaviour is good whereas, 13% of respondents have found nurses' behaviour towards them and their query is not good.

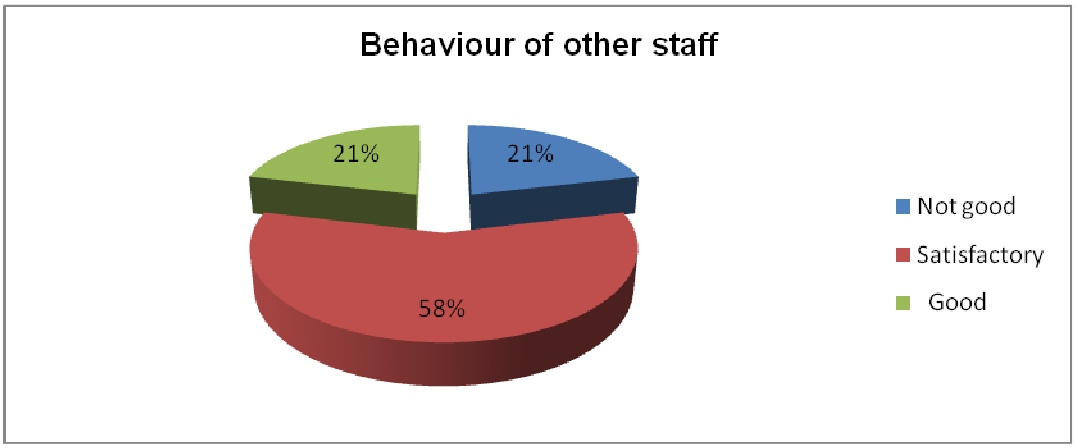

Figure No:28 Feedback about behaviour of other staff

This diagram is a pictorial representation of the responses of the respondents on behaviour of support staff in the wards. 58% of the respondents felt that' support staff behaviour towards them and their query is satisfactory. 21% respondents have told that support staff' behaviour is good whereas, 21% of respondents have found support staff' behaviour towards them and their query is not good.

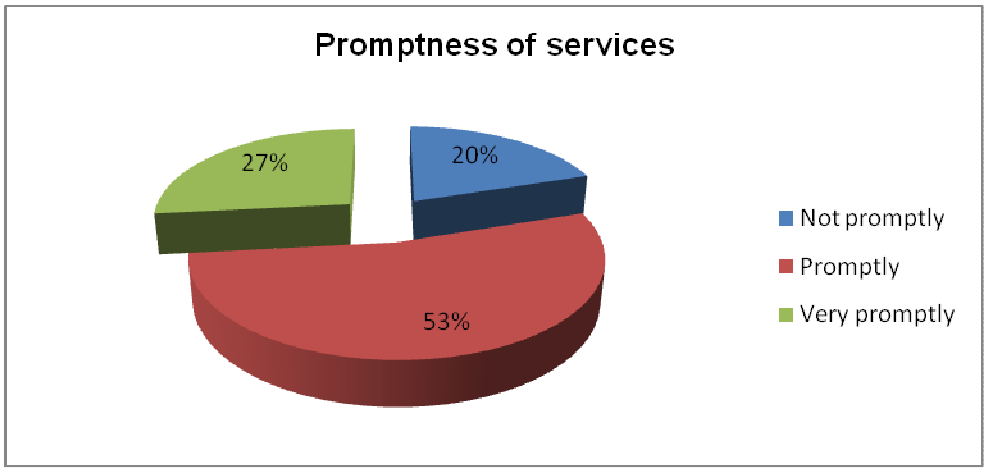

Figure No:29 Feedback about promptness of services

This diagram depicts promptness in service provision in the hospital, as perceived by the respondents. 20% of respondents are not satisfied with the pace of services. 53% have found it to be of satisfying standards, while 27% have found the services to be of very good quality.

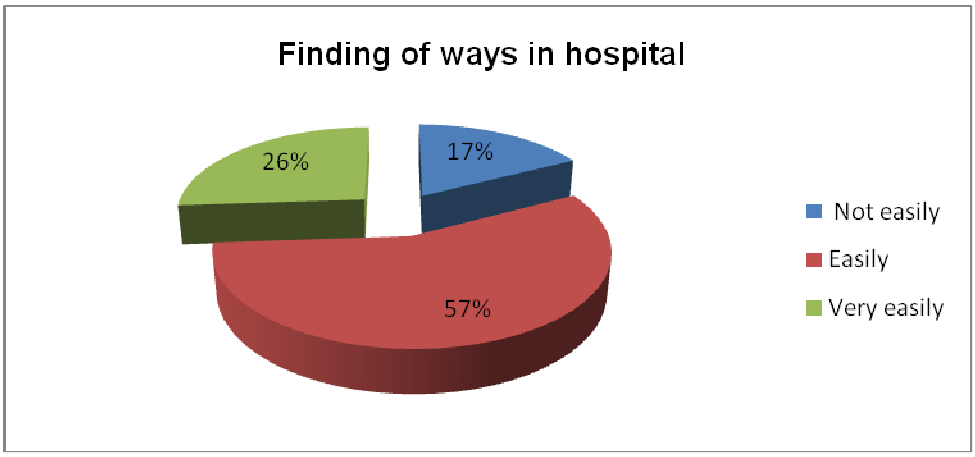

Figure No:30 Feedback about finding ways in hospital

This diagram is a pictorial representation of the responses of the respondents on difficulties in locating the different in patients departments (IPD). 57% of the respondents felt that locating IPDs is easy while 17% respondents have faced difficulty whereas, 26% of respondents have found this very easy.

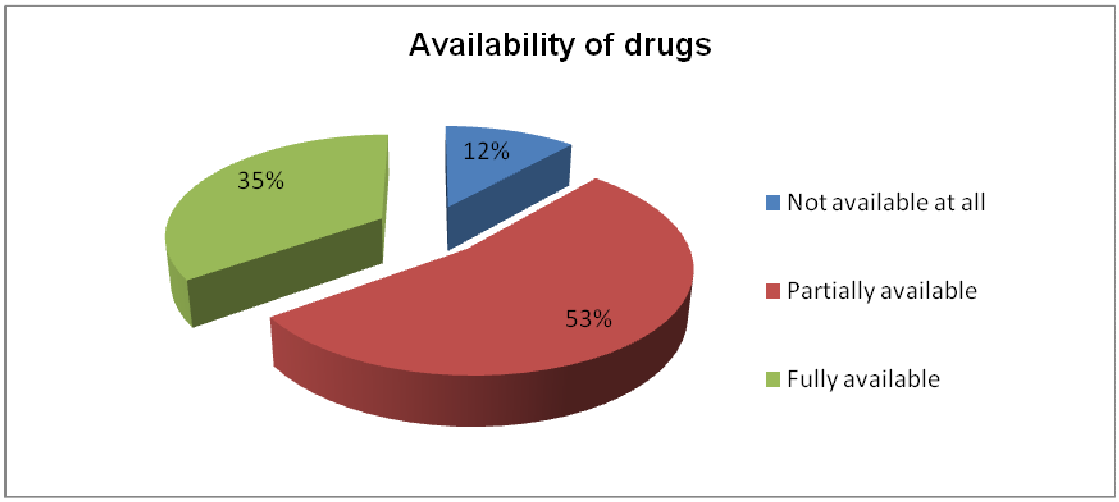

Figure No:31 Feedback about availability of drugs

This illustration is a pictorial representation of the responses of the respondents on availability of drugs. 53% of the respondents told that their need in partially satisfied while 12% respondents have told that their medicinal requirement is not addressed at all, 35% of respondents have found their medicinal requirement always available.

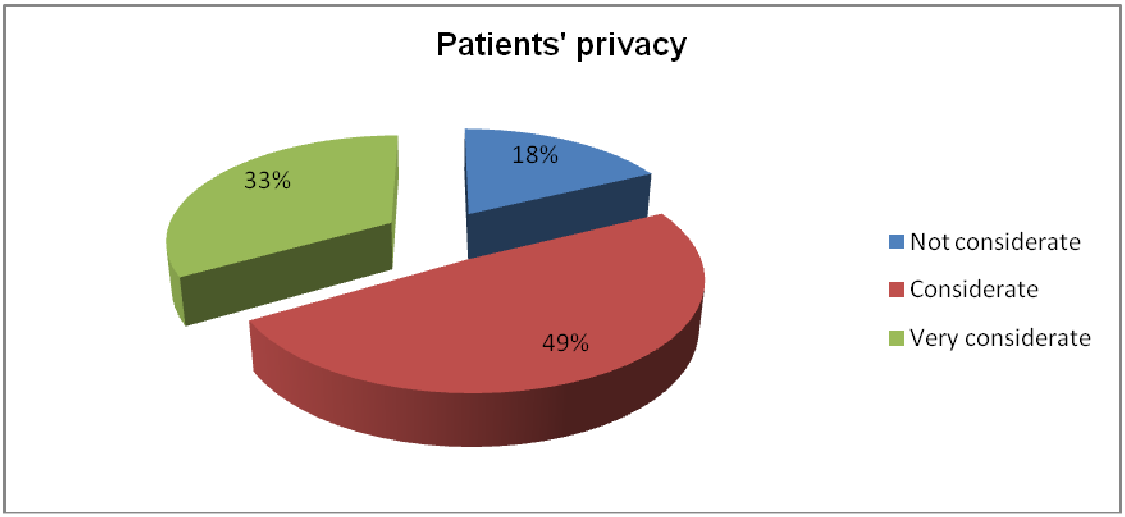

Figure No: 32 Feedback about patients' privacy

This illustration is a pictorial representation of the responses of the respondents on patients' privacy. 49% of the respondents told that their privacy is upholded to a certain extent while 18% respondents have told that their privacy is not at all considered, 33% of respondents have found their privacy is really considered.

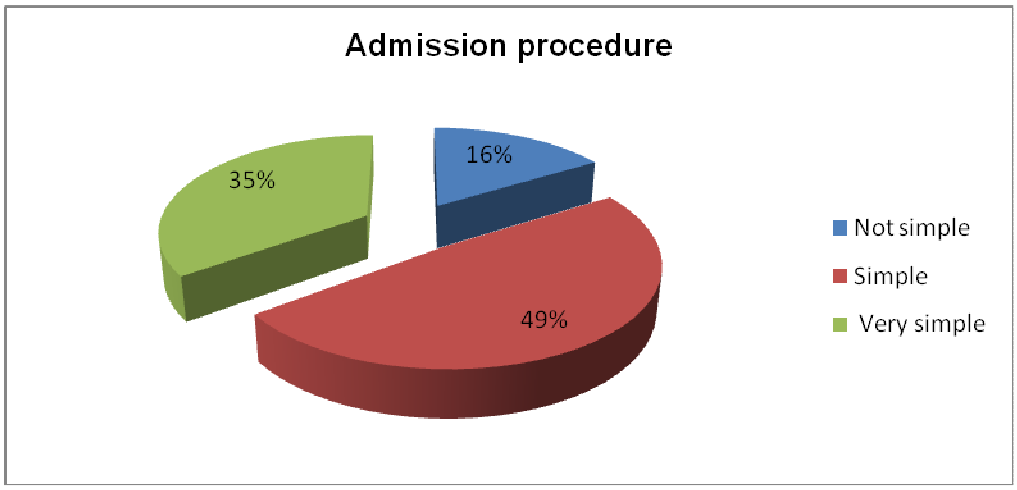

Figure No: 33 Feedback about admission procedure

This diagram depicts the responses of the respondents on admission procedure. 49% of the respondents felt that admission procedure is easy while 16% respondents have faced difficulty whereas, 35% of respondents have found admission procedure very easy.

Provider Perspective Study Report

Table No: 23: Matrix-Provider perspective

Name of Department	Name of H.O.D	Constrains	Suggestions/feedbacks
1. Administration	Dr. U. K Mishra (CMO)	a. Absence of super specialties like Cardio-thoracic surgery, Nephrology and Neuro-surgery	a. ICU needs to be planned which is 10% of the total bed strength. b. State of art centralized OT complex needs to be planned having facilities for all surgical specialties. c. Emergency department needs to be re-organized.
2. Administration	Dr. B. Panigrahi, (DCMO)	a. Absence of super specialties like Cardio-thoracic surgery, Nephrology and Neuro-surgery.	a. 55 bedded ICU needs to be planned which is 10% of the total bed strength. b. State of art centralized OT complex needs to be planned having facilities for all surgical specialties. c. Emergency department needs to be re-organized. d. If hospital is converted to medical college then Lecture hall, Seminar Hall, Library, Demonstration room and Museum needs to be planned. e. Hospital should have autonomy.
2. Emergency	Dr. Nihar Ranjan, Casualty Medical Officer	a. Insufficient number of casualty consultation rooms. b. Radiology, Blood bank and Pathology department	a. One minor OT required for emergency. b. The emergency should be located in close proximity to the diagnostic

		are far away from the casualty. c. Insufficient air conditioning. d. Inadequate circulation space. e. Shortage of crash carts. f. Space not allotted for resuscitation/triaging. h. Procedure room available but no minor OT. i. Poor maintenance	services like X-ray and CT scan. c. Restricted traffic flow to the Emergency department.
3. Paediatric	Dr. S.K. Mishra, Sr. Consultant	a. Zoning not followed in NICU, which leads to cross infections. b. Shortage of NICU beds.	a. More beds required in wards, NICU and PICU. b. Seminar room and lecture hall in the departments if converted to medical college.
4. Medicine	Dr. S.N. Swai, Sr. Consultant	a. Shortage of beds in both male and female ward. b. Absence of duty doctor room near the ward.	a. Present bed strength should be doubled as per the existing number. b. For the next 20 years medicine needs another 500 beds. c. Sufficient waiting area with adequate sitting arrangements for patients in all areas of the hospital wherever required. d. Separate medical ICU with minimum 50 beds required. e. Seminar hall/classroom as per the number of student intake. f. Library and demonstration hall

			required. g. Well furnished duty doctor room must be planned near the wards.
5. Cardiology	Dr. R.S.N. Murti, HOD	a. Shortage of beds in cardiology. b. The ICCU is non functional. c. Medical Gas pipeline is not functional. d. Holter Machine is out of order.	a. Eight and twenty more beds required in ICCU & ward respectively. b. There is an urgent requirement of new cathlab. c. Treadmill & holter and defibrillators required. d. 64 Slice CT scan and Colour Doppler required. d. Central air conditioning required. e. Seminar hall/classroom required if converted to a medical college. h. Space Identified: A new building is under construction in front of Eye block.
6. Pathology	Dr. S.N. Das, HOD	a. Store room for discarded equipments b. Inadequate Circulation space	a. Computer room b. Seminar room if converted to medical college. c. One lecture hall, One demonstration hall if converted to medical college. d. Hematology: Separate room for research if present facility is converted to medical

			college. e. Cytogenetic equipments
7. Radiology	Dr. D.K. Mahapatra, HOD	a. No separate registration counter. b. Dark room needs immediate repair and maintenance. c. No work area provided for the radiographers. d. No separate place to store X-ray films, chemicals, reagents, and other materials. Presently these are stocked either in the X-ray room or in the developing room. e. Toilet for USG patients is not functional.	a. Room for laying patient on stretcher needs to be planned. b. Toilet for USG patients needs to be repaired. c. Seminar hall and lecture hall has to be planned if present facility is converted to medical college.
8. Surgery	Dr. Arun Mahapatra, HOD	a. Shortage of post-operative beds. b. Circulation space c. Lack of necessary equipments d. Absence of separate surgical ICU. e. Zoning cannot be followed as its design does not allow. f. OT does not have any power backup facility. g. Medical gas pipeline system is not functional.	a. OT Complex needs to be re-planned, there should be centralized OT complex for all surgical specialties. b. Toilet needs maintenance and repair. There is no door in the toilet. c. Doctors room, change room separate for male & female, Anesthetist room and preparation room required. d. Post operative room needs to be redesigned. e. Medical gas pipeline must be made functional. f. A CSSD unit needs to be planned urgently

			instead of having one autoclave inside the OT Complex. The Sterile supply unit is not sufficient to take the present work load. g. 20 more beds required; 10 for burn unit & 10 for wounds. h. Forensic Medicine Department needs to be planned. i. If present facility is converted to medical college then lecture theatre/teaching room/seminar room required in the department.
9. Obstetrics & Gynecology	Dr. B.C. Bhooiya, HOD	a. Shortage of OT. b. Shortage of labour tables and rooms. c. Absence of a pediatrician in Obs & Gynae. Dept. d. Ultrasound room is far away from the dept.	a. All the non functional OT should be made functional. b. There should be a separate labor room for paying patients. c. More number of toilets required. d. Pocket feotal Doppler should be provided.
10. Pulmonary Medicine	Dr. Anil Mohanty, HOD	a. Shortage of doctors. b. Absence of separate respiratory unit. c. Spirometer is not	a. Separate chest ward is required with minimum 10 beds as per the case load. b. Separate Sputum examination room is

		functional. d. No trained technician to perform PFT.	required. c. Ventilators, Nebulizers, ABG analyzer, pulse oxymeter and fibre optic bronchoscope are required. d. If the present facility is converted to medical college then lecture theatre/teaching room/seminar room required in the department. e. Centralized OPD along with diagnostics in a close vicinity required. f. In future, facilities for Cytological Investigations can be added.
11. Dermatology	Dr. M. Srichandan, HOD	a. Major Constraints is acute shortage of space for the department. b. More number of doctors required.	a. Separate ward with 4 beds required. b. The department should have abundant natural light source. c. Treatment Modalities/Specialist care in future: Radio frequency cautery, CO2 Laser, PUVA chamber. d. Storage space for equipment and other documents for the department.

12. Dental Surgery	Dr. Mahusudhan Mishra	a. Shortage of dental surgeon.	a. More no. of waiting chairs required in the OPD. b. If converted to medical college all the 12 departments as per Dental Council of India (DCI) required.
13. Ophthalmology	Dr. B.K. Mohanty		a. More no. of waiting chairs required in the OPD. b. Separate toilet required for male and female patients in the ward. c. Treatment Modalities/Specialist care in future: Equipments for Retinal checkups and procedure required like Laser.
14. Psychiatry	Dr. S.N. Parida, HOD	a. Shortage of manpower. b. Separate Psychiatric ward is there but not functional.	a. Clinical Psychologist required social worker, trained nurses and trained attendants. b. Treatment Modalities/Specialist care in future: Behavioral therapy, Bio-feedbacks. c. More number of waiting chairs required for patients.
15. Orthopaedics	Dr. R.N. Jain		a. More no. of waiting chairs required in the waiting area for patients.

			b. Consultation room should be re-planned along with attached toilet. c. OPD and OT should be centralized. d. More no. of Consultants required. e. Shortage of other staff like nurses, etc… f. If teaching facilities introduced then lecture theatre/teaching room/seminar room required in the department.
16. Nursing	Ms. Devani Shetty, Matron	a. There is acute shortage of nursing staff in the wards. b. There is no nursing station in the wards, nurses operates mainly from duty doctors room c. There is no functional critical area in the hospital. d. There is acute shortage of beds in the wards. e. Insufficient supply of materials (medicine & consumables) , O_2 mask is not available	a. Nursing stations needed wherever required. b. Change room required.

Some of the common constraints faced by the HODs are:

- Lack of circulation space
- Lack of waiting area for patient attendants
- Shortage of beds
- OTs are scattered
- Improper maintenance of departments

*A major constraint voiced out by all HODs is improper and inadequate

manpower distribution and supervision.

Majority of the HODs interviewed gave the following common suggestions:

- Creation of a centralized OPD block close to all the diagnostic departments.
- Creation of a modern OT complex, which will help in optimum utilization of manpower and resources.
- Inclusion of CSSD in the OT complex.
- Waiting area for patient attendant.
- Re-location of emergency department in close proximity to the diagnostic services like X-ray and CT scan.

From teaching point of view, all the HODs require rooms for library, seminar/teaching room and demonstration rooms.

Key Findings

Key Findings

Based on our study findings and subsequent analysis, this section of the report identifies certain areas of concern that needs immediate attention.

- **Inter bed distance** in the all the wards and ICUs are less than accepted international standard, which is a cause for cross infection among the patients.

- In all the **operation theater**s more than one operating tables are accommodated which can be a cause of surgical site infection.

- In **maternity & delivery unit** five delivery tables are placed in one room, where aseptic and septic cases are being treated simultaneously which may create adverse effect on the new born as well as the patient. From the point of view of aesthetics, privacy and dignity of patients, this needs change.

- Proper **lighting & ventilation** was not there for the wards and ancillary rooms. There is only one corridor in the ground floor and one corridor in the first floor. The rooms and wards are constructed in such a manner that no natural light or ventilation is available. Artificial Lights installed are inadequate, and many are not functional. All the OTs are lacking in proper mechanical **ventilation** system. C**irculation** for different traffic is inappropriately designed without an access zoning of the OT., The ventilation system in all the **ICUs** is through window and split air-conditioning which are not designed for appropriate air filtration.

- All the **supporting and ancillary rooms** are lacking proper **sanitary annexes, which** lead to poor hygienic condition. There is an acute shortage of ancillary **supporting rooms** for all the wards leading to compromised functioning. Due to lack of MO's **duty room,** the medical officer uses the nursing station during duty hours.

- The **manually operated laundry** is located away from the main hospital building. Civil maintenance condition is very poor. There is lack of proper water supply and sewerage system leading to unsatisfactory environmental sanitation. **Public amenities li**k**e waiti**ng area, toilet, drinking water facility, and fan are very less in number which leads to patient discomfort, and long queue in front of all the facilities.

- **The hospital campu**s is spread over a vast area comprising of various specialties. Due to lack of proper signages, way findings by the patients/relatives become difficult. Inadequacy of **signages, way finding signs, area map, and location map** is a requirement.

- **There are no designated parking areas for patient families**. Patients have to travel a long distance from one area to reach the service departments. Moreover, for distantly located departments, the patients usually park their vehicle in front of the department in an unorganized **manner.**

- **Due to lack of operationa**l **piped medical gas systemm, the intensive care units are non-functional. As a result,** acute patients are referred to other hospitals. In absence of this facility, medical gas is supplied through cylinders. However, this arrangement has its own operational difficulties.

- Provided **generator sets** are not adequate to support the total electrical demand when it is required. A large number of the UPSs are not in working condition (main surgery OT, laparoscopic OT, gynecology OT). This problem can give rise to life threatening situations.

- There is no computerizion in the **medical records** department because of which the entire management of records is done manually. The MRD room was found to be heaped with records since the available space is inadequate. Provided storage facilities such as racks and cabinets are also not present in sufficient quantity. There is no separate room for the MRD in charge and other staff, even when there is no computerization; the MRD needs to be functionally divided into sections for proper flow, control and analysis of records to generate useful clinical, administrative and medical audit data.

Recommendations

Out Patient Department

- Patient flow in the OPD has to be planned properly covering all areas including enquiry, registration, waiting areas, consultation chambers and diagnostic facilities to streamline patient movement.
- For improving the efficiency of services OPD, services should be demarcated as Entrance Zone, Ambulatory Zone and Service zone.
- Sub waiting area to be planned as per requirements. The ideal would be around 0.1 M^2 per patient (average OPD attendance per day is 650 patients).
- Examination rooms to be planned in the Surgery and Orthopaedics OPD.
- A trolley & wheel chair bay to be made available in the OPD to attend serious & old patients.
- More public facilities like toilets, drinking facilities etc to be planned for improving patient care facilities.
- Considering the load each OPD caters to, each requires more circulation space and waiting areas.
- Patient flow within the OPD will need to be guided with the help of proper signages. Signages across the hospital in at least two languages will prevent outpatients wandering into the ward/post operative areas and OT's.
- The obstetrics and gynaecology OPD should be provided with a separate reception /registration counter until these OPD's are also included in the main OPD complex.
- The OPD complex requires a trolley & wheel chair bay and the layout will have to be restructured to cater to physically challenged individuals.
- Addition of more public facilities like drinking water and toilets to OPD complex will be required.
- The OPD complex should be provided with a lab collection room with attached toilet.

Operation Theatre

- The circulation route for three kinds of traffic i.e. patient, staff and material in and out of the OR (Operating Room) will have to be re-planned. Positioning of Scrub area has to be re planned to channelize the traffic flow through change room followed by scrub area to the Operating Room.
- The existing OTs need re-organization to ensure a clear zoning with graded degree of increasing sterility from periphery to inwards.
- Creating a centralized OT complex is of utmost importance at Capital Hospital and this should be given the highest priority in the phasing of the expansion plans. The complex should house all the OTs, with super speciality OTs in one floor and the others in another floor. This complex will also house the CSSD and be directly connected to the surgical ICU's and surgical wards of all specialties.
- The O&G OT will however be housed in the O&G complex for the convenience of the patients and also because they have a high emergency utilization rate.
- Each floor of the complex will need to be divided into protective, clean, sterile and dirty/disposal zones with a circulation system that allows separate access to staff, patients and materials.
- The complex will require a well planned airflow system that will allow flow of clean air over the operating area first and then away from it. A central air conditioning system that maintains a temperature range of 21 to 24^{0}C with about 16 air changes per hour, a relative humidity of about 50% and using 100% fresh air would be ideal.
- An uninterrupted power supply to each OT to avoid untoward incidence that can occur in case of a power cut. The generator is available but it requires some time before it can provide backup.
- Each operating theatre should accommodate only one OT table. There are various areas that need to be incorporated into the OT complex, a list of the areas required in each zone is given below:

(a) Protective Zone

1. Reception
2. Waiting with Toilets
3. Trolley exchange bay
4. Anaesthetists' and Surgeons' examination room
5. Doctors change room with toilets
6. Nurses' change room with toilets

7. Other staff change room with toilets
8. Theatre Store
9. Linen store
10. Appliances and medical stores
11. Instruments and disposable store
12. Autoclave room
13. Gas store
14. Theatre work and preparation
15. Closed Circuit TV for operation viewing (optional)

(b) Clean Zone

1. Pre-operative room
2. Recovery room
3. Toilet
4. Nursing Station
5. Technicians room with toilet
6. Pump storage (for CTVS OT only)
7. Store for costly and sophisticated equipment
8. Blood storage and Frozen section
9. Seminar room with toilet
10. Pantry
11. OT Matron's room
12. Computer room

(c) Sterile Zone

1. Anesthesia induction room
2. Operating theatre

3. Scrub room/area
4. Clean utility store

(d) Disposal Zone

1. Dirty Wash-up room
2. Janitor Closet

Table No: 24: OT rooms requirement matrix - Capital Hospital

Types of surgery	No of operating rooms required if working hours per day is 5 hours	No of operating rooms required if working hours per day is 8 hours	No of operating rooms required (placing of OT tables)	No of operating rooms required (as per MCI guidelines)
General surgery	7.5	4.7	2	4
Emergency surgery	0	0	2	0
Laparoscopic surgery	0.5	0.3	0	0
Gynecology	7.1	4.4	2	2
Ophthalmology	1.5	0.9	2	0
Orthopaedics	1.0	1.1	0	1
ENT	0	0	0	1

Intensive Care Unit

- Medical and surgical intensive care units should be available for comprehensive care.
- Nursing station has to be restructured in Capital Hospital Intensive Care area.
- Per bed area and inter bed distance centre to centre has to be upgraded in accordance with international accepted level of 150 Sq.Ft. for per open bed and 8 ft in between two beds centre to centre distance.
- Ventilation system should be reorganized as per standards with 10 air changes/hour with positive air pressure in the patient care area and six air changes in other areas.
- Separate entry and exit has to be planned for patient, staff, material and dirty items.
- A store has to be planned for the intensive care units for linen and consumables.
- For collection and distribution of patient meals pantry has to be planned.
- In the ICCU, ancillary rooms like doctors' duty room, janitor closet has to be provided and a toilet facility has to be planned for the attendant waiting area.
- The NICU has to be redesigned as per the standards with all the ancillary rooms/area.
- Civil and maintenance part of Intensive care units have to be taken care of while re-planning.
- Provision for a medication area to be provided in ICUs.
- Isolation unit has to be planned for both the intensive care units as per the prevailing standard of one isolation bed for every 10 Intensive care beds. Isolation room should be planned separately for adults, paediatric patients and neonates.
- Medical gas pipelines should be made operational.
- The number of ICU beds required are calculated below:

Existing beds = 547

5% as ICU beds = 28 beds

Required beds at 80% occupancy = 1059

5% as ICU beds = 53

These beds will include the following ICU's:

Medical ICU

Cardiology ICU

Paediatric ICU

Neonatal ICU

Surgical ICU

Burns ICU

- Sound proofing will have to be done for all the ICU's

- Centralised air conditioning can be possible if ICUs are in one complex, in the current situation this may not be possible. A packaged ventilation system can be provided to each ICU, which should ensure a temperature of around 20 to 25^{0}C, relative humidity of around 50% +/- 5% and around 8 to 10 air changes per hour ideally. Positive air pressure should be maintained inside the ICU, except for the isolation rooms, which should have separate ventilation with 100% exhaust - maybe positive or negative depending on the type of conditions the isolation room is meant for.

Maternity & Delivery Unit

- Only one delivery table should be placed in one delivery room.
- One septic labour room has to be planned.
- In labour room, proper ventilation and air flow system should be planned.
- Downwards and outwards air pressure has to be maintained.
- Delivery unit should be planned like a combination of labour, delivery, recovery, and postpartum (LDRP) room.

In Patient Department

- The inter bed (centre to centre) distance in the wards should be 8ft (MCI guidelines) centre to centre to avoid overcrowding and cross infection among the patients.
- As per the MCI guidelines, the nightingale pattern wards should not accommodate more than 30 beds in each.
- Nursing station should be planned in the wards with clear view of all beds with space provision for work & documenting area, medicine trolley keeping area, communication area and nurse duty room with toilet facility.
- Duty Medical Officer room to be planned for IDH, Ophthalmology, Cardiology, female medicine and Orthopaedic wards.
- Separate ward store for linen and consumables has to be planned in all the wards.
- Ancillary service rooms like janitor closet, trolley bay and pantry has to be planned in all the wards.
- The sanitary annexure for the nursing units are inadequately provided. With increase in the bed strength of the wards there should be a proportionate increase in the sanitary annexes.
- The required number of sanitary annexes that are to be provided for the wards can be calculated based on the format described below:

Particulars	Male	Female
Water Closet	1 for every 8 beds	1 for every 6 beds
Bath	1 bath for every 12 beds	1 bath for every 12 beds
Urinal	1 for every 12 beds	
Wash Basin	1 bath for every 12 beds	1 bath for every 12 beds

Table No:25: Requirement Matrix of Sanitary Annexe

Wards	Operational Beds	Present no. of WC	Requirement of WC. *	Present no. of Bathrooms	Requirement of Bathroom *	Present no. of Urinals	Requirement of Urinals*	Present no. of Wash Basins	Requirement of Wash Basina*
Orthopaedics	26	2	3	1	2	0	2	0	2
Eye	20	2	3	1	2	0	2	1	2
I.D.H.	21	4	3	3	2	0	2	1	2
Female Medicine Ward	32	4	5	4	3	0	3	0	3

Male medicine Ward	56	2	7	2	5	0	5	0	5
Obstetrics & Gynecology	100	4	17	4	8	4	8	0	8
Cardiology	14	3	2	1	1	0	1	1	1
Surgery Male	42	4	5	3	4	4	4	4	4
Surgery Female	30	4	5	4	3	2	3	2	3
Paediatric	150	6	19	6	13	0	13	6	13
Observation	11	1	1	0	1	0	1	1	1

Casualty & Emergency

There should restricted traffic flow.
The following areas should be planned additionally in the Casualty and Emergency department**:**

- Triage area.
- Resuscitation area.
- Procedure room and treatment room.

Radiology Services

- A centralized radiology department housing all the radio diagnostic facilities will avoid the duplication of infrastructure and manpower and also be more convenient for patients.
- The centralized radiology department should be planned to allow scope for expansion to cater to the increase in number of cases and frequent technology changes.
- Adequate circulation space and waiting area also need to be planned. A main waiting area that will accommodate the peak patient load present at any time with two relatives per patient can be planned. The average patient load the department caters to per hour is 70 (this is excluding the cases done in the emergency hours), the peak hours are 9am to 12pm, therefore the main waiting area should be able to accommodate 180 to 200 people. Both the regional diagnostic centre and imaging centre do not have adequate waiting area and waiting chairs.
- Toilets need to be provided in both the diagnostic centres and imaging centre - separate for males and females.
- All openings for electrical outlets and ventilation should be located at least 2M above finished floor level which was found below the accepted norms.
- The provided facility has to be re-planned as per the standard Atomic Energy Regulation Board (AERB).

The following are key areas to be included when planning the centralized radiology department

Table No:26: Requirement Matrix of Ancillary Rooms

Particulars
X – ray
a) Radiography rooms
Attached dressing cubicle with toilet
e) Film developing and dark room*
f) Film drying room
g) Radiographic work room
h) Mammography room (Optional)
*If digital radiography is planned then an additional room will be required for the same. In this case only a small dark room will be required for emergency purposes.
i) Injection and barium meal preparation room
Ultrasonography
a. USG rooms (No of rooms to be decided based on patient load) As per MCI guidelines for medical colleges with 150 admissions annually the total number of USG machines should not be less than 2+1(dedicated to obstetrics and gynaecology
b. Colour doppler room
c. Toilet (each USG room should ideally have a toilet next to it)
CT scan
d. Patient Change Cubicle

	e.	Gantry room/CT imaging room
	f.	CT console room
	g.	CT computer room

Stores

- Film stores
- Consumables store
- Equipment stores

The following are certain designing norms laid down for radio diagnostic departments:

X-ray rooms

- The optimum size of an X-ray room should be 18m^2
- The wall on which the primary beams fall should not be less than 35cm thick brick thickness should be more than 35cm
- Shielding of doors and windows should be done with 1.7mm lead
- Not more than one X-ray unit of any type should be in one room
- All openings for light & ventilation should be located above 2m from the finished floor level

CT scan room

- The size of the room should not be less than 38 to 42m^2
- The CT computer room houses the computer and generator modules associated with the CT scan equipment, it should therefore be close to the CT scan room and console

Laboratory

- Specimen collection and report distribution room should be separate.
- Separate media room, media kitchen, media storage, plate pouring room, sterilization room, Incubation room, cold storage and Immunology room have to be planned.
- Specimen cubicle and photometry, chromatography room and electrophoresis room in clinical pathology section has to be planned.
- Equipment cleaning section should be segregated.
- Photography and illustration section should be planned.

Fire Protection Facility

- Area housing inflammable items such as the stores, manifold room should immediately be provided with facilities for combating any calamity resulting from fire.
- There should a designated fire exit for emergency department.
- The hospital should have smoke detectors, sprinkler system, fire alarm, fire shield doors as well as fire signages. There should be an underground water reservoir to combat fire in case of major fire breakouts.

Central Sterile Supply Department

- Hospital of this stature should have an independent and well equipped CSSD.
- The location of the CSSD has to be ideally in close proximity to the OT and ICUs since they are functionally dependant.
- The following are the various areas required in the CSSD listed out in order from unclean to sterile zone.

Table No:27: Requirement Matrix of Ancillary Rooms-CSSD

Particulars
Dirty zone
Receiving area for soiled articles
Sorting
Cleaning & washing area
Clean zone
Packaging
Sterilizing and cooling area
Storage area for clean stocks (not sterile)
Sterile zone
Storage area for sterile stocks
Dispatch area for the sterile packs through a dispatch window
Administrative
CSSD supervisor's room
Staff change room with toilets and lockers

Ambulance Service

- All ambulances should be well connected through wireless system with a proper controlling unit based inside the campus of Capital hospital
- At least one ambulance should be equipped with ICU and emergency facilities.
- Ambulance services should be well manned by trained emergency technicians.
- Garage or shade should be provided for ambulances.

Medical Record Department

- MRD should be restructured and computerized.
- Modern and accepted archiving system should be implemented.
- Provision for ancillary rooms to planned as detailed in the earlier chapter (Analysis- : Medical Record Department)

Laundry

- Mechanized laundry to be planned.
- Proper sewerage system to be planned.
- The total existing area for the laundry can be utilized to establish a fully functional department with all the necessary areas as listed in the table below.

Table No: 28: Requirement Matrix of Ancillary Rooms-Laundry

Particulars
4. Reception/collection and sorting
5. Change room
6. Sluicing and autoclaving
7. Mending
8. Washing machine, driers, hydro extractors, calendaring and pressing
9. Mattress sterilizing
10. Boiler House
11. Stores
12. Janitor closet
13. Sanitary
14. Manager's office
15. Staff change room

Mortuary

- Public amenities like toilets, sitting arrangement have to be added.
- Provision for mechanical boiler has to be made for sterilizing the instruments used on highly infectious patients for autopsy.

Vertical Circulation

- There has to be two types of lifts (in surgery ward, Obs. & Gynae ward, Medicine ward) One for patients, attendants and hospital staff and another for including stretchers, wheel chairs borne traffic etc.

Engineering Services

- There should be sufficient number of generators to provide backup during power cut.
- There should be uninterrupted power supply (UPS) backup for voltage sensitive medical equipments, computers, monitors.
- There should be water treatment plant.
- Medical gas pipeline system has to be functional.

Central stores

Central stores - Administrative area

- Reception & the clerk-typist's area are required for office functions including filing, communications & references.
- Office space for chief pharmacist is required.
- Waiting area for medical representatives & salesmen is required.
- Staff facilities like lockers, toilets, lounge, duty room for on-call duty pharmacist is required.

Storage area to be planned

- Bulk storage
- Active storage
- Refrigerated storage
- Volatile & alcohol storage
- Secured Storage for narcotics & controlled drugs

Signages:

- Signage and directions inside the hospital campus needs to be placed in appropriate locations in bilingual language to locate various departments in the campus.
- Signages in front of all the concern department and buildings.
- Internal signage in OPD and IPD needs to be put at appropriate locations to locate wards, departments and to maintain unidirectional flow of patients.
- Information board in bilingual language should be placed in the OPD for sharing information regarding timing/availability of doctors.
- Same information board can be used for sharing information regarding any addition of new services or facilities.

Parking

- **Designated parking space** needs to be plan out separate for two wheelers and four wheelers.
- Separate parking area for **doctors/staff vehicles** at OPD and in other departments.

Architectural Brief

Recommendations

Based on our study findings and subsequent analysis, this section of the report includes detailed recommendations from Medica Synergie for strengthening Capital Hospital, Bhubaneswar.

Infrastructure Expansion Plans with Space Planning

This will, essentially, include the scaling up plans of the hospital in terms of infrastructure. Rationalization for such expansion plans as well as a detailed explanation of extension in bed compliment and other relevant facilities are provided. Schematic master plan diagrams of the proposed physical structures have been attached.

A hospital is supposed to be ideally planned so that it is functionally adequate for the next 20 years to ensure its viability in the long run. Physical infrastructure built to provide healthcare services should always have a scope for future expansion. The hospital bed planning & distribution must incorporate inputs from a variety of factors such as catchment area, presence of other healthcare delivery infrastructure in the vicinity, population growth & migration rate, demographic composition of the patient population etc. A lot of such intrinsic factors have been taken into consideration while framing an effective master plan for Capital Hospital, Bhubaneswar. Though non-availability of relevant data was the major constraints yet the best possible projections and estimations has been attempted in the proposed plan.

To meet the present hospitalization needs the population growth and increasing disease burden, the Capital Hospital, Bhubaneswar needs to be scaled up to a 1059 bedded facility. This projection has been made from conclusions derived after examining key critical factors affecting utilization of the hospital. An explanation of each of them follows

Additional Bed Needs Determination of Capital Hospital

The bed compliment of a hospital needs to be planned taking into consideration a variety of factors such as catchment area, presence of other healthcare delivery facility in the vicinity, population growth & migration rate, demographic composition of the dependent population, morbidity and mortality pattern, hospital utilization pattern etc. The bed need planning for the hospital under study has been based on such intrinsic and extrinsic factors, which has been discussed as follows.

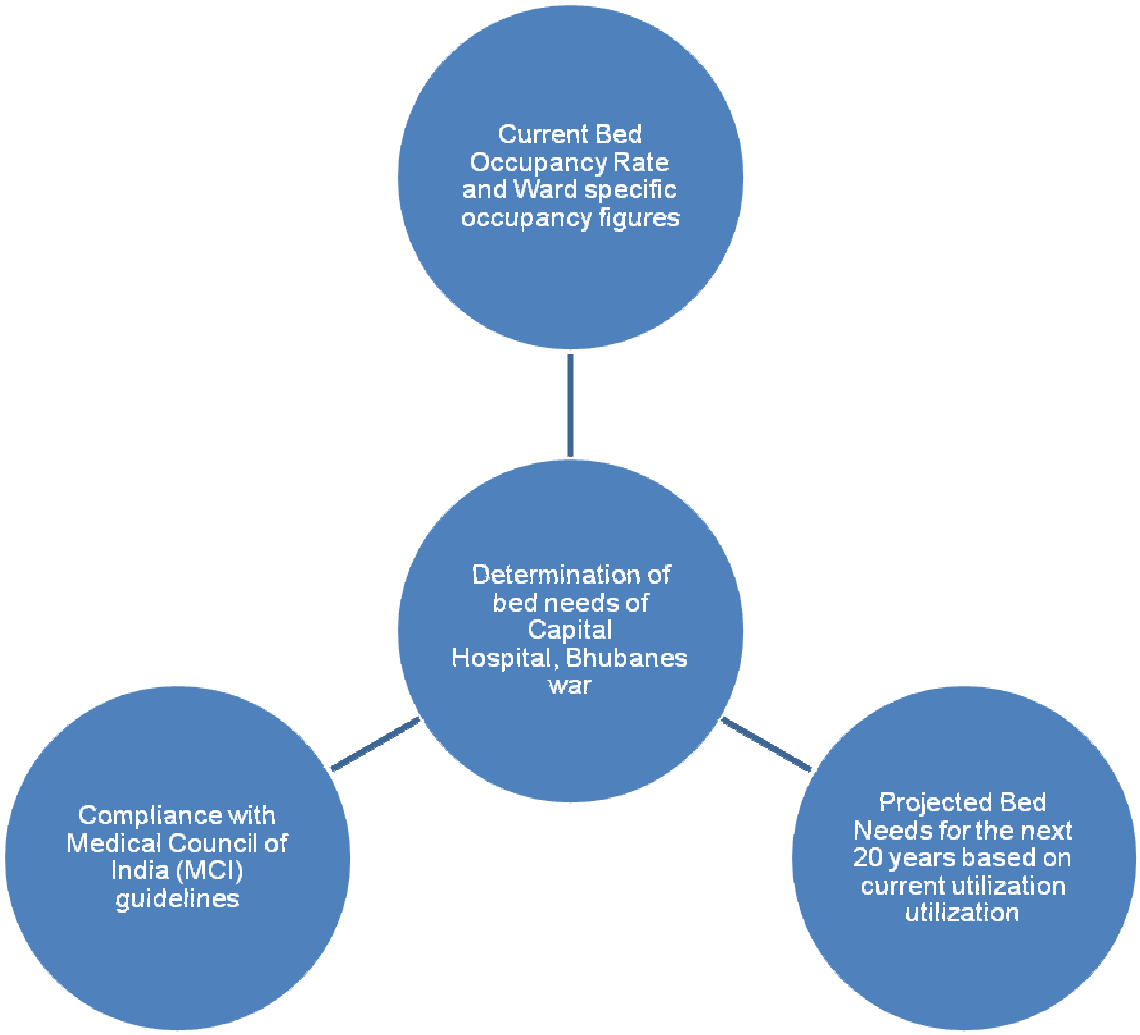

Figure No:34 determinants of bed need projection

Bed Needs Determination - Population Projection

The Capital Hospital, Bhubaneshwar should be planned adequately to meet the healthcare needs of the entire district. Data available at the hospital reveals that in previous year, 57893 patients were admitted across all departments. Considering the average length of stay to be five days, the present occupancy of the hospital stands at 145%, which is exorbitantly high in acute care hospitals.

The maximum permissible occupancy of a hospital should not exceed 80% due to the fact that some beds should be kept vacant for admitting emergency cases. In accordance with the accepted standards of occupancy and length of stay, the present bed requirement for Capital Hospital, Bhubaneshwar is 1059, which necessitate a net increase of 524 beds.

A 20-year population projection has been matched against the requirement of beds. The current hospitalization rate of one admission per 25 populations has been taken as constant. The following table provides the projected bed requirement in the next 20 years.

Table No:29: Population Projection

Year	Projections		
	Population @ current growth rate	**Hospital Admissions @ current hospitalization rate**	**Bed Requirement @ 80% occupancy**
2008	1438116	57893	**991**
2013	1556907	62675	**1073**
2018	1685509	67852	**1162**
2023	1824734	73457	**1258**

2027	1975460	79524	**1362**

At an occupancy rate of 80% the hospital will require around 1073 beds five years from now. The MCI has now recommended (July 2009) inter bed distance (from edge to edge) of about 5 feet considering the width of a standard hospital bed of approximately 3 feet. The earlier planning used to be based on inter bed distance of 3 feet. This would mean that the wards will now be able to accommodate approximately 19% less number of beds. These displaced beds have to be accommodated elsewhere.

The bed need calculation done on a linear progression method can not be taken on its face value. Many other compounding factors affect this calculation. Above will be true only under the following assumptions:

Assumptions

- Assuming that the population growth will be at 1.6% per annum.
- Growth in occupancy will continue consistently even when the present unmet need is satisfied.
- No other medical facility will develop in the catchment area of this hospital during this period.
- The effectiveness of preventive care will remain at the same level and the disease burden of the population will have the same pattern of increase.
- Population will grow at the same rate as of now.
- Epidemiological profile of the morbidity and mortality will remain unchanged.
- There will be no change in the Average Length of Stay of patients and no patients will be discharged prematurely.
- No deserving patient will be refused admission.

Bed Needs Determination - Ward wise Bed Occupancy Rates

Though the total bed requirement of Capital Hospital, Bhubaneshwar could be determined through the above mentioned procedure, Utilization index of wards of different specialties will give a better insight as to the number of beds to be planned in each category. The following table reveals the total caseload of the year 2008 in each of the bed categories along with their individual occupancy rates. Their present bed requirements have also been subsequently calculated.

Table No:30: Bed need determination

Department	Actual bed strength	Annual Inpatient Admission Caseload	Bed Occupancy Rate (%)	Bed Required @ 80% bed occupancy
Casualty	11	1164		
Cardiology	14	1482	116	20
ID Ward	21	1383	271	71
Medicine (Male)	56	5927	145	101
Medicine (Female)	32	3387	145	58
Obstetrics and Gynecology	100	10584	145	181
Ophthalmology	20	2975	82	20
Orthopedics	26	2752	232	75
Laparoscopy	5	529	58	4
Paediatric	150	15858	116	217
Surgery (Male)	42	4445	232	122

Surgery (Female)	30	3175	232	87
Cabins	40	4232	203	101
	547	57893		1059

The present occupancy in capital hospital is 145 %. The ideal occupancy should not exceed 80% in an acute care hospital. In case the occupancy exceeds, there will be occasions when a deserving patient might have to be refused admission or two patients may have to be put in one bed.

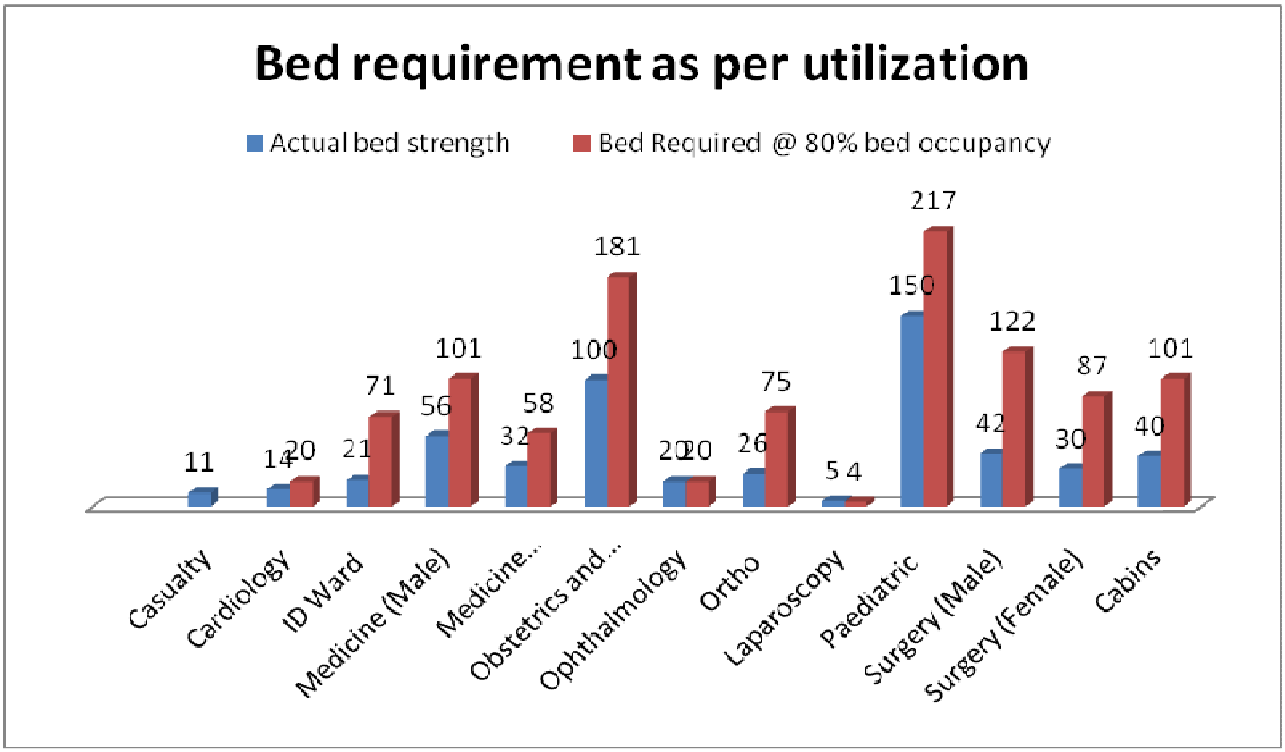

Figure No:34 bed requirement as per utilization

Recommended Bed Distribution – Capital Hospital Bhubaneshwar

Table No:31: Recommended Bed Distribution

Department	Existing Bed Strength	Recommended Bed Strength	Additional Bed Requirement
Casualty	11		
Cardiology	14	20	6
ID Ward	21	71	50
Medicine (Male)	56	101	45
Medicine (Female)	32	58	26
Obstetrics and Gynecology	100	181	81
Ophthalmology	20	20	
Orthopedics	26	75	49
Laparoscopy	5	4	
Paediatric	150	217	67
Surgery (Male)	42	122	80

Surgery (Female)	30	87	57
Cabins	40	101	60
TOTAL	**547**	**1059**	**512**

Bed Needs Determination – Compliance with MCI Guidelines for Teaching Hospitals

Though Capital Hospital is presently not a teaching hospital, yet the DMET has planned to upgrade the same into a medical college and hospital. A medical college hospital has to comply against the recommended Medical Council of India (MCI) guidelines for the same for the bed requirements and other facilities. The following matrix checks the compatibility of MCI against the existing facilities.

Additional requirements for a medical college with 150 annual intakes are given in the following table

Table No:32: Additional Facilities Requirement for a Medical College

Facility	Availability	Space Requirement with Remarks
1. Office Space for		
(a) Dean	Nil	36 M^2
(b) Medical Superintendent	Nil	36 M^2
(c) Hospital Office for supportive staff	Nil	
(d) Nursing Superintendent's room and office	Yes	
(e) Waiting Space for Visitors	Nil	There should a visitors room in the hospital premises

2. Enquiry office	Nil	This facility has to be provided
3. Reception Area including facilities for (a) Public Telephone (b) Waiting space for patients and visitors (c) Drinking water facility (d) Toilet facility nearby	Yes	400 M^2
4. Store rooms	Yes	One Central store is available
5. Linen Rooms	N.A	
6. Hospital & staff Committee room	N.A	80 M^2
7. Central Medical Record Room	Yes	250 M^2
8. One Central Lecture Theatre Gallery Type with a seating capacity of 200 persons	N.A	
9. Central Registration and statistics department with	N.A	This facility has to be incorporated to convert present hospital facility in to

computer facility		medical college facility
10. Residential accommodation. For interns and residents and Registrars	N.A	
For Each Ward		
11. Accommodation in General Ward shall not exceed 30 patients		
Bed Distribution	No. of beds and Units required Beds/Units	
MEDICINE AND ALLIED SPECIALITIES		
(a) General Medicine	180/6	
(b) Paediatrics	90/3	
(c) Tuberculosis and respiratory Disease	30/1	Facilities of larger tuberculosis and chest diseases hospital, if under administrative control, can be utilized
(d) Dermatology, Venereology and Leprosy	15/1	

(e) Psychiatry	15/1	Facilities of larger mental hospital, if under administrative control can be utilized
(f) ICU		
(g) ICCU		
(h) Intensive care Paeditric beds		
(i) Intensive Care in Tuberculosis and Respiratory Diseases		Preferable
SURGERY AND ALLIED SPECIALITIES		
a) General Surgery	180/6	
b) Department of Orthopaedics	90/3	
c) Department of Ophthalmology	30/1	
d) Oto-rhinolaryngology	30/1	
e) Intensive Care Burn Unit		

f) Surgical Postoperative Critical Care Unit		
OBSTETRICS AND GYNAECOLOGY		
(a) Obstetrics	50	
(b) Gynecology	32	
(c) Postpartum	08	
78. Nurses Duty Room/		
79. Lab for routine exam	N.A	
80. Examination and treatment room	N.A	
81. Ward Pantry	N.A	
82. Store Room for Linen and other equipment	N.A	
83. Resident Doctors and Students Duty Room	N.A	
84. Clinical Demonstration Room	N.A	
1) For each Department		

a) Office for HOD and HOUs	N.A	
b) Accn. For other unit staff	N.A	1) Professor & Head of the Department- (18 Sq.m.area); 2) Associate Professor/Reader-Two rooms (15 Sq.m.area each); 3) Asstt. Professor/Lecturers (Three)-One room (20 Sq.m.area); 4) Tutor/Demonstrators-One room (15 Sq.m. area) 5) Department office cum Clerical room - one room (12 Sq.m.area); and 6) Working accommodation for non-teaching staff (12sq.m. area)
c) Clinical Demo room (at least one for each department	N.A	

(a) Dept. Library - cum Seminar room with seating capacity of 50 students	N.A	30 M^2
Research Laboratory	N.A	
85. OT Unit		Following to be provided: 1) Waiting room for patients. 2) Preparation room 3) Operation theatre. 4) Post-operative recovery room (minimum of 10 beds). 5) Soiled Linen room. 6) Instrument room. 7) Sterilisation room. 8) Nurses rooms. 9) Surgeon"s and anaesthetist's room (separate for male and female).

		10) Assistant's room. 11) Observation gallery for students. 12) Store rooms 13) Washing room for Surgeons and Assistants; and 14) Students washing up and dressing up room.
86. General Surgery		4 Operating Theatres(Including one for septic Cases)
87. ENT	N.A	1
88. Orthopaedic		1 OT
89. Ophthalmology		1 OT
90. Obstetrics and Gynecology		2 OTs
91. Other surgical OT		One or more extra theatre for other surgical specialties and one theatre for emergency casualty area

92. Additional Space for Endoscopic Procedures	N.A	This facility has to be incorporated to convert present hospital facility in to medical college facility
93. Central Sterilization Service		
94. There shall be an independent Central Sterilization unit capable of taking the total working load of operation theatres, laboratories close to or in the operation theatre block itself. It shall have adequate equipment like bulk sterilizer with separate ends for loading unsettle material, unloading sterile, cold sterilize, Ethylene oxide sterilize, freon ethylene instruments and mattress sterilizer, sterile racks, mixers, and trays for instruments.	N.A	Sterilization facility exists but there is no Centralized facility.
95. Laundry (Central		

Mechanical Laundry)		
96. To be located in campus. Operation may be outsourced but to be supervised by the MS	Yes	1 Manually operated laundry is present in the present hospital campus
(a) Bulk washing Machine	N.A	
(b) Hydro extractor	N.A	
(c) Flat Rolling Machine	N.A	
(d) Facilities for i) Drying ii) Pressing iii) Storage: (1) Clean and (2) Soiled Linen	N.A	
iv)	N.A	

v)	N.A	
vi)	N.A	
Department of Radio-Diagnosis		
a) Radiography Room Size >= 25 Sq Meter	N.A	This facility has to be incorporated to convert present hospital facility in to medical college facility
b) Control Panel location as per AERB Guidelines	N.A	This facility has to be incorporated to convert present hospital facility in to medical college facility
c) Accommodation for: i) 300mA, 500 mA, 600 mA machines ii) IITV iii) Fluoroscopy System (36 Sq M) iv) 60 mA Mobile X-ray (15 Sq M)		
d) Ultrasound Room (15	Yes	

Sq M)		
(e) CT Scan System (Total Area 80 Sq M) i) Examination Room ii) Control Room iii) Computer Room iv) Service Room for electrical Panel, UPS, Servo Stabilizer)	Yes	
(f) MRI (preferable)	N.A	
(g) Store room for X-ray films (15 Sq M)	N.A	
(h) Museum (25 Sq M)	N.A	
(i) Waiting room patient	N.A	
(j) Enquiry Office	N.A	

(k) Staff Room for Prof, Assoc. Prof., Asst.Prof. Residents, Tutors as per requirement	N.A	
97. Department of Anesthesiology		Accommodation to be provided in OT
(a) Offices for HOD and Heads of Units	N.A	This facility has to be incorporated to convert present hospital facility in to medical college facility
(b) Accn for other unit staff	N.A	This facility has to be incorporated to convert present hospital facility in to medical college facility
(c) Clinical Demo room (at least one for each department)	N.A	This facility has to be incorporated to convert present hospital facility in to medical college facility
(d) Departmental Library Cum Seminar room (30 Sq M) - seating for 50 students	N.A	This facility has to be incorporated to convert present hospital facility in to medical college facility
98. OPTIONAL DEPARTMENTS		

(a) Department of Radiotherapy (Minimum Area 2000-2500 Sq M)	N.A	This facility has to be incorporated to convert present hospital facility in to medical college facility
(b) Department of Physical Medicine and Rehabilitation	Yes	Provided space is approx.2000 Sq.Ft., which is very low as per the standard, so This facility has to be restructured to convert present hospital facility in to medical college facility
Clinical Departments - OPD		
Accommodation:		
(a) Waiting/Reception	Yes	
(b) Enquiry and Record Room	N.A	
(a) Four examination room for each department	N.A	
(b) Case Demo room for each department	N.A	
(c) Dispensary	Yes	

99. Additional Accommodation	N.A	
(a) For Surgical specialities:		
(b) Dressing room for men and women	Yes	
(c) OT for outpatient surgery	N.A	
100. In Ophthalmic Section		
(a) Refraction room, Dark rooms, dressing rooms	N.A	
101. In ENT Section		
(a) Sound proof audiometry room, ENG Lab, Speech therapy facilities	Yes	Audiometry room is available
102. In Paediatric		
(a) Child Welfare including Immunization clinic	Yes	

(b) Child Rehabilitation clinic including facilities for speech therapy and occupational therapy		
103. In OBG		
(a) Antenatal Clinic, Family Welfare Clinic	Yes	
(b) Sterility Clinic	N.A	
(c) Cancer Detection Clinic	N.A	
(d) Students duty room separately for male and female attached to labour room	N.A	
104. In Dental section		
Accommodation:		
(a) Dental Surgery	Yes	
(b) Prosthetic Dentistry	N.A	

105. Reception and waiting hall for patients	Yes	
106. A seminar room for students	N.A	
107. Central Laboratories	Yes	
108. Central Casualty Department	Yes	
109. Casualty ward with 20 beds	Yes	10 beds are available
110. Central Hospital Pharmacy	Yes	
111. Central Kitchen	Yes	
112. Hospital Waste Management	Yes	
113. Staff Quarters		
(a) For 100% Sr. Resident and Jr.Resident	N.A	This facility has to be incorporated to convert present hospital facility in to medical college facility
(b) Quarters for each of 20% Nurses, teaching and non teaching staff	N.A	This facility has to be incorporated to convert present hospital facility in to medical college facility

114. Central Hospital Stores	Yes	This facility has to be replanned to accommodate more space to convert present hospital facility in to medical college facility
115. Post graduate Admission		
116. Bed strength in clinical departments for MD/MS		**As per total bed need @80% bed occupancy**
117. General Medicine		159
118. General Surgery		217
119. Obs & Gynae		180
120. Other Specialties	N.A	
121. Bed strength in clinical departments for DM/MCh	N.A	
122. Outpatient		
123. Specialty Clinics in relevant specialty		

124. Laboratory Facilities		
125. Equipment		
126. Number of PG students to be admitted		
127. In one unit		2 degree + 1 diploma in a year
128. PG Super specialty courses		1 per year with 3 Faculty Members + 20 beds

Minimum number of beds required in the hospital for 150 annual intakes of students is 750

Bed Needs – Compliance with MCI Guidelines & Hospital Utilization

Table No:33:Bed need as per MCI guidelines

	Existing		Guidelines As per Teaching Facility			Beds Proposed as per 80% BOR	Gaps	Total Bed Strength (Patient need+ teaching facility)	Units Required
Name of the Department	**No. of Units**	**Total bed Strength**	**Units**	**Bed Strength**	**No. of beds in each unit**				
Cardiology	1	14				20	6	**20**	
Infectious Disease	8	21				71	50	**71**	
Medicine	6	88	6	180	30	159	21	**180**	6
Obstetrics & Gynecology	4	**100**	3	90	30	181	81	**181**	6
Ophthalmology	1	20	1	30	30	20	10	**30**	1
Orthopedic	2	**26**	3	90	30	75	64	**90**	3
Pediatric	5	**150**	3	90	30	217	67	**217**	7
Psychiatry		0	1	15	15		15	**15**	1
Surgery	6	72	6	180	30	209	137	**209**	7
TB& Chest		**NA**	1	30	30		30	**30**	1
Skin & VD		**NA**	1	15	15		15	**15**	1

Dermatology/ venereology/ Leprosy		**NA**	1	15	15		15	**15**	1
Psychiatry		**NA**	1	15	15		15	**15**	1
Oto-rhyno-laryngology		**NA**	1	30	30		30	**30**	1
Laparoscopy	1	**5**				6	0	**6**	1
NICU	1	**8**						**8**	1
CICU	1	8						**8**	1
Private Beds		**40**				101		**61**	
Burn Ward		**Yes**							
Total						**1059**		**1201**	

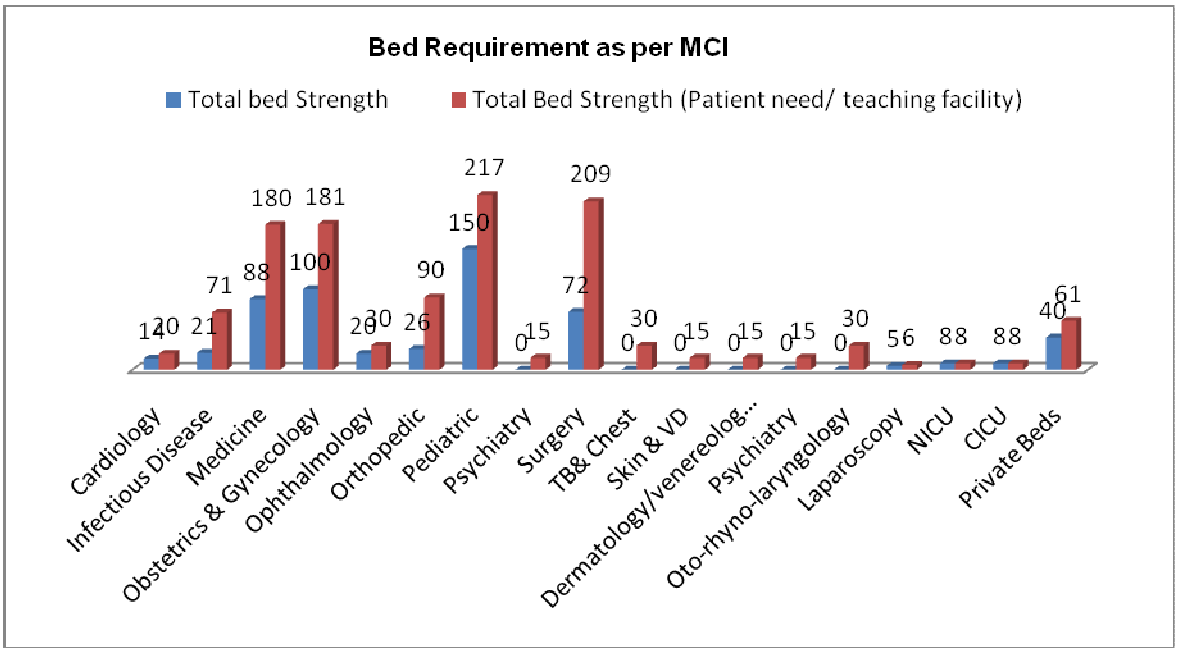

Figure No:35 bed requirement as per MCI guideline

Architectural Assesment & Recommendations

Architectural assessment and recommendations

Summary

The hospital is a low-rise, spread-out building with single storey and some double storey blocks put together. The hospital has expanded over more than fifty years. While circulation spine has been kept rather linear, functional distribution is not conducive to efficient operations. With the medical programme still inadequate without intensive care units and the support services programme inadequate due to the absence of good kitchen, laundry and a decent CSSD for a hospital that currently houses more than 550 beds, the hospital needs immediate renovation and expansion thereafter in order to meet demand in future.

The hospital campus, at present, is quite saturated in terms of coverage by buildings, with not much space left for future horizontal expansion. Moreover, majority of the blocks of the hospital are single storied, which provide poor conversion of FAR on ground coverage.

In view of the above, it is recommended that the hospital be expanded vertically by adding one more floor on the existing ground floor wherever first floor does not exist. Preliminary physical inspection of the buildings suggests addition of the extra floor should not be a problem for most blocks. However, necessary physical tests shall be conducted on the existing structures at a later date in order to decide whether structural strengthening would be required for accommodating one more floor above.

As present building requires more maintenance and on assessment of construction material used, we recommend that all material selected for upgradation should be chosen with a focus on easy maintenance and longevity of the material.

Circulation / Movement pattern and Inter-departmental relationships

It is very important in a hospital to control traffic movement – whether that of patient, relative, visitor, doctor, nurses, services or housekeeping and maintenance staff

- In order to achieve the desired level of hygiene and cleanliness in different areas of the hospital, particularly in critical areas like operating suites, intensive care units and emergency department by reducing unnecessary traffic flow in these areas
- In order to increase functional efficiency by reducing travel lengths
- In order to provide the patient with greater privacy and dignity by avoiding wheeling them through public areas
- In order to insulate doctors and other hospital personnel from unnecessary contact with patients' relatives and other visitors, thereby allowing them more time to devote to patients

- In order to check pilferage of hospital supplies

At present, the hospital allows unrestricted movement of all such traffic throughout the hospital, including in critical areas. The planning and design of the building does precious little to aid in providing such control. There is no point in providing security personnel at various locations as points for entry to the inner core of the hospital are various.

A close analysis of locations of various departments (illustrated through floor plans of existing building) in the hospital reveals that

- There are too many entrance points to the campus. This can create conflicting traffic movement as well as confuse the patient's sense of direction.
- There are no clearly defined entrance points to the building for OPD and IPD patients. This creates a lot of confusion and unnecessary movements.
- The entire Casualty block sits right in the middle of OPD consultation areas. Even most recent additions and renovation works have further squeezed Casualty department. There is no apparent realization of the importance that Casualty department holds for this size of a hospital. It is severely inadequate in size and encumbered by various functions around it.
- Entrance to the Casualty block is crowded with lot of shops and parking spaces just opposite to it.
- Movement of patient from Casualty to OT or IPD wards would have to be through OPD areas and even through emergency entrance lobby.
- Movement of patient from Casualty to Imaging department would have to be either through OPD areas, main entrance lobby and some administration areas or through OPD areas and corridor in front of medical wards. Either way, the distances are too long for efficient operation.
- Movement of patients from Casualty to CT scanner is even more tortuous as the travel is even longer and along the same route as mentioned above.
- Distance between OPD consultation areas and Imaging is too long and they criss-cross through casualty, administration areas and corridor in front of some wards.
- OPD consultation areas in the main building seem sporadic – distributed over ground and first floor.
- Movement of kitchen supplies is very long due to the spread-out nature of the building and hardly anything can be done about that at this stage.

- Use of ramps in the main building is not too convenient as they are located in such a manner that distribution of vertical movement is not equal over the two existing ramps.
- There are no elevators in the main building and patient movement should happen through elevators rather than ramps.
- Operating rooms are located on the ground floor. Apart from the fact that they are severely inadequate in various respects, as a location ground floor is not appropriate for operating rooms as it is quite easily accessible by moles, cats and dogs apart from many other insects.
- Distance and route from Casualty to Operation rooms is hardly ideal.
- Minor OT in Casualty area is opened only if there is a VIP surgery, which indicates the difficulty in maintaining such operating rooms in Casualty area.
- With OPD consulting rooms for various disciplines scattered over the entire building or set of buildings, either distance to Imaging becomes inefficient or duplication of equipment becomes necessary. The model of having separate self-sufficient blocks for each discipline is a cost-intensive and manpower-intensive one and is not recommended for a government hospital.

In order to rationalize the above movements, our recommendations (illustrated through floor plans of the proposed building) are

- The gate straight in front of the present Administration areas could be retained as the Emergency Entry, the gate between Blood Bank and unorganized shops to be retained as the Main Entrance and the gate between Eye Centre and Sulabh Shauchalaya be retained as Service Entry.
- Casualty should be relocated to the side block where the entrance has been recently renovated. This side is free from unnecessary traffic – both vehicular and pedestrian and would be ideal for emergency traffic movement. This relocation will also allow Casualty to secure undisturbed space and leaves it with good scope for expansion into the space where presently Imaging exists.
- The space vacated by Casualty should be used by OPD consultation rooms. This will allow OPD rooms to be consolidated around the new entrance and registration lobby created for OPD. It is proposed that all OPD, irrespective of which discipline, except for contagious and socially vulnerable diseases, be located here as this location has easy access to all Imaging facilities. The in-patient wards can still be suitably segregated in different blocks. This, obviously, implies that even Cardiology OPDs can be moved to this location and only in-patient wards to be constructed in the new building under construction.

- OPD entrance would be created right into the new registration area created for OPD. This large hall would have registration counters on one side and Medicine Dispensary on the other side of the entrance. This hall will not be used as a waiting hall for OPD as it is unlikely to succeed for such function with no consultation rooms opening into this area.
- Adequate waiting area would be created in front of the OPD chambers.
- All Imaging services are proposed to be consolidated into the space presently occupied by wards just behind the Casualty and new OPD area. This area would be central to OPD, Casualty and in-patient areas. Casualty can be connected to this area by constructing a side-open covered corridor through the internal courtyard behind it.
- Once the above relocation exercise is done, Casualty will be easily connected to OPD, Imaging, OT and in-patient areas without having to move patients through public areas.
- With two OTs already in the OBGY block and one in the Paediatric block, it is recommended that another six OTs be consolidated at one location and relocated to the first floor on top of the present CT scanner room. This location is well served by the ramp right in front of this block and can be used by Emergency patients and is also easily accessible to the proposed Imaging area.
- A well-equipped CSSD would be located on top of the present OT area and will have easy access to the proposed OT area. This area will be free from most movement and is ideal for services.
- Surgical ICU can be located on top of the Cardiology block. This location is easily accessible from OT and close to it.
- It is proposed to create first floor on top of most single storey blocks and connect them with corridors. These spaces then can be used as patient wards.
- The present Kitchen can expand into the space vacated by CSSD. This space will be adequate for kitchen for the entire hospital.
- Laundry can be set up in the space presently occupied by Psychiatry wards.
- Medical stores can occupy the floor on top of the kitchen.
- For other non-medical stores, including housekeeping, space on top of present Psychiatry can be utilized by constructing a first floor there.
- Two freight elevators can be located along the corridor connecting kitchen and laundry. These will be used for movement of services as the ramps are too far.

- Two 20-passenger bed elevators will be installed along the corridor at the corner of the present Cardiology and Imaging area. This location is close to the OT, ICU and Casualty areas.

Overall, movement of visitors shall be restricted to OPD, Imaging and administrative offices of the main hospital building. Doors will be located at strategic locations on the corridors, with minimal security arrangement, in order to control traffic movement within the hospital. There shall be no criss-cross between restricted and unrestricted traffic.

Medical programme and its functional components

Following important programme elements are missing in this hospital and are recommended to be introduced in the proposal

- Intensive care units – Physical infrastructure for 12 beds will be provided close to the OT area. This area will be carved out of the wards on top of Cardiology block.
- In all other areas, particularly in nursing areas, support functions are severely inadequate and shall be provided as required.
- There is only one large X-ray machine operating in this hospital. It is important to provide infrastructure for two X-ray machines.
- Infrastructure for two Ultrasound machines should be there while one exists.
- The Operating suite should have proper three-level segregation of circulation with strategic location for change rooms that create a buffer between clean and unclean areas of the suite.
- Sterilization for male is done in the operation rooms used for other purposes in this hospital. It is recommended that two of the existing operating rooms be used for the purpose while the main operating suite will be relocated to the first floor.

Non-clinical support services

Following essential components are missing in this hospital and are recommended to be introduced in the proposal

- **Kitchen** – The existing kitchen is too small to cater for all patient and staff needs. Neither is the flow from kitchen to various areas of the hospital unhindered. It has, therefore, been recommended above that the present kitchen be expanded and upgraded with proper modern equipment in order to handle the required load.
- **Laundry** – It is recommended that a modern Laundry be set up in the area presently occupied by psychiatry wards. This location for laundry will allow for good logistics movement within the hospital. It has been observed that the hospital laundry dries clothes

in the open areas of the campus. This practice needs to be stopped by using driers inside laundry.

- **CSSD** – It is recommended that a fully equipped CSSD be provided on top of the kitchen block. This location is close to the OT area and other intensive care areas. The location also provides access for easy movement of material from Casualty.
- **Medical stores** – At present two floors of a complete building block are occupied by stores. This building is ideally suited to accommodate patient wards. Therefore, it is recommended to shift the stores from there and relocate them on top of the kitchen.
- **Non-medical stores** – Other stores like stationery, housekeeping stores, etc. can be located on top of the proposed Laundry.
- **Mortuary** – There is a separate Mortuary block for the hospital with dedicated vehicular access for the hearse at the rear end of the campus. Presently it only provides post mortem facility. It is recommended that three 2-cabinet cadaver drawers be provided in the Mortuary for storage of bodies.
- **Piped Medical Gas delivery system** – Piped supply of oxygen gas is provided to OT and the non-functional ICU at present. For suction portable machines are used only, and there is no provision for compressed air. Titration, flow velocity and fluid efficiency is much better in piped supply from manifold than from cylinders. It is, therefore, recommended that oxygen, suction, compressed air and nitrous oxide be piped from manifold, while coverage of oxygen and suction gas be extended to some general care or step down wards also apart from intensive care units.
- **Administration offices –** Presently administrative offices are functioning from multiple areas of the hospital. It is recommended that all Administration areas be consolidated and they operate from the first floor of the block on top of proposed Casualty.
- **Medical Records Department** – It is proposed that a properly sized MRD be located on the first floor of the medical gas manifold room beside CSSD.

Engineering support services

Following important components for engineering support are recommended to be added to the proposal for upgradation of the hospital

- **Plant room** – It is proposed that the OT area and Intensive care areas be provided with ASHRAE recommended air quality through compact package air conditioners with proper air changes. However, running cost of package units is very high. Therefore, a chilled water based system could also be installed for all critical areas. Running of such system involves full time involvement of a maintenance engineer.

- **Medical gas manifold room –** It is proposed that piped medical gas be supplied to the OT area, Maternity area and other Intensive care areas. A Manifold room with storage stack for Oxygen and Nitrous oxide gas cylinders along with Pump room for compressed air and vacuum suction is proposed to be located on the ground floor of the present OT block alongside sterilization centre for male. This location provides for good logistic movement while it is also close enough to the destination areas to be served in order to keep pipe lengths to a minimum.

- **Ventilation –** It is important that the entire hospital, particularly the in-patient areas, is well ventilated by periodically replenishing the inside air through mechanical means. For the purpose, it is proposed that evaporative cooling units be located in suitable locations and ducted pre-cooled air is supplied to these areas from them. This will keep bacteria growth lower and will also remove fowl odour from the wards and other hospital areas. It is considered an essential component of modern hospitals in order to maintain acceptable hygiene standards. Alternatively, if a chilled water based system is used, water coolers can be replaced by TFA (Total Fresh Air) units.

- **Water supply –** At present water is pumped up to overhead tanks on different areas of the hospital directly from bore wells after online chlorination. While this kills bacteria at source, it does not reduce hardness of the water. This results into choked pipelines and sanitary fittings at every outlet over a period of time. Moreover, there is no significant storage of water. Therefore, during periods of crisis, the hospital will stop functioning. Keeping in view the above, it is recommended that

    - An underground storage tank to be created in order to augment the present storage capacity and allow for at least one day storage for mitigating crisis situations.

    - A water treatment plant be installed including softening and chlorination before pumping them to various destination points.

    - Some of the existing water supply pipelines would need replacement and so would sanitary fittings.

- **Drainage of waste water and solid waste –** At present everything is discharged to the municipal sewers. However, all modern hospitals try to reduce load on municipal sewer lines and also care about not discharging solid waste before treating them for infection removal. For the purpose, it is proposed to set up a Sewage Treatment Plant, which will decompose all drained waste matter and disinfect the same in chlorination tanks before pumping up the residual treated water for irrigation, flushing and make up water for chiller plants.

- **Storm water drainage –** The network of storm water drains within the site are open at various locations and stretches. This results in water logging in areas where drains are

choked by falling leaves and other solid waste. Moreover, this stagnant water in storm water drains breeds to mosquito and other infection carriers. Therefore, all storm water drains will need to be covered.

- **Internal electrification –** Overall condition of electrical installations and their maintenance is not up to the mark and is a potential flashpoint for any serious accident.
    - Distribution Boxes are rusted, most do not have a secure lock and cables going in and out of the DBs mostly have their sheaths worn out. It is recommended that new DBs be installed in most locations.
    - Conduits are exposed and are very difficult to keep clean and free from cobwebs. It is recommended that entire conduiting in the hospital be concealed inside walls for better protection.
    - Wiring is very old in the old building and would require complete overhauling. While conduits are getting embedded inside the walls, it might make a case for changing wiring too.
    - Luminaires in different areas are old and lamps used in them drain high energy. Luminaires in operating areas and emergency areas are still the fluorescent tubes, which are very difficult to clean as they are round in section. It is recommended that light fixtures in most areas be changed to use CFL and T5 lamps as much as possible and operating areas, intensive care areas and emergency areas should have luminaires that have lamps covered with prismatic diffusers. Number of lamps also needs to be rationalized in order to provide proper lux levels in different areas.
    - Switches and sockets in most locations will need to be replaced with modular type installations so that replacement and spares are consistent with original installations and are easy to procure.
- **Power distribution** – While power connection in the hospital currently meets the demands, it is important to realize that demands are low because infrastructure is inadequate. With more required infrastructure recommended, it is important to augment the power supply to the required level. Such detailed calculations are yet to be carried out in order to arrive at the desired power requirement.
- **Captive power –** The hospital has hotline connection. Therefore, DG power back up has been currently kept at a minimum. However, with Operating theatres upgraded, new intensive care units introduced and lot of other equipments augmented including elevators, it would be necessary to increase the emergency captive power that must back up for air conditioning also in critical care areas. An additional DG set of 250 KVA is recommended for the purpose.

- **Hot water generation –** With laundry, kitchen and CSSD being introduced in the hospital, requirement of hot water would go up by a huge margin. Requirement of steam for these areas is estimated at 600 kg/hr. A boiler would need to be introduced and it is proposed to be located near the pump room for water supply.

- **Air conditioning and ventilation –** It is critically important to maintain prescribed standards of air quality in critical areas. ASHRAE regulations should be followed for the purpose. At present operating rooms have been provided with exhaust fans which is exactly opposite of recommendations as it effectively puts operating rooms under negative pressure and, therefore, susceptible to infections from outside the operating rooms. Apart from that, this also allows birds and insects to get into the operating rooms. These practices need to be changed.

Vertical transport systems

The hospital already has two ramps in the rear middle of the hospital building. These ramps can be used for transport of material trolleys and staff and visitors. However, for transport of patients ramp is not the ideal system and, therefore, a set of two elevators are proposed for carrying patients in this building. Two elevators would ensure better synchronization and lower waiting time while also providing options for redundancy. It is recommended that two 20 passenger bed elevators be installed in the building at a location quite central to the entire hospital yet being close to the critical care areas like operating rooms, intensive care units and casualty. Two more freight elevators are proposed to be located near kitchen and laundry as distance between these service areas and the ramps is quite high.

Condition of the building

While the main hospital building has major areas in an unsatisfactory condition, the relatively newer buildings like OBGY and Paediatric, even though better than the old one, are not up to the desired standards. Some sprucing up has happened sporadically at some corners of the hospital, but the efforts are not concerted enough to raise the standard of the hospital.

- Flooring in all areas except OT and engineering or non-clinical support service areas – Some new work has been done with large vitrified tiles, but the major part of the hospital still either has smaller ceramic tiles or mosaic flooring both of which are not desirable. It is expected that at least 30% of the hospital area would require flooring to be upgraded to vitrified tiles of 600x600 size.

- Flooring in OT areas – Operating suite requires flooring that is seamless, does not have too many nooks or crevices, hard, easy to clean and stain resistant. Any tiled flooring is advised against in such areas as more the number of joints more is the scope for bacteria growth. It is recommended that the entire operating suite be provided with a self-leveling epoxy flooring with coved corners at skirting.

- Flooring in engineering and other non-clinical support service areas – Flooring in functional areas like kitchen, laundry, CSSD, manifold room and plant room requires being hard enough to bear the load of equipment including their dynamic load during operation; joints should be minimal and should not allow accumulation of water in order to keep them clean. In order to achieve these, it is recommended that flooring of such areas be done with kota stone.

- Dampness on walls -- There are too many areas in the hospital which have significant seepage and dampness which inevitably leads to fungal growth that is detrimental for a hospital. It is always difficult to ascertain the source of such seepage. Therefore, it might be advisable to redo the water proofing on terrace that is already several decades old and has outlived its life. It is recommended that water proofing on roof top be replaced with fresh tapecrete with insulation and finished with cement tiles.

- Walls in OT areas – Walls in sterile areas, particularly inside operating rooms, needs to be scrubbed often. For the purpose, cladding with stone or stainless steel can be used. However, a cost effective way of providing washability on walls is to provide a clear epoxy coating on plaster and paint. This arrangement would require regular maintenance at intervals of six to twelve months – the epoxy coating would need to be applied at periodic intervals as this tends to wear off with regular scrubbing.

- Walls in other areas – There are too many areas in the hospital with dampness on walls. Plaster on such walls needs to be scraped off and redone with water proofing chemical admixture in plaster. Painting on all areas needs to be redone with oil bound distemper or a better paint. White wash should be strictly avoided in a hospital as such paint tends to shed dry paint dust over a period of time.

- Walls in corridors – Corridors and some public areas like OPD waiting require protection on walls from getting dirty and wear and tear due to touch. Most hospitals have ceramic tile cladding on walls up to at least four feet height. However, the tiles used for such cladding are too small in size resulting in lot of joints. Moreover, ceramic tiles have accentuated joints due to beveled edges. These joints get dirtier and allow more bacteria growth with every scrubbing and wiping with moist cloth. It is, therefore, recommended that such cladding be done with vitrified tiles of size 600x600 (as illustrated in the sketches).

- Walls in wet areas – Walls in wet areas like toilets, sluice rooms or pantry would be provided with cladding of vitrified tiles of size 600x300 up to a height of 1200mm except for shower areas where the cladding would extend to a height of 2400mm.

- Toilets – Cleanliness of any building, not hospitals in particular, is evident in the quality of toilets. Unfortunately, the hospital presents toilets conditions of which are so abysmal that they can hardly be used without fear of infection. It is recommended to overhaul all toilets

in the hospital including replacing sanitary fixtures and fittings, wall and floor tiles, etc. There should be absolutely no compromise in achieving best standards of sanitary hygiene.

- Doors and windows – Most of the doors are made of wood which are quite old and are too rough textured to enable cleaning while windows are in steel sections that rust over time and operation of such windows becomes difficult. It is recommended that all doors and windows be replaced by aluminium doors and windows. This will ensure neatness in aesthetics as well as long-term durability providing easy cleaning options.

Condition of external environment

- External façade of the building does not have any unique character to itself and, as a result, does not capture the imagination of the viewer. It is recommended that with minor modifications on the external façade, the building character be changed. Use of sand stone on the external wall in some areas will significantly improve maintenance standards over a period of time.

- Roads and Parking areas – Access to the hospital building from the entrance gate to the campus is quite direct and hardly calls for any modification except for the fact that there is a paucity of parking areas apart from the front of emergency. In view of the lack of open space around the hospital, no specific recommendation can be proffered to augment this facility. However, relocation of Casualty would automatically divide the total visitor and patient load at the main entrance of the hospital.

- Landscaping and Horticulture – There have been some effort from the hospital administration for developing good lawns in the external courtyards of the hospital. The same effort needs to be extended to define the immediate environment of the hospital including internal courtyards.

Signage

Signage is an essential component of way finding in hospitals. However, one often loses sight of the fact that adequate signage, well synchronized with interior décor, and could significantly enhance the internal environment of a hospital.

It is also important to note that a lot of patients visiting government hospitals are incapable of reading signages. Therefore, a pictorial representation of signage is also important for such hospitals. It is recommended that a comprehensive signage design be developed including pictorials for each area.

Material selection of signage is a delicate balance between longevity and upfront cost. While metal signage lasts longer, other materials like acrylic and sun board are cheaper. Preliminary cost estimate considers digital print on sun board.

Changes incorporated into the Masterplans following discussions with the Hospital authorities and HODs of various department

Following the completion of the draft masterplans a review meeting was held with the Medical Superintendant and the Heads of Departments of Capital Hospital. The following are the changes incorporated post the discussions:

- The first request made by all HODs is to correct the entry and exit flow to the hospital, this has been addressed on the site plan.
- While preparing the master plans for Capital hospital, the first focus point was to ensure that there is no mixing of OPD, IPD and emergency traffic. This was voiced out in the review meeting which was agreed upon by all present. To achieve this a new building has been created in the area where small shops exist presently opposite the existing casualty. This building will be the centralized OPD complex which can be completely closed after the OPD hours thereby reducing the need for security personnels. The IPD entrance and waiting has been planned just opposite to the bloodbank further down the road. A part of the existing administration block and the existing OPD has been planned to a casualty (emergency block) with the entrance facing totally away from the road to the OPD and IPD entrance.

- The centralized OPD complex will also house a sample collection centre to avoid the cumbersome up and down movement that patients have to go through when travelling from the OPD to the RDC

- The existing casualty and a part of the OPD has been replanned to accommodate the Radiology and imaging department. This location is ideal as it ensures that the radiology department is right next to the casualty, exactly opposite to the OPD complex and is also easily accessible from the IPD area.

- The remaining part of the main hospital building on the ground floor has been planned to accommodate the medicine and allied wards. However the area housing the existing OTs has been converted to the PPC area.

- On the first floor a centralized OT complex has been planned which will be next to the centralized ICU complex. In addition space has been created as waiting area for relatives of patients admitted in the ICU or undergoing surgery in the OT. The OT complex has also been planned such that it is very close to the CSSD and sterile store which has been proposed on the terrace of the existing OTs. The rest of the first floor will be utilized as surgery wards except for the area above the proposed casualty which will be the administrative and MRD area.

- Considering the fact that greater Bhubaneshwar is coming up and that Capital hospital will then have to be upgraded to a tertiary care hospital, a new building has been proposed next to the Infosys paediatric hospital. This building will house all the superspeciality services that will be added to the hospital in the coming years.

- The building housing the store is currently being underutilized, we have therefore proposed for a non medical store on the first floor of the existing psychiatry building and a medical store on the first floor of the existing kitchen.

- With the idea to house all support services in one location easily accessible from all areas of the hospital we have proposed a centralized laundry on the ground floor where the psychiatry ward is. The kitchen has been redesigned to also occupy the space currently utilized by the CSSD.

- The existing store building can now be efficiently utilized to accommodate the psychiatry ward on the ground floor, this will not have access to the first floor which will house the burn ward. The necessity of a burn ward was voiced by most HODs present in the review meeting.

- As suggested by the OBG HOD and the paediatric HOD the NICU has been planned to be relocated to the OBG block. Also a direct connection between the OBG and Paediatric block has been created on the first floor. A USG room has been created in the OBG block as suggested by the HOD.

- A request for a covered connection between the RDC and the main hospital building was made by the HOD, this has been created on the ground floor.

- Parking areas have been planned all around the hospital to cater to each area of the hospital.

Appendix

INFRASTRUCTURE ASSESSMENT CHECK LIST

NURSING UNITS (WARDS)

Name of the hospital

_____

Name of the department:

_____

Ward Name (or Number)

_____

Name of the respondent

_____

Name of the interviewer

_____

Date

_____

Give a General description

_____

_____

_____

_____

_____

1. Building	
2. Location (Floor etc)	
3. Relationship with neighbouring wards	
4. Access to the department (Corridor width)	
5. Type of ward design:	
(a) Rig pattern	
(b) Nightingale pattern	
6. No of beds	
7. No of private rooms	

8. No of semiprivate rooms	
9. Distance between two beds (centre to centre - in multi bed rooms)	
10. In Nightingale pattern ward, width of central corridor	
11. Sisters' Duty room with toilet	
12. Supporting Areas	
(a) Nurses Duty station	
(i) Location	
(b) Treatment and clean utility	
(c) Ward Store	
(d) Linen Store	
(e) Pantry	
(f) Dirty Utility	
(g) Soiled Linen store	
(h) Janitor's closet	
(i) MO's duty room	
(j) Trolley Bay	
(k) Staff/Visitor's Toilet	
13. For special care units, any other areas if provided	
14. Sanitary Annexe	Numbers provided
(a) Bath	
(b) Urinal	
(c) Water Closet	
15. Comment on the following	
(a) State of maintenance	
(i) Civil	

(1) Floor	
(2) Ceiling	
(3) Walls	
(4) Windows	
(5) Doors	
(ii) Plumbing	
(1) Wash Hand Basins	
(2) Water Closets	
(3) Water taps	
(iii) Electrical	
(1) Electrical outlets	
(2) Wiring	
(3) Other fixtures and fittings	

Tool Kit No 2

INFRASTRUCTURE ASSESSMENT CHCKLIST

OPERATION THEATRE

Name of the hospital

_____

Name of the department:

_____

Ward Name (or Number)

_____

Name of the respondent

_____

Name of the interviewer

_____

Date

_____

Give a General description

_____

_____

_____

_____

_____

Hospital Name: _____

2. OT	
3. Department (if departmental)	
4. Building	
5. Location (Floor)	

(a) Comment on location (should be in quiet environment, freedom from noise and other disturbance, freedom from contamination and other possible cross infection, maximum protection from solar radiation and convenient relationship with acute surgical ward, ICU, Imaging department, laboratory and Blood bank)	
6. **Zoning** (with rooms in each zone)	
(a) Protective	
(b) Clean	
(c) Sterile	
(d) Disposal	
7. Entry/Exit	
(a) Staff	
(b) Patients	
(c) Supplies	
(i) Clean	
(ii) Sterile	
8. Ventilation System	
(a) Central	
(b) Packaged	
(c) Window	
(d) Others	
(e) Air Flow	
(i) Laminar Air Flow	
(ii) Turbulent Flow	
(iii) Positive Pressure Ventilation	
(f) Type of Air Filters Used	

(i) HEPA	
(ii) Others	
(iii) No specific air filters	
(g) Return Air System	
(h) Fresh Air 100 % outdoor air	
(Give Operating Room wise details)	
9. Operating Room No	
(a) Types of operations done	
(b) Size of the room	
(c) No of OT table placed in one room	
10. Ancillary rooms	
(a) PROTECTIVE ZONE	
(i) Reception	
(ii) Waiting with Toilets	
(iii) Anaesthetists' and Surgeons' examination room	
(iv) Doctors change room with toilets	
(v) Nurses' change room with toilets	
(vi) Other staff change room with toilets	
(vii) Theatre Store	
(1) Linen	
(2) Appliances and medical stores	
(3) Instruments and disposable store	
(viii) Trolley bay	
(ix) Autoclave room	
(x) Gas store	

(xi) Theatre work and preparation	
(xii) Closed Circuit TV for operation viewing	
(b) CLEAN ZONE	
(i) Pre-operative room	
(ii) Recovery room	
(iii) Toilet	
(iv) Janitors' closet	
(v) Nursing Station	
(vi) Technicians room with toilet	
(vii) Pump storage for CTVS OT	
(viii) Store for costly and sophisticated equipment	
(ix) Blood storage and Frozen section	
(x) X-ray unit with dark room	
(xi) Seminar room with toilet	
(xii) Pantry	
(xiii) OT Matron's room	
(xiv) Computer room	
(c) STERILE ZONE	
(i) Anaesthesia induction room	
(ii) Clean utility store	
(iii) Operating Room	
(iv) Scrub up	
(v) Trolley Laying	
(d) DISPOSAL ZONE	
(i) Dirty Wash-up room	

(ii) Janitors' closet	
11. Comment on the following	
(a) Dado height	
(b) Door width	
(c) Shape of the Operating Room	
(d) Availability of PMGV System	
(e) UPS availability	
(f) Standby Power Supply	
(g) State of maintenance	
(i) Civil	
(1) Floor	
(2) Ceiling	
(3) Walls	
(4) Windows	
(5) Doors	
(ii) Plumbing	
(1) Wash Hand Basins	
(2) Water Closets	
(3) Water taps	
(iii) Electrical	
(1) Electrical outlets	
(2) Wiring	
(3) Other fixtures and fittings	

Tool Kit No 3

Out-Patients' Need Assessment

PART A: BACKGROUND INFORMATION

	Date of Interview	
	Name of the interviewer	

1.	Name of the Facility		
1.1.	Age of the patient (in years)		
1.2.	Location of Residence (Currently Living)	1. Bhubnsewar	
		2. Cuttack	
		3. Behrampur	
		4. Sambalpur	
		5. Other Districts of Orissa	
		6. Out Side Orissa	
		7. If Orissa (Other than Bhubneswar) then the name of the district	
1.3.	Sex of the patient	1. Male	
		2. Female	
1.4.	Main Occupation of the patient	1. Agriculture	
		2. Labour	
		3. Service	

		4. Business	
		5. Unemployed	
		6. House-wife	
		7. Others	
1.5.	For how long you or your family members are using the services of this hospital? *(for first visit, write "0", for less than 1 year write "1", and so on)*	1. First visit.	
		2. Less than one year	
		3. For 1-2 years	
		4. More than 2 years	
		5. If more than 2 years then for how many years?	
1.6.	Mode of transport used to reach the hospital	1. Public Transport	
		2. Cycle	
		3. Motor Cycles	
		4. Hired Four Wheelers	
		5. Own Four Wheelers	
		6. Ambulance	
		7. Others (specify	

SECTION 2: CRITERIA FOR SELECTING THE FACILITY

SN	Question	Options	
2.1.	What is the most important reason for selecting this particular hospital?	1. In-expensive	
		2. Good infrastructure	
		3. Skilled doctors	
		4. Skilled nurses	
		5. Good behavior of doctors & other Staff	
		6. Good Diagnostics	
		7. Availability of drugs	
		8. Close proximity	
		9. Cleanliness	
		10. Prompt services	
		11. Others (specify	
2.2.	For what problem you have visited this facility?		
2.3.	Location of the OP Service utilised (In which building of the hospital in the OP / Clinic/ Diagnostic used by the patient located)		

SECTION 3: FEEDBACK ABOUT FACILITIES, AMINITIES & CONVENIENCES

SN	Question	Options	
	Signage's		
3.1.	How difficult it was to locate the Doctor's Room / Radiology / Laboratory / Other services?	1. Easy	
		2. Somewhat Difficult	
		3. Difficult	
3.2.	In case it is difficult to locate, what are these areas		1. 2. 3.
3.3.	How did you locate the various service locations?	1. Asked the reception / help desk	
		2. Through signage boards	
		3. Asked other patients / public	
	Waiting Area / Amenities		
3.4.	How will you rate the Facilities (space, seating, water, toilets) provided in the waiting areas adequate?	1. Not adequate	
		2. Some what adequatre	
		3. Adeqaute	
3.5.	What are the facilities / amenities you would like the hospital to additionally provide? (Tick the choices that the respondent expressess by himself….No prompting to be provided)	1. Seating / Chairs / Benches	
		2. Water Dispnesers / Coolers	
		3. Canteen / Cofee/ Tea Kiosks	
		4. Communication Centers / Internet Café /	
		4. Toilets	
		5. Fans	
		6. Lighting	

SN	Question	Options	
		7. Others (Speify, List options not covered above)	
	Accessibility Factors		
3.7.	Distances between various services (OPD – Labs, OPD – Pharmacy, OPD – X-ray)	1. Far from each other	
		2. Away from each other, but accessible	
		3. Nearby each other	
3.8.	Any specific facility / service you would suggest that may be located near to the OPD (List the name of the service)		
3.9.	Rate the crowding in the lifts provided? (In case the hospitalshas provision for them)	1. Not crowded	
		2. Moderate crowd	
		3. Very crowdwd	
	Parking facilities (To be asked to only patients / family who has own transport / hired transport)		
3.10.	Where did you park your cycle / two wheeler / four wheeler?	1. Outside hospital campus 2. Hospital Campus (Unmarked area) 3. Designated Parking Area	

SECTION 4: FEEDBACK ABOUT AVAILABILITY & ADEQUACY OF SERVICES

SN	Question	Options	
4.	Was the type of specialist / specialty you wanted to consult available?	1. Yes	
		2. No	
4.1.	Incase of No, Name the type of specialist / speciality not available		
4.2.	Did you have to rely on any of the outside hospitals / laboratory for any laboratory investigations?	1. Yes	
		2. No	
4.3.	If yes, Name of the investigation for which you had to go to other places		
4.4.	Did you have to rely on any of the outside hospitals / Scan Centers for any Imaging / Radiology investigations?	1. Yes	
		2. No	
4.5.	If yes, Name of the investigation you had to get done in other places?		

SECTION 5: FEEDBACK ABOUT GENERAL QUALITY PARAMETERS

Provide Ratings for the following parameters

5.	Infrastructure	1. Not Good	
		2. Satisfactory	
		3. Very Good-	
5.1.	Cleanliness	1. Not Good	
		2. Satisfactory	
		3. Very Good	
5.2.	Behavior of the Doctors	1. Not Good	
		2. Satisfactory	
		3. Very Good-	
5.3.	Behavior of the other staff	1. Not Good	
		2. Satisfactory-	
		3. Very Good	
5.4.	Promptness in the services	1. Not Good	
		2. Satisfactory	
		3. Very Good	
5.5.	Signage /marking system	1. Not Good	
		2. Satisfactory	
		3. Very Good	
5.6.	Availability of Drugs	1. Not Good	
		2. Satisfactory	
		3. Very Good	
5.7.	Availability of Diagnostics services	1. Not Good	
		2. Satisfactory	

		3. Very Good	
5.8.	Time spent by the doctor	1. Not Good	
		2. Satisfactory	
		3. Good	
5.9.	Maintenance of privacy **(For female Pts only)**	1. Not Good	
		2. Satisfactory	
		3. Very Good	
5.10.	Availability of doctors	1. Not Good	
		2. Satisfactory	
		3. Very Good	

Section 6: Patient Friendliness

6.	How stressed you feel in the OPD	1. Very stressed	
		2. Stressed	
		3. Not stressed	
6.1.	How easily you get all the information you need	1. Get no information	
		2. Get Some information	
		3. Get all information easily	
6.2.	How friendly the staff are	1. Not at all friendly	
		2. Friendly	
		3. Very friendly	
6.3.	How long do you have to weight in the OPD to get your job done	1. Very long	
		2. Long	
		3. Not long	
6.4.	Do the staff properly explain to you the reason for delay on their own	1. Do not explain at all	
		2. Explain in a hurry when asked	
		3. Explain properly without asking	
6.5.	Before any procedure, does the staff properly explain to you what you should expect?	1. Never explain	
		2. Explain when asked	
		3. Always explain properly without asking	
6.6.	If possible, would you avoid coming to this OPD in future, if required?	1. Definitely avoid	
		2. Avoid	
		3. Never shall I avoid	

Tool Kit No 4

IN-PATIENTS' NEED ASSESSMENT

SECTION 1: BACKGROUND INFORMATION

1.	Date of Interview	
1.1.	Name of the interviewer	
1.2.	Name of the Facility	

1.3.	Age of the patient (in years)		
1.4.	**Location of Residence (Currently Living)**		Put a **X** (against the response)
	• Bhubnsewar		
	• Cuttack		
	• Behrampur		
	• Sambalpur		
	• Other Districts of Orissa		
	• If in Orissa (Other than Bhubneswar) then the name of the district		
	• Out Side Orissa (Name the state)		
1.5.	Sex of the patient	1. Male	
		2. Female	
1.6.	Main Occupation of the patient (Put a **X** against the appropriate occupation of the patient)	1. Agriculture	
		2. Labour	
		3. Service	

		4. Business	
		5. Unemployed	
		6. House-wife	
		7. Others	
2.	For how long you or your family members are using the services of this hospital? *(for first visit, write "0", for less than 1 year write "1", and so on)*	1. First visit	
		2. For less than one year	
		3. For 1-2 years	
		4. More than 2 years	
		Number of years	
2.1.	Mode of transport used to reach the hospital	1. Public Transport	
		2. Cycles	
		3. Motor Cycles	
		4. Hired Four Wheelers	
		5. Own Four Wheelers	
		6. Ambulance-	
		7. Others (specify	
2.2.	For what problem you have visited this facility?		
2.3.	How long you have been admitted in the hospital (No of days)		
2.4.	What is the most important reason for selecting this particular hospital? (Put a **X** against the appropriate answer)	1. In-expensive	
		2. Good infrastructure	
		3. Skilled doctors	
		4. Skilled nurses…	

		5. Good behavior of doctor & other Staff	
		6. Availability of drugs	
		7. Close proximity	
		8. Cleanliness	
		9. Prompt services	
		10. Good Diagnostics	
		11. Others (specify	
2.5.	Name of the ward where the patient is admitted?		
2.6.	Location of the Ward (In which building of the hospital is the ward located)		

SECTION 2: FEEDBACK ABOUT FACILITIES, AMINITIES & CONVINIENCES

	Question	Options	Circle, most appropriate		
	Basic Amenities				
2.1.	Are the numbers of toilets adequate?	1. Not adequate 2. Some what adequate 3. Adeqaute	1	2	3
2.2.	To what extent are you satisfied with availability of drinking water	1. Not satisfied 2. Satisfied 3. Highly satisfied	1	2	3
2.3.	Is location of drinking water point suitable to you	1. Not suitable 2. Suitable 3. Most suitable	1	2	3
2.4.	Are availability of wash basins adequate for your need	1. Not adequate 2. Adequate 3. Most adequate	1	2	3
2.5.	Are numbers of toilets and baths adequate	1. Not adequate 2. Adequate 3. Most adequate	1	2	3
2.6.	Are you satisfied with availability of hot water for bathing etc	1. Not satisfied 2. Satisfied 3. Highly satisfied	1	2	3
SECTION 3:Food / Diet Related Amenities					
3.3.	Is hospital diet provided to you	1. Not provided 2. Occassionally provided 3. Always provided	1	2	3
3.4.	In case patient diet is not provided, are you satisfied with hospital canteen supply	1. Not satisfied 2. Satisfied 3. Highly satisfied	1	2	3
3.5.	Are you satisfied with the food supply arrangement to your attendants staying with you?	1. Not satisfied 2. Satisfied 3. Highly satisfied	1	2	3
3.6.	Is the location of hospital canteen convenient?	1. Not convenient 2. Convenient 3. Most convenient	1	2	3
3.7.	Are you satisfied with hospital night stay arrangement, if	1. Not satisfied 2. Satisfied 3. Highly satisfied	1	2	3

	Question	Options	Circle, most appropriate		
	required, for your relatives				
3.8.	If your relatives have to make their own night stay arrangements, are these conveniently located	1. Not convenient 2. Convenient 3. Very convenient	1	2	3
3.9.	**Parking facilities (To be asked to only patients / family who has own transport / hired transport)**				
3.10.	Is the parking facilities provided for your vehicle satisfactory	1. Not satisfactory 2. Satisfactory 3. Very satisfactory	1	2	3

SECTION 4: FEEDBACK ABOUT AVAILABILITY & ADEQUACY OF SERVICES

SN	Question	Options			
4.	Is the doctor you wanted to see always available	1. Not available 2. Sometimes available 3. Always available	1	2	3
4.1.	Could all your tests and investigations be done in the hospital itself	1. None Could be done 2. Some could be done 3. All could be done	1	2	3
4.2.	Could all your x-ray, if needed, be done in the hospital itself	1. Never 2. Sometimes 3. Always	1	2	3
4.3.	Could all Ultrasound examinatiion, if needed, be done in the hospital itself?	1. Never 2. Sometimes 3. Always	1	2	3
4.4.	Could all your CT, if needed, be done in the hospital itself	1. Never 2. Sometimes 3. Always	1	2	3
4.5.	Could all your MRI examination, if needed, be done in the hospital itself	1. Never 2. Sometimes 3. Always	1	2	3

SECTION 5: FEEDBACK ABOUT GENERAL QUALITY PARAMETERS

Provide Ratings for the following parameters

5.	How do you find hospital buildings, roads	1. Not good 2. Satisfactory 3. Good	1	2	3
5.1.	How well Cleanliness is maintained in the hospital	1. Not good 2. Satisfactory 3. Good	1	2	3
5.2.	Do you find doctors are always friendly and approachable	1. Not at all 2. Sometimes 3. Always	1	2	3
5.3.	How do you find nurses' behavior towards you and your relatives	1. Not good 2. Satisfactory 3. Good	1	2	3
5.4.	How do you find other staffs' behavior towards you and your relatives	1. Not good 2. Satisfactory 3. Good	1	2	3
5.5.	How promptly your needs are attended to	1. Not promptly 2. Promptly 3. Very promptly	1	2	3
5.6.	Can you find your way and direction in the hospital easily with the help of displayed signage and markings	1. Not easily 2. Easily 3. Very easily	1	2	3
5.7.	How adequately the drugs prescribed to you were available	1. Not available at all 2. Partially available 3. Fully available	1	2	3
5.8.	Do you feel the doctor has given you enough time to answer all your queries	1. Not given any time 2. Has given some time 3. Has given full time	1	2	3
5.9.	Do you think the doctor and other staff were considerate for your privacy	1. Not considerate 2. Considerate 3. Very considerate	1	2	3
5.10.	Were the doctors available readily when needed	1. Not available 2. Available with delay 3. Available quickly	1	2	3

Section 06: Data on Patient Friendliness

6	How well anyone explained to you about how a procedure on you will be carried out	1. Not explained at all 2. Very little explained 3. Fully explained	1	2	3
6.1	If you were waiting for a procedure, how much you were told about the reason for delay	1. Not told at all 2. Told somewhat in the passing 3. Explained fully	1	2	3
6.2	How well you have been explained, how to get redressal of your problem, if any	1. Not explained 2. Explained a little 3. Fully explained	1	2	3
6.3	How well the visiting hours suit your relatives	1. Does not suit 2. Somewhat suits 3. Suits well	1	2	3
6.4	Was the admission procedure simple	1. Not simple 2. Simple 3. Very simple	1	2	3
6.5	If alternatives are available to you, would you come here again, if required	1. Never 2. Yes, but reluctantly 3. Always	1	2	3
6.6	What you liked best in this hospital				
6.7	What you liked worst in this hospital				

Thank you for sparing some time to respond to this survey. This will help us to serve you better

Tool Kit No 5

INFRASTRUCTURE ASSESSMENT CHECKLIST

HOSPITAL LABORATORY

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

(1)	(2)			
Check Availability of the Following	(**Put a √ in the relevant column)**			
	Available		Area sufficient, if available?	
1) General	**Yes**	**No**	**Yes**	**No**
2) Reception & registration				
a) Specimen collection and distribution				
b) Examination cum sample collection room				
3) Waiting Room with Toilet				
4) Pathologists' Office				
5) Stores				

a) Chemical				
b) General items				
c) Packing materials				
d) Acid				
6) Stores-in-charge's room				
7) Staff changing with toilets				
8) LPG Bank				
9)				
10) Histopathology Section				
a) Histopathologist's room				
b) Grossing and Processing				
c) Section cutting and staining				
d) Specimen store				
e) Microphotography room				
f) FNAC room				
11) Hematology Section				
a) Hematologist's room with his lab				
b) Hematology Lab				
12) Biochemistry Section				
a) Biochemist's room				
b) Biochemistry Laboratory				
13) Microbiology Section				
a) Microbiologist's room				
b) Bacteriology laboratory				
c) Mycology laboratory				

d) Media rooms				
i) Media Kitchen				
ii) Media storage and plate pouring room				
iii) Sterilizing Room				
e) Incubator room				
f) Cold storage				
14) Immunology Section				
a) STS laboratory				
b) Laboratory for other serology work				
15) Clinical Pathology Section				
a) Stool Urine Examination				
b) Specimen cubicle				
c) Photometry, Chromatography & Electrophoresis Room				
16) **Virology Section**				
a) Virologist with his laboratory				
b) Virus Serology laboratory				
i) Egg Inoculation Cubicle				
ii) Animal inoculation cubicle				
c) Tissue Culture Room				
d) Animal Room				
17) Equipment Cleaning Section				
a) Wash up and preparation room				
b) HP sterilizer room				
c) Sterile storage				
d) Janitor's closet				

18) **Photography & Illustration, Pathology Museum and other facilities**				
a) Photography & Illustration				
b) Pathology Museum				
c) Library				
d) Class room				
e) Common Room				
19) **Computer and reporting room**.				
20) Comment on the following				
21) a)State of maintenance				
i) Civil				
(1) Floor				
(2) Ceiling				
(3) Plastering				
(4) Walls				
(5) Windows				
(6) Doors				
ii) Plumbing				
(1) Wash Hand Basins				
(2) Water taps				
iii) Electrical				
(1) Electrical outlets				
(2) Wiring				
(3) Other fixtures and fittings				
22) b) Illumination				
23) c) Ventilation				

INFRASTRUCTURE ASSESSMENT CHECKLIST

MATERNITY & DELIVERY UNIT

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Particulars	**Put a √ in relevant column**			
	Available		Is Area sufficient?	
1) Reception cum waiting area				
2) Admission/Examination/Triage				
3) Nurses Locker/Change/Rest room				
4) Doctors' Locker/ Change/ Rest area				
5) First stage labour cubicles with numers				
a) If yes, how many?				
6) Delivery Rooms				
a) How many rooms?				
b) How many delivery tables				
c) Baby resuscitation room				
d) Recovery room				

e) Septic delivery room?				
7) Are the following present:				
8) Instrument Sterilizing room				
9) Sterile store room				
10) Scrubbing room				
11) Dirty utility room				
12) Operating Delivery Room				
a) OT recovery room				
13) Eclampsia room?				
14) Comment on the following				
15) a)State of maintenance				
16) Civil				
(1) Floor				
(2) Ceiling				
(3) Plastering				
(4) Walls				
(5) Windows				
(6) Doors				
17) Plumbing				
(1) Wash Hand Basins				
(2) (10)Water taps				
18) Electrical				
(1) Electrical outlets				
(2) Wiring				
(3) Other fixtures and fittings				

19) Illumination	
20) Ventilation	
21) Condition of the building generally	

Tool Kit No: 7

INFRASTRUCTURE ASSESSMENT CHECKLIST

BLOOD BANK

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Particulars	**Response**	
1. Condition of the building		
2. Area of the unit (Minimum 100 M^2 for whole blood and additional 50 M^2 for components)		
3. Location (mention the departments in close proximity)		
4. Is the following available:	Place a √ appropriately	
	Yes	No
(a) Room for registration and Medical Examination		
(b) Lab for blood group serology (A/C)		
(c) Lab for blood transmissible diseases (Syphilis, Malaria, HIV-antibodies, Hepatitis-antibodies)		

(A/C)		
(d) Blood collection room (A/C)		
(e) Blood component Preparation (Shall be A/C) – 50 M^2		
(f) Sterilization cum washing		
(g) Blood storage Area		
(h) Area for quarantine of blood and reagents not suitable for use		
5. Store cum Records Room		
6. Staff Room		
7. Blood Bank In charge room		
8. Patient waiting area		
9. Patient refreshment/ rest room		
10. ICTC Counseling Room		
11. PPTCT Counseling Room		

Tool Kit No: 8

INFRASTRUCTURE ASSESSMENT CHECKLIST

IMAGING DEPARTMENT

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Particulars	**Response**				**Remarks**
9) Condition of the building					
10) Approximate area					
11) Location (mention the departments in close proximity)					
12) Check the availability of the following	Put a √ appropriately				
	Available		Is space sufficient		
	Yes	No	Yes	No	
a) Reception and Registration counter?					
b) Waiting room with toilet					
c) Fluoroscopy and radiography rooms					

i) 800/1000 mA machine					
ii) 500 mA machine					
iii) 200 mA machine					
iv) 100 mA machine					
v) Attached dressing cubicle with toilet					
d) Film developing and dark room					
e) Film drying room					
f) Office, Record and computer room					
g) Radiographic work room					
h) Stores					
i) Film stores					
ii) Chemical Stores					
iii) Special Packing material stores					
iv) Equipment stores					
13) Radiologists' rooms					
14) Injection and Barium meal preparation room					
15) Trolley Bay					
16) Observation room					
17) Room for lying patients on stretcher					
18) **Ultrasonography**					
a) Sub waiting room					
b) USG room (Black & White)					
c) Colour Doppler room					
d) Toilet					
19) Mammography room					

a) Change room					
20) Film Library					
21) Seminar room					
22) CT scan					
a) Trolley Bay					
b) Patient Change Cubicle					
c) Radiologist's room					
d) Technician room					
e) Gantry room (=>25 M^2)					
f) Console room					
g) Record room/Computer room/Reporting room					
h) Dark room					
i) Toilets					
j) Store room					
23) MRI					
a) Reception & sub-registration					
b) Sub-waiting					
c) Changing cubicle					
d) Control console					
e) MRI Chamber					
f) Radiologist's room with toilet					
g) Technicians' room					
h) Cooling chamber					
i) Store					
j) Computer / reporting room					

k) Office					
l) Toilets					
24) Check conformance to AERB norms for X-ray rooms					
25) Wall thickness > 35 cm thick brick					
a) Shielding of doors and windows (equivalent of 1.7 mm lead)					
b) Room size >=18 M^2					
c) Not more than one unit of any type should be in one room					
d) All opening for light and ventilation to be located above 2M from the finished floor level					
e) Waiting areas to be located outside the x-ray room					
26) **Comment on the following**:					
a) State of maintenance					
i) Civil					
(1) Floor					
(2) Ceiling					
(3) Plastering					
(4) Walls					
(5) Windows					
(6) Doors					
ii) Plumbing					
(1) Wash Hand Basins					
(2) Water taps					
b) Electrical					
i) Electrical outlets					
ii) Wiring					

iii) Other fixtures and fittings			
27) Illumination			
28) Ventilation (A/C)			

Tool Kit No: 9

INFRASTRUCTURE ASSESSMENT CHECKLIST

CSSD

Name of the hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Particulars	Response			
1. Approximate area				
2. Location (mention the departments present in close proximity)				
3. Check availability of	Put a √ appropriately			
	Available		Is space sufficient?	
	Yes	No	Yes	No
4. Receiving area for soiled articles				
5. Sorting area				
6. Cleaning area				
7. Packing area				
8. Sterilizing and cooling area				
9. Storage area for clean stocks (not sterile)				
10. Storage area for sterile stocks				

11. Despatch area for the sterile packs				
12. CSSD supervisor's room				
13. Staff change room with toilets and lockers				
14. Is ventilation, humidity, temperature controlled in the storage area of sterile stocks				
15. State of maintenance of:				
16. Civil				
(a) Floor				
(b) Ceiling				
(c) Plastering				
(d) Walls				
(e) Windows				
(f) Doors				
17. Plumbing				
(a) Wash Hand Basins				
(b) Water taps				
18. Electrical				
(a) Electrical outlets				
(b) Wiring				
(c) Other fixtures and fittings				
19. Illumination				
20. Ventilation				

Tool Kit No: 10

INFRASTRUCTURE ASSESSMENT CHECKLIST

IT DEPARTMENT

Name of the hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Particulars	Response		Remarks
1. Check availability of the following:	Put a √ appropriately		
	Yes	No	
(a) Room for Senior Systems Analyst cum I/C			
(b) Programmers' room with Computer Lab			
(c) Technicians room			
(d) Computer Workshop			
(e) Store			
2. Server room			
3. Toilets			

Tool Kit No: 11

INFRASTRUCTURE ASSESSMENT CHECKLIST

EMERGENCY AND CASUALTY UNIT

Name of the hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Particulars	Response				Remarks
2) Location (mention the departments in close proximity)					
3) Approximate area (50 M^2/1000 yearly attendances)					
4) Location of the entrance					
5) Separate entrance for ambulance and ambulatory patients					
6) Yearly patient attendances for the last three years					
7) Total number of observation beds present					
8) Check availability of the following: 9)	Put a √ appropriately				
	Available		Is space sufficient?		
	Yes	No	Yes	No	
a) Reception					

b) Triage					
c) Resuscitation Area (1/15000 yearly attendances)					
d) Acute Treatment Area (1/1100 yearly attendances) [For non-ambulant patient]					
e) Consultation Area (For ambulant patient)					
f) Procedure room					
g) Plaster room with storage for plaster, bandages, splint and crutch store					
h) Pharmacy/drug preparation					
i) Psychiatry room					
j) Isolation room(s) – for infected, for privacy, and for patients who are a source of visual, olfactory and auditory distress to others					
k) Decontamination room (contaminated with toxic substances)					
l) Treatment room					
m) Administrative area					
n) Storage					
o) Clean Utility					
p) Dirty Utility					
q) Cleaners' room					
r) Diagnostic Area (Imaging / Laboratory)					
s) Doctor's room					
t) Nursing station					
u) Security room					
v) Room for police personnel					
w) Disaster equipment store					

x) PMGV supply		
y) Relatives' waiting area with toilet		
z) Nurse staff room with toilet facility		
aa) Immediate access to OT		
10) State of maintenance of:		
a) Civil		
i) Floor		
ii) Ceiling		
iii) Plastering		
iv) Walls		
v) Windows		
vi) Doors		
b) Plumbing		
i) Wash Hand Basins (1 for every resuscitation / procedure/ treatment/ consultation room)		
ii) Water taps		
c) Electrical		
i) Electrical outlets		
ii) Wiring		
iii) Other fixtures and fittings		
iv) Emergency Power		
11) **Illumination**		
12) Ventilation		

Tool Kit No: 12

INFRASTRUCTURE ASSESSMENT CHECKLIST

PHARMACY

Name of the hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

1. Particulars	Response				Remarks
2. Location (mention the departments in close proximity)					
3. Approximate area					
4. Check availability of the following:	Put a √ appropriately				
	Available		Is area available sufficient?		
5.	Yes	No	Yes	No	
(a) Cash counter					
(b) Storage room s					
i) Textile Store (Gauze, Bandage etc)					
ii) Storage for IV Fluids					

iii) Bulk drug storage					
iv) Retail dispensary					
v) Cool and cold storage					
vi) Packing Material Store					
vii) Store for rubber goods					
viii) Acid store					
ix) Medical Gas store					
x) Store for items awaiting Condemnation and disposal (Held till disposal)					
(c) Administrative office					
(d) Proper circulation space					
(e) Patient waiting area					
(f) Sanitary facility					
13) State of maintenance of:					
a) Civil					
i) Floor					
ii) Ceiling					
iii) Plastering					
iv) Walls					
v) Windows					
vi) Doors					
b) <u>Plumbing</u>					
i) Wash Hand Basins					
ii) Water taps					
c) Electrical					

i) Electrical outlets					
ii) Wiring					
iii) Other fixtures and fittings					
iv) Emergency Power					
14) **Illumination**					
15) Ventilation					

Tool Kit No: 13

INFRASTRUCTURE ASSESSMENT CHECKLIST

ENGINEERING SERVICES

Name of the hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Particulars	Response
1. Electric Engineering	
(a) How many sources of supply?	
(b) Connected Load of each	
(c) Transformer Capacity of each	
2. Generation room with generator	
(a) How many generators	
(b) Capacity of each	
3. Lighting of the campus	
4. HVAC System	
(a) Which areas are under Central A/C	

i)	
ii)	
(b) Capacity of Chillers	
i)	
ii)	
5. Water Supply	
(a) Sources of supply	
(b) If from bore well, how many?	
(c) Capacity of water tanks	
6. PMGV System	
(a) Which areas (wards/departments) have piped medical gases and vacuum (O^2, NO_2, Compressed Air, Vacuum)	
(b) Which gases are supplied in these areas	
(c) How many Manifold Rooms	
i) Location of these manifolds	
ii) Capacity of cylinder banks manifold wise	
iii) How many outlets for each gases manifold wise	
7. Public Health Engineering	
(a) Any en campus Sewage Treatment Plant	
i) Is the capacity sufficient at present	
ii) How much more load it can take	
(b) Storm water drainage system	

Tool Kit No: 14

INFRASTRUCTURE ASSESSMENT CHECKLIST

FIRE PROTECTION

Name of the hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Particulars	Response
1. Is fire/smoke detectors have been installed?	
2. Is automatic sprinkler system installed?	
3. If detectors are installed, are they connected with an alarm system?	
4. Is it strategically located in a place which is always manned? (please specify the location)	
5. Is there escape routes during emergency?	
6. If yes, how far apart these escape routes are located	
7. If yes, what kind of egress method has been provided?(ramp, stair, fire lifts)	
8. What are the types, numbers, locations of portable fire extinguishers placed in different departments?	
9. What is the average distance of the extinguishers from one point to	

another?	
10. Are the basic instructions regarding the safety measures displayed for the general public?	
11. Do all employees know the method of using the extinguishers?	
12. Is there any underground water storage for firefighting?	
13. If yes, what is the capacity?	
14. Is there any wet riser and down comer?	
15. Standby power for water pumps?	
16. Standby power to any lift designated as fire lift	
17. Any arrangement for compartmentalization to contain fire	
18. If any fire door provided, what is their ratings (hour)	
19. How many emergency exits are there?	
20. Fire drill practiced regularly?	

Tool Kit No: 15

INFRASTRUCTURE ASSESSMENT CHECKLIST

VERTICAL CIRCULATION – ELEVATORS/RAMPS

Name of the hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

ELEVATORS				
Particulars				
1) Location (Building wise)	Type (Bed / Passenger)	Capacity	Standby Power	Present Condition
2) 1.				
3) 2.				
4) 3.				
5) 4.				
6) Are the available number of lifts sufficient				
7) Is the lift suitable for use as a means of egress in emergency				
8) Is it meant to carry both people and goods				
9) Any dedicated lift available for disposal of waste				
10) Any lift earmarked for food distribution				

11) Is safety arrangement provided for catering to mechanical or electrical failures				

RAMPS	
1) Building No (or Name)	
2) Is ramp available (Yes/No)	
3) What is the slope? (8% is preferred)	
4) Is level landing provided at each door opening in the direction of travel (Yes/No)	
5) Can a wheel chair bound patient easily move up the ramp (Yes/No)	
6) Is the ramp covered for giving protection during rainy seasons (Yes/No)	
7) Is the surface of the ramp nonslip (Yes/No)	

Tool Kit No: 16

INFRASTRUCTURE ASSESSMENT CHECKLIST:

AMBULANCE SERVICES

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

	Response
1. Covered garages available?	
2. If yes then:	
(a) For ambulances	
(b) For other vehicles	
(c) Condition of the Garage	
(d) Location of the garage	
(e) How many more covered garages are required?	

Tool Kit No 17

INFRASTRUCTURE ASSESSMENT CHECKLIST:

MEDICAL RECORD DEPARTMENT

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

	Response
1. Is there any Medical record Department present in the hospital? Yes/ No	
2. Location of the department	
3. Approximate area of MRD?	
4. Is there any Separate room for MRD In charge?	
5. Sufficient space provided for all the sections of the MRD?	
(a) Vital Statistics desk	
(b) Admission Check Desk	
(c) Census Desk	
(d) Assembly and Deficiency Check desk	

(e) Incomplete Record Control DeskDischarge Analysis and Administrative Statistics desk	
(f) Coding and Indexing Desk	
(g) Complete Record Control Desk	
6. Is there separate area provided for doctors to fill in the incomplete medical records?	
7. Is there separate fire fighting arrangement in MRD?	
8. Is MRD computerized? Yes /No	
9. Is there sufficient storage capacity in the MRD?	
10. Does MRD include sufficient no. of Racks and Cabinets?	
11. Does MRD need expansion?	

Tool Kit No:18

INFRASTRUCTURE ASSESSMENT CHECKLIST:

LINEN & LAUNDRY SERVICES

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

	Response				Remarks
1. Approximate area of laundry					
2. Location					
3. Condition					
4. Check Availability of the following areas/rooms	Place a √ appropriately				
	Available		Is area sufficient?		
	Yes	No	Yes	No	
(a) Reception/Collection and Sorting					
(b) Change Room					
(c) Sluicing and autoclaving					
(d) Mending					

(e) Washing machine /Driers/ Hydroextractors/ Calendering and pressing					
(f) Mattress sterilising					
(g) Boiler House					
(h) Stores					
(i) Fuel					
(ii) Soap and detergent					
5. Janitor Closet					
6. Sanitary					
7. Manager's Office					
8. State of Maintenance					
(a) Civil (Floor, Walls, Ceiling, Doors, Windows)					
(b) Electrical (Wiring, outlets, fixtures)					
(c) Mechanical (Boiler)					
(d) PHE (water supply, drainage, plumbing, fittings)					
9. Lighting					
10. Ventilation					

Tool Kit No: 19

INFRASTRUCTURE ASSESSMENT CHECKLIST

DIETARY SERVICES

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

	Response				Remarks
1. Availability of Kitchen(yes/no)					
2. Location					
3. Condition of physical infrastructure					
Check availability	Available		Is it sufficient		
	Yes	No	Yes	No	
(a) Reception of kitchen stores					
(b) Dietician's room					
(c) Kitchen Manager's office					
(d) Staff Change Room					
(e) Staff rest room					

(f) Preparation area					
(g) Cooking Area					
(h) Therapeutic Diet Preparation and Cooking Area					
(i) Pan Wash					
(j) Food Trolley and container wash					
(k) Food trolley bay					
(l) Servery					
(m) Pot / utensil wash area					
(n) Lighting (natural)					
(o) Ventilation (exhaust chimneys)					
(p) Electric supply					
(q) Water supply (how many/duration of supply)					
(r) Storage facilities					
(i) Poultry					
(ii) Vegetables					
(iii) Dry items (Rice, Atta etc)					
(iv) Fuel store (Coal/Wood/Gas)					

(v) Store for dairy items					
(vi) Storage for implements, machines, bowls, pans, utensils					
(s) Refrigeration facilities					
4. Disposal of kitchen waste					
5. Toilets					
6. Hand washing facilities					
11. State of Maintenance					
(a) Civil (Floor, Walls, Ceiling, Doors, Windows)					
(b) PHE (water supply, drainage, plumbing, fittings)					
12. Lighting					
13. Ventilation					

Tool Kit No: 20

CHECKLIST

BIOMEDICAL WASTE MANAGEMENT

Name of the hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Items	Yes	No	Remarks
1. Is a Biomedical Waste Management Committee in place to guide and monitor all aspects of BMW Management			
2. Has any officer been made responsible for hospital waste management?			
3. Has license for generation, segregation, transportation, temporary storage and disposal of biomedical waste been obtained from the State Pollution Control Board?			
4. Any superior authority monitors all the processes pertaining to biomedical waste management on			

a day to day basis?			
5. Is required documentation for biomedical waste done regularly?			
6. Are periodical reports and returns submitted to prescribed authorities?			
7. What is the quantity of BMW generated in the hospital per bed per day			
8. Segregation and Collection			
(a) Is segregation of waste done at point of generation?			
(b) Are color coded bins / plastic bags used for waste segregation and collection?			
(c) Has needle destroyer and hub cutter provided and used?			
(d) Has puncture proof container for sharps provided and used			
9. Has covered wheel burrows/trolleys been provided for intra-hospital transport of waste to the temporary storage facility			
10. **Temporary Storage**			
(a) Secure hard standing Temporary Storage facilities for the BMW available			
11. Is Waste disposed off within the			

maximum permissible period of 24/48 hours in summer/winter		
12. Shredder for recyclable plastic material available and used		
13. Has Sodium Hypochlorite solution been provided for treating liquid waste and used?		
14. Is autoclaving of culture media done before disposal?		
15. Has protective clothing provided to sanitary workers		
16. Are the workers trained to handle all types of waste like cytotoxic drugs, date expired drugs, heavy metals, liquid waste etc		
17. Is disposal done in-house or outsourced?		
18. What is the mode of disposal (Incineration, autoclaving, burning, burial pits)?		
19. Is there any in house incinerator?		
20. If yes, what type of incinerator present? • Single chamber • Double chamber		
21. What is the capacity (Kg/hour)?		
22. Is there any change room		

available for the staffs?		
23. Is washing facilities for the wheel burrows available		
24. How the incinerator ash is disposed?		
25. Any waste disposal manual prepared?		
26. Do all workers know how to deal with emergencies/injuries pertaining to waste disposal (like needle stick injuries, spillages)		

Tool Kit No: 21

INFRASTRUCTURE ASSESSMENT CHECKLIST

MORTUARY

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Items	Response
Location (should be concealed from public view)	

14. Check the availability of the following:	Place a √ appropriately				
	Yes	No	Yes	No	
(a) Body Store					
(b) Autopsy Room					
(c) Doctor's Change room with toilet					
(d) Viewing room					
(e) Relatives' waiting room					
(f) Janitors' closet					

15. State of Maintenance					
(a) Civil (Floor, Walls, Ceiling, Doors, Windows)					
(b) Electrical (Wiring, outlets, fixtures)					
(c) Mechanical (Boiler)					
(d) PHE (water supply, drainage, plumbing, fittings)					
16. Lighting					
17. Ventilation					

Tool Kit No: 22

INFRASTRUCTURE ASSESSMENT CHECKLIST

PHYSIOTHERAPY

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

	Response			
1. Is there any physiotherapy unit present in the hospital?				
2. Location of the department				
3. Condition of the department				
4. Approximate area of the department				
5. Check if following spaces have been provided:	Place a √ appropriately		Is available space sufficient	
	Yes	No	Yes	No
6. Waiting rooms with toilets				
7. Reception / Office / Records				
8. Electrotherapy cubicles				

(a) Infrared cubicle				
(b) Ultraviolet room				
(c) Combined treatment				
9. Gymnasium				
(a) Changing cubicles				
10. Any other equipment provided?				
(a) Cubicles available for these?				
(b) If No, how many more cubicles required				
(c) What will be their sizes				
11. Stores				
12. Sanitary (Separately for male and female)				
13. What is the state of maintenance of the department				
(a) Civil (Floor, Walls, Ceiling, Windows, Doors)				
(b) Electrical (Wiring, Outlets, Fixtures)				
(c) Public Health Engineering (Plumbing, Wash Hand Basins, Water closets, Taps)				

Tool Kit No 23

INFRASTRUCTURE ASSESSMENT CHECKLIST

Parking

Name of the hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Item	Response	
1. Is there any parking space inside the hospital premise present?(yes/ no)		
2. If yes, location of the parking areas	1 2 3 4	
3. Is there separate provision for: (a) Staffs' vehicle parking (b) Visitor's vehicle parking		
4. Is there separate parking for :	Yes (If yes, No of places)	No

(a) Four wheeler vehicle				
(b) Two wheeler (motor bikes, scooters & bicycles)				
5. As per the Municipal Bye Laws how many parking spaces are to be provided?	Car	Scooter	Cycles	Others
6. During the peak working hours, is it possible for a patient/visitor to park his 4-wheeler vehicle easily?	Yes		No	
7. Is the present facility adequate?	Yes		No	
(a) If No, does this facility need expansion?				
(b) If yes, then is space available?				
8. Is the management of the parking lots outsourced	Yes		No	
9. Is the security satisfactory				
10. Observe, if vehicles are parked in places other than parking lots when space is available there				
(a) If yes, then number of such vehicles and types	Car	Scooter	Cycle	Others

Tool Kit No: 24

INFRASTRUCTURE ASSESSMENT CHECKLIST

OUTPATIENT DEPARTMENT

(A) Name of the hospital: _____

(B) Please give a brief description of the OPD: _____

_____

_____

_____

_____

(C) Location: _____

(D) Accessibility: _____

(E) Name of respondents: _____

(F) Name of Surveyor _____

ITEM	RESPONSE
1. Is the OPD centralized or decentralized? (i.e. for the departments separately)	
2. If decentralized, how many different OPDs are functioning	
(a) What are the departments which are conducting own OPDs	
(i)	
(ii)	
(iii)	

(iv)				
(v)				
(vi)				
3. Is the Registration centralized				
4. If not, at how many places registration is done?				
5. Give total yearly attendance of OPD				
6. Give discipline wise breakdown of yearly attendances	New	Old	New	Old
	OPD (i)		OPD (ii)	
	OPD (iii)		OPD (iv)	
	OPD (v)		OPD (vi)	

7. Give discipline wise no of consultants attending OPD daily	
Discipline	Number
(a)	
(b)	
(c)	
(d)	
(e)	
8. No of consultation room earmarked for each discipline	
9. How many consultation rooms are used by more than one consultants of	

the same discipline simultaneously	
10. Do the Resident doctors attend to OPD patients independently?	
11. If yes, give the number of such residents discipline wise	
12. Does the hospital prefer independent consultation rooms for the Resident Doctors as well?	
13. What is the size of a typical consultation room?	
14. Are the consultation rooms provided with attached toilets	
15. If not, what is the sanitary arrangement?	
16. Are the consultation rooms air conditioned?	
17. Are the discipline-wise OPDs having sub-waiting areas?	
18. If yes, how much sitting arrangement has been provided	
19. What is the approximate size of the OPD? (Length and Breadth)	
20. Please indicate if the following spaces have been provided? (Zone wise)	
(a) **Public Areas**:	
(i) Entrance: Is it easily accessible	
(ii) Reception and information	
(iii) Registration and Records area	
(iv) Waiting areas	
(1) If provided, its size (Ideal is: 0.1 M^2 per patient)	

(2) Public toilets and washrooms (For each OPD)	Male			Female	
	WHBs	Urinals	WCs	WHBs	WCs
(a)					
(b)					
(c)					
(d)					
(e)					
(f)					
(g)					
(h)					
(3) Fans provided**?**					
(a) Are the numbers sufficient?					
(4) Drinking water?					
(5) Any snacks bar?					
(6) Telephone Booth?					
(b) Clinical Areas					
(i) Discipline					
(1) Sub Waiting Area available?					
(a) Seating arrangement for how many					
(2) Consultation rooms					
(a) All fixtures available? (Table, Chair, WHB, Exam Couch,					

equipment for exam)	
(3) Special Consultation room for the department which needs special equipment	
(c) Ancillary Facilities	
(i) Injection room	
(ii) Treatment and dressing room	
(iii) Pharmacy	
(1) Waiting area (No of seats)	
(2) Approx. Size	
(iv) Immunization clinic	
(d) **Auxiliary Facilities** (may be common for both IP and OP)	
(i) Laboratory	
(ii) Radiology	
(iii) BloodBank	
(iv) Health Education facility	
(v) Medical Social Service	
(vi) Play area for children (For paediatrics OPD)	
(e) Preventive and Social Health Facilities (for counseling	
(i) Well Baby Clinic	
(ii) Well women clinic	
(iii) Nutrition clinic	
21. For each service points give:	

(a) Registration:	
(i) No of counters	
(ii) "Q" length every 30 minutes for say 3 hours	
(iii) Service time in each counter	
(b) Pharmacy	
(i) No of counters	
(ii) "Q" length every 30 minutes for say 3 hours	
(iii) Service time in each counter	
(c) Injection room	
(i) No of service points	
(ii) "Q" length every 30 minutes for say 3 hours	
(iii) Service time in each counter	
(d) Dressing room	
(e) Consultation rooms (At least for 25 % of consultation rooms)	
(i) Consultation room	
(ii) "Q" length every 30 minutes for say 3 hours	
(iii) Service time in each counter	
24) a)State of maintenance	
i) Civil	
(1) Floor	
(2) Ceiling	

(3) Plastering	
(4) Walls	
(5) Windows	
(6) Doors	
ii) Plumbing	
(1) Wash Hand Basins	
(2) Water taps	
iii) Electrical	
(1) Electrical outlets	
(2) Wiring	
(3) Other fixtures and fittings	
25) b) Illumination	
26) c) Ventilation	

Tool Kit No: 25

INFRASTRUCTURE ASSESSMENT CHECKLIST

TELEMEDICINE UNIT

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Particulars	Response
1. Comment on the following:	
(a) Objective of TM Services	
(i)	
(ii)	
(iii)	
(b) Scope of TM Services	
(i)	
(ii)	
(iii)	
(c) Mention the location desired by the hospital authority for the set up, in case of a new service	
(d) In case of existing services, is the present site suitable?	
(e) If no, what site is desired?	

(f) Mention what is desired:	
(i) 24x7 hours working facility or	
(ii) Fixed hours	
(iii) Conference room facility	
(g) Connectivity	
(i) One to one or one to many	
(ii) Projection facility	
2. Do you consult with higher centres?	
(a) If yes, is it live?	
(i) If yes then	
(1) Arrangement for examination of patient	
(2) Arrangement for Procedures (like endoscopy)	
(3) Toilet	
(4) Wash Hand Basin	
(5) Waiting room for relatives	
(6) Room for staging of patients	
3. Do you provide consultation to lower centres	
(a) If yes is it round the clock	
4. Comment on the following:	
(a) Location desired	
(b) Does it function on the basis of: (1) Real time (2) Store and forward	
(c) Is it working for (i) 24x7	
5. Is there a seminar room available? (a) If yes, how many people can sit? (b) Is it adequate?	
6. Is Projection facility available? (a) If no, is it required?	
5. Comment on the following:	
(a) Arrangement for glare prevention	

(b) Acoustic treatment of the TM room	
(c) Whether color rendering of the artificial light has been taken into account (i.e. should be like natural light)	

Tool Kit No: 26

INFRASTRUCTURE ASSESSMENT CHECKLIST

OPD – Maternity

Name of the Hospital:

(A) Please give a brief description of the Maternity OPD:

_____
_____
_____
_____
_____

(B) Location:

(C) Accessibility:

Particulars	Response
1. Is there any separate entrance for the maternity OPD?	
2. Mention the OPD attendance for the last three years	
3. How many registration counters are there?	
4. What is the average waiting time for the following?	
(a) Registration	
(b) Consultation	
(c) Pharmacy	
(d) Injection	
(e) Laboratory	

5. How many consultation rooms are earmarked for this discipline?	
6. Is the size of a typical consultation room adequate (as per the consultant)	
7. Are the consultation rooms provided with attached toilets	
8. If not, what is the sanitary arrangement?	
9. Are the consultation rooms air conditioned?	
10. Is there rooms allocated for: (specify the approximate areas also) (a) Ante natal check up (b) Education Room for prospective mothers (c) Injection room (d) Ultrasonography (e) A set up to support any emergency case	
11. Is there provision for the following ancillary facilities: (a) Drinking water (b) Sitting arrangement (c) Toilet facilities(if yes, mention how many) (d) Telephone booth (e) Tea/Snacks Bar (f) Signage	
12. Any children play zone is available?	
13. Comment on the following:	
(a) State of maintenance	
(i) Civil	
(1) Floor	
(2) Ceiling	

(3) Plastering	
(4) Walls	
(5) Windows	
(6) Doors	
(ii) Plumbing	
(1) Wash Hand Basins	
(2) Water taps	
(3) Water Closets	
(iii) Electrical	
(1) Electrical outlets	
(2) Wiring	
(3) Other fixtures and fittings	
b) Illumination	
c) Ventilation 12. AC (mention the capacity) 13. Non-AC	

Tool Kit No:27

Appendix

INFRASTRUCTURE ASSESSMENT CHECKLIST

NEONATAL INTENSIVE CARE UNIT

Name of the Hospital:

Location of the facility in the hospital:

Accessibility:

Date:

Respondent:

Interviewer:

Particulars	Response
1. Is there any separate entrance for the unit?	
2. No of beds	
3. Space per bed (Approx.)	
4. Level of Care of this NICU?	
5. PROTECTIVE ZONE	
(a) Trolley Bay	
(b) Reception	
(c) Waiting Room with toilet	
(d) Shoe change room	
(e) Change Room	
(i) Male	
(ii) Female	
(f) Counselling Room	

6. CLEAN ZONE	
(a) Doctor' duty room	
(b) Sisters' duty room	
(c) Linen Store	
(d) Clean Utility/treatment/dressing	
(e) Store Room	
(f) Equipment room	
(g) X-ray room	
(h) Pantry	
(i) Clinical Test Room	
(j) Feeding area	
(k) Formula room	
(l) Examination area	
(m) Breast Milk Bank	
7. STERILE ZONE	
(a) Scrub up room	
(b) Intensive Care Area (No of beds)	
(c) Intermediate Care Area (No of beds)	
(d) Septic Care Area (No of beds)	
(e) Nursing Station	
(f) Wash Hand Basins (No provided)	
8. DIRTY ZONE	
(a) Dirty utility & Soiled linen room	
(b) Janitor's closet	
(c) Toilets	

10. PMGV System(yes/No)	
11. Comment on the following	
(a) State of maintenance	
(i) Civil	
(1) Floor	
(2) Ceiling	
(3) Plastering	
(4) Walls	
(5) Windows	
(6) Doors	
(ii) Plumbing	
(1) Wash Hand Basins	
(1) Water taps	
(2) Water Closets	
(ii) Electrical	
(1) Electrical outlets	
(2) Wiring	
(3) Other fixtures and fittings	
12. Illumination	
13. Ventilation	
(a) AC	
(b) Non-AC	
(c) Heating	

Tool Kit No 28

INFRASTRUCTURE ASSESSMENT CHECK LIST

INTENSIVE CARE UNIT

Hospital Name: _____

Department: _____

ICU Type (Specialty): _____

Location: _____

Name of respondent _____

Name of interviewer: _____

Date: _____

1. No of beds	
2. Space per bed (Approx.)	
3. Ancillary space	
(a) Waiting Room with toilet	
(b) Trolley Bay	
(c) Shoe change room	
(d) Doctor' duty room	
(e) Sister's duty room	
(f) Clean Utility/treatment/dressing	
(g) Store	
(h) Equipment room	
(i) Pantry	
(j) Clinical Test Room	
(k) Dirty utility & Soiled linen room	
(l) Nursing Station	

(m) Toilets	
(n) Janitor's closet	
4. Ventilation	
(a) AC	
(b) Non AC	
5. Wash Hand Basins (No provided)	
6. PMGV System	
7. Comment on the following:	
(a) State of Maintenance:	
(i) Civil	
(1) Wall	
(2) Ceiling	
(3) Doors	
(4) Windows	
(ii) Plumbing	
(1) Taps	
(2) Wash hand basins	
(3) Water Closets	
(iii) Electrical	
(1) Outlets (condition and sufficiency)	
(2) Wiring	
(3) UPS	
(4) Standby power	