Quality Improvement Programme- Gujarat

Hospital Engineering Service as per NABH

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Engineering Services are perhaps the most vital of the utility services in the hospital. The efficiency of entire patient care delivery system of the hospital depends on their efficiency. Even the slightest breakdown of power supply system, information system communication system or malfunctioning of vital equipment can have catastrophic effects.

The scope of engineering services in a hospital comprises of civil assets, electricity supply, water supply including plumbing and fittings, steam supply, central medical gases, air and clinical vacuum delivery system, air conditioning and refrigeration, lifts and dumb waiters, public health services, lightening protection, structured cabling, communication system (public address system, telephones, paging system), TV and piped music system, non-conventional energy devices, horticulture, arboriculture and landscaping and last but not the least workshop facilities for repairs and maintenance.

The scope of services generally includes repair and maintenance of existing facilities to ensure optimum operational reliability, risk reduction and their safety for the patient, staff and public. Initial planning and building the civil assets is to included in the scope of services.

**FUNCTIONS OF THE ENGINEERING SERVICE**

1. Planning and implementation of a program of planned preventive maintenance in r/o all the facilities / services under their responsibility.
2. Ensuring that all the facilities, systems and services under the scope of engineering services are well maintained and kept in a state of optimum operational efficiency.
3. Maintaining an up-to-date inventory of all the equipment available and their distribution on the hospital.
4. Maintaining an up-to-date history sheet for each and every / equipment unit in the hospital.
5. Anticipating the requirement of commonly required spares and arranging for their adequate stocking.
6. Ensuring that break down maintenance is prompt enough to ensure uninterrupted services. This, however, does not include sophisticated / electronic equipment that should be better handled under the arrangement by suppliers.
7. Ensuring that the facilities / services coming under their scope are safe and hazard free.
8. Ensuring that the facilities / services under their scope are in **compliance with the** relevant legal provisions.
9. Ensuring that the facilities / services provided under their scope of responsibility are **conductive to efficient and high quality patient care.**
10. Ensuring timely action for renewal of maintenance contracts / **insurance cover** of the facilities / equipment under their purview.
11. Ensuring that the services under their scope are provided at the minimum possible **operating costs.**
12. Playing an active role in successful planning and implementation of the **Equipment Audit program.**
13. **Advising the management** about the most cost-effective ways of managing the facilities / services under their purview (saving of energy / water, purchase of equipment with low life cycle cost and high efficiency).
14. A program of continuous **training of staff.**
15. Planning and implementing a program of **Quality Management** of Engineering services department.

**ASSURANCE OF QUALITY OF ENGINEERING SERVICES**

Engineering service is one single department on which depends the efficiency of each and every department and each and every member of the hospital staff. Even though it is a department that generally does not come in the lime light for any credits, in view of its crucial role it would be more appropriate to call it an “Enabling Service”.

This is the department that is responsible for soundness and integrity of the buildings, power and water supply, air conditioning, communication, transportation, functioning of all the equipment, and prevention of most of the hazards. Any break in any of the services may spell a disaster of some kind or the other.

The volume of workload, maintenance efficiency and hence the quality of services of the engineering department depends a lot on the quality of infrastructure (buildings, equipments, cabling / wiring, switches and sockets, MCBs, etc.) Installed and to be maintained. A lot of hazards and maintenance load can be reduced by proper planning of facility, fitments / fixtures in the initial stages and installation of equipments as per accepted norms, rules and regulations. If the infrastructure is of poor quality, the hazards, breakdowns and the repair liability would be far more than in case of high quality infrastructure.

**Quality of Outcome**

Let us think of the quality of engineering services in terms of their outcome and ability to satisfy the expectations of clientele, both internal (doctors / nurses / technicians / management) and external (the patients / their relatives as well as the regulatory authorities).
Expectations of the Patients

1. There is a regular and uninterrupted power / water supply, the communication system and a comfortable environment (lighting, ventilation, humidity, noise / odor level).
2. Failure of these services is not the cause of any untoward effect, on their treatment / chances of recovery.
3. The service should be able to provide to them an atmosphere like their home atmosphere.

Expectations of the Doctors / Nurses / Technicians

1. The services optimize the comfort level of the patient.
2. That the services are adequate enough to support the timely performance of the diagnostic / therapeutic procedures
3. The communication system is efficient and fully reliable
4. The services do not, in any way, adversely affect the treatment of their patients.

Expectations of the Management

1. No complaints from the patients, staff or the regulatory authorities.
2. Safety of patients, public and staff from all possible hazards related to the facility management.
3. Minimum possible cost of maintaining / operating the facilities / equipment under the charge of the department.

Expectations of the Regulatory Authorities

1. Absolute compliance of all legal provisions and no incidence of violations of the laws.
2. Complete safety of the patients, relatives, public and the staff.
3. No complaints from the public about environmental nuisance.

Since the quality of Outcome is supposed to be dependent upon the quality of infrastructure and processes in use let us discuss those aspects.

QUALITY OF STRUCTURE

To manage the engineering services, with full efficiency and effectiveness, the hospital requires a full department of engineering services.

Location, Space, Layout

The engineering department should be located at the rear of the building on the ground floor where all engineering services are clubbed together. It should have
space for office, space for storage of spare parts, workshop areas for electrical, mechanical, plumbing repairs and maintenance. There should be a separate space for the biomedical / electronic engineering section with a dust proof enclosure.

**Quality of Manpower**

The department should be headed by a senior and well qualified electrical engineer with exposure to air conditioning, refrigeration, communication technology and some idea of mechanical / biomedical equipment besides, of course, the knowledge of civil works. He should be answerable directly to the medical superintendent. Adequate supervisory and other staff in all branches, including the civil, mechanical, electrical and plumbing section, should be available to attend to problems round the clock. Bio-medical Engineering section should have a qualified and experienced bio-medical engineer (diploma in bio-medical engineering) as well as a technician to attend to the minor day-to-day problems and ensure maintenance of all the equipment, in house, as well as through annual maintenance contracts.

**Quality of Equipment**

The department should have all the tools / equipment necessary for monitoring, maintenance and repair of all the services / facility under their responsibility. Computer terminals should be provided on an as required basis for efficient maintenance of records.

Also, it is important that the equipment installed in the hospital is of high quality and low on maintenance. Maintenance of costly electronic equipment should be entrusted to the suppliers / their authorized agents under the maintenance contract.

Of particular importance is the quality of cabling and provision of adequate number of sockets at every user point as per the requirement so as to avoid misuse / overloading which can be quite hazardous.

**Quality and Availability of Materials and Spare Parts**

Often the delay in repairing / restoring the equipment is due to delay in purchasing spare parts. This delay can be eliminated by carefully planning and maintaining the inventory of spares. Whenever equipment is purchased, a list of commonly required spares should be prepared in consultation with the supplier and the spares should be added to the inventory. However, the quality of spares purchased must be ensured and a periodic check and updating of the inventory must be carried out.
QUALITY OF PROCESS

Quality of process should be such as would ensure the following:

1. Availability of a **documented manual for quality assurance** of engineering services with clearly defined role and scope of services and the policies procedures covering every aspect of their activities.

2. A procedure for **detection / reporting of defects** and their repair / maintenance with the minimum possible downtime.

3. A documented system of **planned preventive maintenance** (and breakdown repairs) in r/o all civil assets as well as equipment installed.

4. There is a documented check list of all the **legal compliances** and a mechanism for ensuring regular updating of licenses / registrations / certifications.

5. There is a procedure for ensuring **implementation of all legal provisions** and the responsibility in r/o each provision is clearly documented and known to all concerned.

6. The organization has a comprehensive **equipment management program** and a system of equipment audit and the engineering staff are involved in the program. The records of proceedings including the audit points and corrective actions are maintained.

7. There is a documented, updated **inventory of all the equipment** available in the hospital and a comprehensive history sheet in respect of each and every equipment unit.

8. There is a laid down policy about storing pf **spare parts** and the same is being implemented.

9. There is a documented operational and maintenance plan for ensuring **safety of environment and facilities** for the patients, staff and public.

10. A standardized system and format for registering complaints giving the detail of:
    - Ward / department
    - Detail of equipment
    - Detail of defects
    - Urgency involved (routine / urgent / immediate)
    - Date and time of complaint
    - Authentication by the complainant.

11. The **responsibility for maintenance** has been specified in writing, the responsible staff are fully aware of their responsibility and the maintenance staff are available for **emergency repairs**, round the clock.

12. A **record of breakdown complaints** and the response time for attending to complaints (restoration of operational status) is maintained and monitored.

13. There is a procedure for **periodic inspection and calibration of the equipment** by the authorized agencies.

14. There is a procedure for ensuring **potable water supply** round the clock with adequate reserve (three days requirement) or an alternate source identified and regularly tested for quality of water.
15. Planned **periodic cleaning of AC ducting and filters** and inspection / change of HEPA filters wherever provided.

16. There is a check list of actions to be taken by the departmental staff during **fire / other emergencies**. It is ensured that up to date floor plans along with the escape routes are available, the escape routes are kept free of any obstacles and there is a documented plan for safe escape of patients / public and staff during fire or other emergencies.

17. The engineering service is represented in the **hospital safety committee** which regularly inspects the facilities at least twice a year. The reports of safety committee are documented, the corrective measures implemented and a record is maintained.

18. There is a system of **planned preventive (and breakdown) maintenance of centralized gas and vacuum supply** to ensure uninterrupted and optimum service.

19. There is a system of **periodic inspection and planned preventive (and breakdown) maintenance of all fire safety equipment** to ensure its optimum operational status.

20. Identification and documentation of all possible **hazards and the plan for prevention**, monitoring and combating the hazards.

21. There is a documented system of **periodic inspection and planned preventive (and breakdown) maintenance and risk reduction** in respect of each of the following services.
   b. Electric supply and distribution system including the diesel generator (DG) sets, UPS systems and stabilizers. No loose hanging wires or temporary connections are allowed.
   c. Water supply and distribution system including the supply of hot, cold, potable, ultra pure water and stream supply. There are no dripping taps, leaking pipes or blocked sewage lines.
   d. Air conditioning and refrigeration facilities
   e. Centralized gas and vacuum supply service
   f. Communication system
   g. Traction / transportation system
   h. Lightening Protection-Periodic testing of patency of earthing.
   i. Public health engineering system (waste storage / disposal, effluent treatment plant)
   j. All electric equipments and their proper earthing.
   k. All switches and sockets to ensure their adequacy and hazard free functioning.

22. There is a documented program for continuous, on-job as well as formal **training of the staff** and a record is maintained.

23. A checklist for ensuring **renewal of insurance cover and / or maintenance contracts** for the buildings equipment installed in the hospital.
**Carry out structural survey of a hospital in view of NABH standards**

There is a documented operational and maintenance plan with up to date drawing with detail of site layout, floor plans and fire escape plans. There is internal and external signage in the organization in a language understood by patient, families and community. Provision of space shall be accordance with the available literature on good practice. There are designed individuals responsible for the maintenance of all the facilities.

**The organization has provisions for safe water, electricity, medical gases**

**And vacuum systems:**

- Potable water and electricity round the clock
- Alternate sources in case of failure.
- Regularly tests the alternate sources
- Maintenance plan for piped medical gas, vacuum installation

**The organization has plans for fire and non fire emergencies within the Facilities:**

- Mock drills are held at least twice in a year.
- Staffs are trained for their role in case of such emergencies.
- Documented safe exit plan in case of fire and non fire emergencies.

**The organization has a smoking limitation policy:**

- Organization defined and implements to reduce or eliminate smoking.
- The policy has provisions for granting exceptions for patients and families to smoke.

**The organization has a plan for management for hazardous material:**

- Hazardous materials are identified within the organization.
- There is a plan for managing spills of hazardous materials.
- Staff is educated and trained for handling such materials.
Hospital implements processes for sorting, labelling, handling, storage, transporting and disposal of hazardous material.

The organization has systems in place to provide a safe secure environment.

- The hospital has a safety committee to identify the potential safety and security risks.
- Patient safety devices are installed across the organization and inspected periodically.
- There is a safety education Programme for all staff.

Energy Management Policy:

- Promote energy saving & conservation of resources
- Use of non-conventional sources of energy
- Comply with the energy legislation & other regulations
- Promote use of energy efficient alternatives
- Communicate energy management policy to all employees & encourage their involvement through training & participation
- Create awareness amongst all employees for innovate ideas towards conservation of energy

To make an effort to reduce the cost continuously every year by adopting an effective energy for detailed engineering services we focused as per below:

1. General:
   1) Name of Hospital
   2) Location
   3) Year of Establishment
   4) Number of storeys / blocks
   5) Bed strength / distribution of beds
   6) Additional specialty
   7) Plot area
8) Covered area
9) Accommodation other than Hospital's technical accommodation within the plot.
10) Any expansion under planning/execution
11) Parking space- care be taken to leave 50% of the open space for landscape.
12) 1 parking space per 100 sqm covered area.
13) Area for each car space in Basement, Ground floor & open parking to be 32, 28 & 23 sqm respectively
14) The standards given are equivalent car space (ECS) and it includes parking for all types of vehicles i.e. cars, scooters, cycles, also light veh. & ambulances.
15) For Govt Hospital - 0.67 ECS
16) For non Govt. Hospitals & Nursing home-1.33 ECS

2. Physical Environment:

1) Lighting - not to exceed 750 Lux.
2) Patient control of light within their territorial spaces. Ensure access to outdoor day light.
3) Noise - acceptable value 30-40 dB
4) Selective use of music with adequate concern for patient control.
5) Ventilation - adopt traditional method for cleaning duct work thro vaccum cleaners.

3. Building elements:

A. Floors - non slip quality also when wet.

1) Lab.-Acids, alkalis, solvents & stains proof
2) Food prep.-water resistant
3) Radiology-with stand loads of 2000 kgs/sqm
4) Conductive floors in rooms, where electronic equipment use on patients are needed.
5) Coved skirting with min. radius of 3 cm. & min. height of 10cm. Skirting be kept flush.

B. **Ramps**- gradient may not be greater than 1:10 Pedestrian ramps to have hand rails 90 cm.high. Landing at every 9m. Min.width 1.6m

C. **Walls finishes** shall be hard, robust, joint less, impervious, non absorbent & unaffected by colour change, staining mildew.

1) Corners in Operating rooms shall be rounded and all fixtures and joinery frames be kept flush with the wall surfaces.

2) In Lab:- slow flame spread characteristic.

3) Protective guards -where heavy equip. moved.

D. **Ceilings**

1) A class 10 Clean room application -OR ceiling

2) The cleanliness is controlled by laminar flow. Air is cleaned through HEPA filters. Room must be free of particles releasing materials.

3) In OT, operating Delivery, isolation rooms and sterile processing rooms, ceilings to have min. retention of passage of dirt particles.

4) Rooms containing ceiling mounted equipment or ceiling mounted surgical light fixtures shall be sufficient in ht. for their normal movement.

5) In Psychiatric patient rooms, toilets and seclusion rooms, ceiling shall be monolithic to inhibit possible escape or suicide.

E. **Shielding**

1) Electromagnetic interference be eliminated from rooms in which EEG, EMG or any other such sensitive equipment is used.

2) Radiation screening in X-ray rooms where the working capacity doesn’t extend 150KV and radiation is undirected, comprise 2mm thick Lead sheet, 16cm concrete / 25cm masonry.

3) Doors and other means of access to the X-ray room & CAT units and observation windows also require sacrificing operational efficiency.
F. Allied considerations

1) Floors and walls penetrated by pipes, ducts and conduits shall be tightly sealed to minimise entry of rodents and insects.

2) Expansion and seismic joints shall be constructed to restrict the passage of smoke.

3) No mirrors at hand washing fixtures in food preparation areas, nurseries, clean and sterile supply, scrub sinks, or areas where asepsis control would lessen by hair combing.

4) Hospital with an organised emergency service shall have the emergency access well marked to facilitate entry from public roads.

G. Doors, Windows openings

1) Door height -215 cm

2) Doorways opening including frame for

3) Easy passage of a wheel chair

4) In OT, staff dressed in sterile garments

5) For OT, two leaf door, surface sliding, power operated & controlled by photoelectric cell

6) Post operative recovery area & ICU

7) Neonatal ICU

8) In Laboratories - door to swing out

9) Patient bed room

10) Doors on patient floors be self closing / be kept closed to prevent smoke spread.

11) Patient's toilet door to open outward or in a manner to avoid pressing a collapsed patient

12) Functional planning requirements

13) Window area generally occupies 20 to 30% of the window wall - satisfaction lvl.
14) Patient rooms window operation shall be restricted to inhibit possible escape

15) Window in the path of direct X-ray beam - lateral X-ray exposures are hazardous or

H. Elevators & Dumb waiters

1) Elevators shall be arranged in groups of 2 or more. Hospital type elevator - car size 150cm wide and 230 cm deep, car door 120cm wide 215 cm high

2) Dumb waiters not to open directly into a corridor or exit, but open into a room with fire resistance rating of not < one hour.

3) Fire protection provisions

4) Public address system in the lift craw speaker

5) Fire lift for exclusive use of the fireman in an emergency

6) Floor area not more than 1.5 sq.m, load capacity 500 kg

7) Electric supply-on separate service- automatically trip over.

8) Operation - a simple toggle or two button switch in glass box

9) "FIRE LIFT" conspicuously displayed in fluorescent paint.

4. Environment of Care

4. A Nursing units

4. A.a Nursing Units (Medical & Surgical)

1) Patient rooms

2) Multiple bed room (4 to 6 beds) - per bed

3) Multiple bed room (2 beds) with toilet

4) Single bed room with toilet

5) Infectious isolation room

6) Protective isolation room

7) Security room for close supervision
8) Service areas - Nurse station, dictation area, supervisor office, staff lounge with toilet, securable cabinets, clean and soiled work rms, medication stn, pantry & clean linen store.

9) House keeping room per floor for >1 NUs.

10) Examination/ treatment / floor for > 1NUs.

11) Storage room for emergency equipment.

12) Multipurpose room to serve several Nus.

4. A.b Nursing Unit (Paediatric and Adolescent)

1) Patient rooms - as for (A.a.1) above

2) Nursery to contain not more than 8 bassinets

3) Nursery work room-with observation to' b'

4) Functional planning requirements

5) Nursery Visiting and feeding

6) Examination / treatment room

7) Service areas - as for (A.a.8) above, also to include multipurpose room, infant formula, isolation cubicle.

4. A.c Psychiatric Nursing Unit

1) Patient rooms - as for (A.a.1) above but with omission of nurse call system, hand washing & visual privacy in multiple bed rms.

2) Service areas - as for (A.a.8) above, but with addition of 2 separate social spaces for noisy & quite activities, space for group therapy.

3) Examination and treatment room

4) Separate Consultation room

5) Occupational therapy

6) House keeping / Environmental services room

7) Isolation rooms
8) Seculation Treatment room for short term occupancy for a violent or suicidal patient. It is padded with combustible materials - and protected 1 hour fire rating.

4. A.d New Born Nurseries

1) Full time nursery-not>16 infant stations -per
2) Baby holding nursery - next to nurse station
3) Work room (s) - contain scrubbing & gowning for staff and house keeping personnel
4) Infant examination and treatment areas
5) Infant formula facilities
6) Conference and treatment planning room

4. B Critical Care Units

4.B.a Critical Care ( General)

1) Private rooms / cubicles
2) Administrative centre/nurse station-central
3) Medication station
4) Isolation room
5) Additional service spaces - securable closets, clean work rm., clean linen storage, soiled work rm., and a nourishment stn.
6) Located out side the unit- Visitor's waiting, office space, staff lounge, special procedure room, multipurpose room, house 'keeping and stretcher/ wheel chair storage space.

4.B.b Coronary Critical Care unit

1) Functional planning requirements
2) In addition to 4.2.1, following shall apply:
3) separate room for acoustical & visual privacy
4) Patient to have access to toilet in the rm.
5) Continuous monitoring with visual display for each patient at the bed side &at the nurse stn.
6) Combined Med. / Surg. & Cardiac CCU
7) at least 50% of the beds must be located in private rooms or cubicles. Cardiac patients shall not be in open ward area.
4.B.c Paediatric Critical Care Unit

1) may be an open ward plan and shall include
2) Space at each bedside for visiting parents.
3) Sleeping space for parents
4) Consultation / demonstration room
5) Separate storage cabinets for toys and games.

4.B.d Newborn Intensive Care Unit

1) A scrub / gowning area
2) wider door for portable X-ray equipment entry
3) Controlled access from Labour & Delivery area
4) A central control stn.to permit visual observation
5) An infection isolation room
6) Blood lab. Facilities & sleeping space for parents.
7) Physician's sleeping room with access to a toilet.
8) A respiratory therapy work area and storage rm.
9) A consultation / demonstration / breast feeding
10)Additional service spaces such as Medication station, Clean work room, soiled work room, Lounge, Emergency equipment storage & house keeping rm.
11)Spaces shall also be provided for Visitors waiting room, Nurses / supervisors office or stn. Multipurpose room(s) for staff, patients & patients families for education & training etc.

4.C Surgical Suites - Operation Theatre

1) There may be four well defined zones of varying degree of cleanliness. They are sterile area, clean zone, and Protective zone & Disposal zone.
2) General Operating room
3) Theatre for special procedure
4) Open heart surgery
5) Orthopaedic and neuro-surgical surgery with additional rooms in the restricted area of suite.
6) Cytoscopic and other endo- urologic procedures
7) Functional planning requirements
9) Post Anesth.Care Unit - for each patient
10)comprising of patient's beds shall contain a medication stn.,nurse stn., storage space for stretchers, supplies & equipments. Staff toilet.
11)Separate and additional recovery space may be necessary to accommodate surgical outpatients and pediatric patients.
12)Service areas
13) Control stn. to permit visual observation
14) A supervisor's office
15) A sterilizing facility
16) Medication station
17) Scrub facility may serve two operating rooms
18) Soiled work room for exclusive use of suite.
19) Clean work room / instrument lay up room
20) Medical gas storage facilities
21) Anesthesia work room
22) Equipment storage room
23) Staff clothing change rooms
24) Staff lounge and toilet facilities
25) Dictation and report preparation area
26) Patients holding area
27) Storage areas for portable X-ray equipment
28) Housekeeping facilities
29) Examination and preparation of frozen section
30) Refrigerated blood bank
   Pathological specimen storage prior to transfer

4.D Burn Centre

1) Changing rooms (three)
2) Operation theatre
3) Instrument sterilization & scrub up (each)
4) Resuscitation room
5) Dressing room
6) Saline bath
7) Tissu deep freeze
8) Linen and medical store
9) Nurse station, office, charting, toilet & staff lounge, Medication station, staff cabinets.

4.E Obstetrical Facilities - Obstetrical Suites

4.E.a: Post partum Unit

1) Postpartum bed room - multi-bed / single
2) Infectious isolation room with attached toilet
3) Support services
4) Surgeon’s / Anaesthetist room
5) Functional planning requirements

6) Consultation/ conference room
7) Clean work room with clean linen storage
8) Soiled work room
9) Nourishment station
10) Equipment storage room
11) Housekeeping room
12) Examination / treatment room with toilet
13) Emergency equipment storage

4.E.b: Caesarean / Delivery Suite

1) Caesarean / Delivery room
2) Delivery room
3) Infant resuscitation within caesarean / delivery
4) Labour room (LDR)- 2 beds / caesarean/delivery
5) Recovery room(s)
6) Service areas
7) Nurse station, supervisor's office, waiting room with toilet, drug distribution station.
8) Sterilizing facility convenient to all delivery rms.
9) Scrub facility for caesarean / delivery rooms
10) Soiled work room
11) Clean work room with clean linen storage
12) Anesthesia storage facilities.
13) Clean sterile storage area
14) Anesthesia work room
15) Equipment storage room
16) Staff clothing change areas
17) Lounge and toilet facilities for obstetrical staff
18) House keeping

4.E.c: LDR facilities

1) Birthing concepts may be performed in the LDR rooms. The postpartum unit may contain single occupancy LDR rooms with a minimum floor area exclusive of toilet.

4.F Emergency Service

4.F.a: Initial Emergency Management

1) A marked entrance, protected - weather.
2) Treatment room with a toilet
3) Storage for general emergency supplies
4) Reception, control and public waiting & toilet
5) Communication hookup to poison control center
4.F.b: Definitive Emergency Management

1) Grade level entrance sheltered from weather for ambulance. Ent. & Driveway clearly marked.
2) Reception, triage and control station.
3) Wheelchair and stretcher storage.
4) Public waiting area with toilet, telephone & DF.
5) Functional planning requirements
6) Communication centre
7) Examination and treatment room(s)
8) Trauma / cardiac rooms -emergency procedures
9) Orthopedic and cast work
10) Scrub station
11) Convenient access to Radiology & Laboratories
12) Poison control centre and EMS commun. centre
13) Disposal of solid and liquid waste
14) Emergency equipment storage
15) Patient's toilet. 2 in case of > 8 treatment rms.
16) Storage rooms for clean, soiled or used supplies
17) Clean work room
18) Soiled work room
19) Administrative centre or nurse station for staff work & charting. Securable cabinets/ closets, convenient and private access to staff toilets
20) House keeping room
21) Security station
22) Infectious Isolation room
23) Bereavement room
24) Secured Holding room to allow for security, patient & staff safety & sound proofing.

4.F.c: Other space consideration

7) When functional program defines the need
8) A decontamination room for both chemical and radiation exposure.
9) A separate Pediatric emergency area
10) Observation / holding units
11) A separate fast track area to include
12) Treatment / procedure room
13) Registration, discharge, triage, waiting, nurse work
14) Examination and treatment areas
15) Atleast one for pelvic examination
4.G Imaging Suite – Radiology

1) Most imaging requires radiation protection.
2) Includes fluoroscopy, radiography, mammography, tomography, Ultrasound, CT scanning, MRI, Angiography and other similar techniques.

4.G.a: Diagnostic X-ray

1) Radiography room
2) Tomography & Radiography/Flouroscopy
3) Mammography room

4.G.b: Ultrasound with toilet facility for patient

1) Functional planning requirements

4.G.c: Computerized Tomography Scanning rooms

2) Control room - computer & other equipment
3) Some equipment may require air-conditioning
4) A patient toilet

4.G.d: Magnetic Resonance Imaging

1) Control room-computer & other equipment
2) Computer room
3) Cryogen storage
4) Dark room
5) Magnetic sheilding - Radio frequency sheilding
6) Patient holdup area
7) Power conditioning and voltage regulation

4.G.e: Angiography - procedure room

1) Control room
2) Viewing area
3) Scrub sink outside staff entry
4) Patient holding area
5) Storage for portable equipment & catheters
6) Extended post-procedure observation-outpatient

4.G.f: Support Spaces

1) Patients Waiting area
2) Control desk and reception area
3) Holding area  
4) Patient Toilet rooms  
5) Patient Dressing rooms  
6) Staff facilities - Lounge and toilet  
7) Film storage (Active and Inactive)  
8) Storage of unexposed film  
9) Offices for Radiologist (s), Assistant(s)  
10) Clerical Offices  
11) Consultation area  
12) Contrast Media Preparation  
13) Film Processing Room  
14) Quality control area  
15) Cleanup facility  
16) Hand washing facility  
17) Clean storage  
18) Soiled holding  
19) Medications and drugs.

4. H: Laboratory Suite

1) for performing tests in Hematology, Clinical chemistry, Microbiology, Anatomic pathology, urinanaylsis, Cytology & Blood banking.  
2) Laboratory work counter (s) with Lab. Sink(s)  
3) Refrigerated blood storage facilities  
4) Storage facilities - reagents, supplies, slides etc.  
5) Functional planning requirements  
6) Specimen collection  
7) Chemical safety provisions  
8) Equipment for terminal sterilization - specimens  
9) Administrative areas  
10) Staff lounge, locker and toilet facilities.

4. I: Rehabilitation Therapy Department

1) For restoration of body functions.  
2) Physical and Electrotherapy  
3) Individual treatment cubicles with hand washing  
4) storage for Clean linen, Equipment & supplies  
5) separate storage for soiled linen & supplies  
6) Patient dressing areas, showers & lockers  
7) Hydrotherapy  
8) Occupational therapy - tailoring, carpentry, canning, hosiery, watch & radio repairing, book binding, etc.  
9) Prosthetics and Orthotics  
10) Speech and hearing  
11) Exercise therapy (Gymnasium)
12) **Common elements**

13) Office and clerical space

14) Reception and control station

15) Patients waiting and toilets

16) Space for wheelchairs and stretchers

17) Locking cabinets, lockers & toilets for staff

### 4.J: Pharmacy

1) Depend upon drug distribution system used, patients served, extent of shared or purchased services.

2) Dispensing

3) Storage - bulk, active, refrigerated, controlled

4) Administration

5) Hand washing, toilet & locker

6) Equipment for supplies, packing, labelling etc.

### 4.K: Out Patient Facilities

1) Are used primarily by patients capable of travelling, including handicapped disabled.

2) **Entrance** - grade level, clearly marked.

3) **Common elements-Administrative & public areas.**

4) Public services - reception and information counter, wheelchair storage, waiting spaces, public telephones, toilets & drinking fountains.

5) Interview space (s)

6) General & individual office (s)

7) Multipurpose room(s) for visual aids, conferences

8) Functional planning requirements

9) Special storage for staff personal effects

10) General storage for supplies & equipment.

11) **Clinical facilities - as needed.**

12) General purpose examination room(s) for medical, obstetrical and similar examinations.

13) Special purpose examination (s) for eye, ENT, surgical and similar examinations.

14) Treatment room(s)

15) Observation room(s)

16) Nurse station with drug distribution, clean storage, soiled holding & sterilizing facility.

17) Injection room and Social worker room (each)


19) Housekeeping rooms - per floor

20) Staff locker rooms and toilets

21) For additional facilities for each of the clinic to diagnostic and therapeutical need ref.
4. K.a: Outpatient Surgical facility –

1) Performed without anticipation of overnight patient care.
   a. Operating room
   b. Post-anesthesia recovery
   c. Designated supervised recovery lounge
2) Services in the surgical areas
3) Control station with drug distribution facility
4) Scrub facilities
5) Soiled work room
6) Fluid waste disposal facilities
7) Anesthesia workroom
8) Medical gas supply and storage
9) Equipment storage room(s)
10) Staff clothing change areas
11) Out patients surgery change areas
12) Stretcher storage area
13) Lounge and toilet facilities for surgical staff
14) Housekeeping room
15) Sterilizing Facilities
16) Sterilizing equipment and supplies
17) Soiled work room
18) Clean assembly /work room

4. K.b: Additional facility - Clinic wise

4. K.b.a: Medical clinic

1) Cardiographic examination room

4. K.b.b: Surgical clinic

2) Treatment cum dressing room
3) Functional planning requirements

4. K.b.c: Orthopedic clinic

1) Fracture and Treatment room
2) Plaster and splint storage room
3) Recovery room

4. K.b.d: Ophthalmic clinic

1) Consultation-cum-refraction
2) Minor surgery and treatment
3) Dark room
4.K.b.e: ENT clinic

1) Examination-cum-treatment room
2) Audiometry room (sound proof)
3) Speech therapy room

4.K.b.f: Dental clinic

1) Consultation-cum-examination room
2) Dental Hygienist
3) Dental workshop
4) Recovery room

4.K.b.g: Obstetric and Gynecological clinic

1) Reception-cum-registration (separate)
2) Ante and post-natal care
3) Clinical laboratory
4) Toilet cum changing room
5) Treatment room
6) Family welfare clinic
7) Operating rm. for IUCD insertion & investigation
8) Health educator-cum-social worker room

4.K.b.h: Paediatric clinic

1) Treatment room & Immunisation room
2) Recreation cum play room

4.K.b.i: Skin clinic

1) Treatment room-for Dermatology & STD
2) Treatment room for Leprosy
3) Superficial therapy
4) Skin Laboratory

4.K.b.j: Psychiatry clinic

1) ECT Treatment room
2) Insulin therapy room
3) Narcoanalysis room
4) Recovery room
5) Psychologist's room
6) Social worker room
4.L: HOSPITAL SERVICES

1) Dietary Facilities
   a. Functional elements
   b. Receiving / control station
   c. Storage spaces - bulk, refrigerated & frozen foods
   d. Cleaning supplies storage
   e. Additional storage - cooking wares, extra trays
   f. Food preparation workspace
   g. Assembly and distribution
   h. Food service carts
   i. Dining area- ambulatory patient, staff, visitors
   j. Vending service
   k. Area-receiving, scraping & sorting soiled tableware
   l. Ware washing facilities
   m. Pot washing facilities
   n. Waste storage room
   o. Hand washing Office space
   p. Office spaces - food manager / dietician
   q. Toilet and locker space
   r. Grease trap of adequate capacity
   s. Commissary or contract services from other areas.
   t. House keeping room

2) Hospital Laundry
   a. Functional elements
   b. Dirty area
   c. Receipt of used linen
   d. Sorting
   e. Weighing
   f. Change room with toilet & hand wash - staff
   g. Washing area
   h. Washing, Scudding
   i. Starching
   j. Hydro extaction
   k. Clean area
   l. Drying
   m. Calendering
   n. Ironing
   o. Folding and packing
   p. Repair and mending
   q. Clean storage and distribution

3) Administrative area
4) Offices

5) Central linen store

6) Material storage

7) Linen trolley bay

8) Staff toilets

9) **Central Sterile Supply Services**

10) **Dirty Zone**

   a) Receipt of used sets
   b) Cleaning
   c) Washing
   d) Change room with toilet & hand wash - staff
   e) Clean Zone
   f) Drying
   g) Folding
   h) Packing
   i) Labelling
   j) Storage of linen & instruments
   k) Sterile Zone
   l) Sterilization
   m) Storage of sterile sets
   n) Distribution and delivery
   o) Office for supervisor & storage.
   p) Change room, toilet and wash for personnel
   q) Administrative Zone
   r) Office and seminar room

**Central Medical gases, Air Delivery System**

   a) Source Equipment - Manifold room
   b) Oxygen - bank of cylinders
   c) Nitrous oxide - bank of supply
   d) Suction pump
   e) Distribution system

**General Stores**

   a) General Storage room (s)
   b) Off-street unloading facilities
   c) Receiving area
d) Additional Storage room(s) - outpatient deptt.
e) Facilities and equipment
f) Separate room for receiving and holding soiled linen until ready for pickup or processing.
g) Central, clean linen storage & issuing room(s)
h) Cart storage area(s) for separate parking of clean and soiled linen carts out of traffic.
i) Clean linen inspection and mending room
j) Hand washing facilities in each area.

**Mortuary**

a) For keeping dead bodies conducting autopsy. Mourners and relatives - have direct access.
b) Functional elements for performing autopsies
c) Refrigerated facilities for dead body holding
d) An autopsy room containing:
e) Work counter with a sink equipped for hand washing
f) Storage space for supplies, equipment, & specimens
g) An autopsy table
h) A deep sink for washing of specimens.
i) A housekeeping service sink or receptor.
j) Functional planning requirements

**Waste Processing Services**

a) Storage, treatment and disposal of waste.
b) Incineration
c) Incinerator for complete destruction of pathological waste.

**Administrative and Public Areas**

a) Entrance - accessible to the handicapped
b) Lobby to include reception & information, public waiting area, public toilet, public telephones & drinking fountains.
c) Interview spaces relating to social service, credit, and admissions.
d) Admissions area to include separate waiting, work desk for staff, wheelchairs storage-area
e) General or Individual Offices for business transactions, medical and financial records and administrative and professional staff.
f) Multipurpose Room(s) for conferences, meetings, & health education purposes.
g) Storage for Office Equipment and supplies.
h) Quality assurance and utilization review area
Medical Records

a) Rooms, areas, or offices for the following functions shall be provided:
b) Medical Records administrator / Technician
c) Review and dictation
d) Sorting, recording, or Microfilming records
e) Record storage

Engineering Office & Storage

a) Civil and Electrical & mechanical Engineer's offices with file space and provisions for protected storage of facility drawings, records, manuals, etc.
b) Functional planning requirements
c) Storage room for building maintenance supplies
d) Separate area or room specifically for storage, repair, and testing of electronic and medical equipment.
e) Yard equipment and supply storage areas - be located so that equipment may be moved directly to the exterior without interference with other work.
f) General maintenance shop(s) for repairs

ENGINEERING SERVICES

a) Electricity
b) Electric Main
c) Sanctioned Load
d) Source
e) Incomer / Receiving station
f) Transformer
g) Sub station
h) Pit below transformer with sand & aggregate - not found provided
i) Store room for fuel outside the transformer room
j) HT Panel
k) LT Panel
l) Automatic Voltage Stabilizer (AVR)
m) Standby Generators room - weather proof
n) Engine and appropriate accessories
o) Cooling towers and heat rejection equipment
p) PLC room
q) Electrical Inspection
r) Maintenance Service Station
s) Preventive Maintenance System
t) Electrical Standards
u) Safety guards - diagnostic equipment
v) Shielded isolation transformers, voltage regulators, filters, surge suppressors, or other safety guards - where power line disturbances are likely to effect data processing.

w) **Switchboards & Power Panels**

x) Be convenient for use, readily accessible for maintenance, away from traffic lanes, located in a dry, ventilated space free of corrosive or explosive fumes, gases or flammable material.

y) **Panel boards**

z) serving normal lighting and appliance circuits - located on the same floor as the circuits they serve. Those serving critical branch emergencies circuits-located on each floor that has major users. Those serving life safety emergency circuits may serve floors above and /or below for secondary users.

aa) Functional planning requirements

**Lighting - Direct, Indirect, task, site lighting.**

a) Direct lighting-standard design-improvement of luminaries & use of more efficient light sources

b) Indirect lighting- utilizes reflective characterist. of ceiling / walls to disperse light- less glare & higher visual comfort.

c) Task lighting reduces general area lighting needs by applying light to specific task.

d) Site lighting, a speciality, requires design skill to create an efficient system. The lighting to be high & /or low pressure sodium /metal halides

e) Operating & Delivery rooms- general lighting in addition to special lighting units at surgical & obstetrical tables. General and special lighting be on separate circuits.

**Patient rooms** - general and night lighting. A reading light for each patient, at least one night light fixture in each patient bed room-controlled at the entrance, all light controls be quite-operating. Lighting for Intensive care bed areas- permit staff observation of patient but minimize glare.

**Nursing unit corridors** - general illumination with provisions for reducing light levels at night. Receptacles (Convenience Outlets):

**Each Operating & Delivery room**- have atleast 16 simplex or 8 duplex receptacles at a height of 90 cm. In addition provide special plugs or voltage for mobile X-ray, laser or other equipt.

**Each patient room** - have duplex grounded receptacles. One on each side of the head of each bed, one for TV, one on every other wall.

**Nurseries** - have at least two duplex-grounded receptacles for each basinet.

**Critical care areas**, including pediatric & new-born intensive care - have at least seven duplex-outlets at each bed head, crib, or basinet.
Emergency's examination & treatment rooms- have minimum of six duplex outlets located convenient to head of each bed. Functional planning requirements

In corridors- provide duplex- grounded outlets 15 m apart & within 7.5m of corridor end. Single polarized receptacles marked for X-ray. Equipment Installation in Special areas:

**X-ray film illuminator unit** - for displaying two films simultaneously - be installed in each OR, emergency treatment room & X-ray viewing rm. **When ground fault circuit interrupters** - used in critical areas, insure that other essential eqpt. is not effected by activation of one interrupter.

Nurse Calling System:
**Inpatient areas**, each patient room shall be served by one calling station for two way voice communication. Each bed to have call device.

**A nurses emergency call system** - be at each inpatient toilet. This system shall be accessible to collapsed patient lying on floor.

In Critical areas - patients under constant visual surveillance, the nurses call system may be limited to a bedside button or station.

**A staff emergency system** - to summon assistance - be provided in each operating, delivery, recovery, emergency treatment, in all critical care units, nurseries, spl. procedure rms., stress test, triage, outpatient surgery, admission & discharge areas, seclusion rms.

**Air Conditioning, Heating & Ventilation Systems**

a) Central Air-conditioning
b) Central Air-conditioning plant capacity / units - No central AC
c) Direct Expansion system (circulating air directly)
d) Chilled water system (circulating water)
e) Screw type compressor
f) Air handling Unit (s)
g) Air Filtration - Micro-vee filters / HEPA filters
h) Maintenance programme / responsibility
i) Facilities on Central Air conditioning system
j) Central Heating (Winter heating)
k) Hot water generators
l) Heating arrangement catered to Central AC.
m) Facilities on Central Air conditioning system
n) AC Packaged units
o) Packaged unit capacity / numbers
p) Facilities on Packaged unit
q) Functional planning requirements
r) Split type Airconditioners
s) Facilities on Split Acs.
t) Window Airconditioners
u) Facilities on Window air conditioners
v) Central Cooling System
w) State of Ducting arrangement
x) Facilities on central cooling system
y) Evaporative Cooling
z) Facilities on evaporative cooling
aa) Temperature & Relative humidity indicators
bb) Operation theatres
c) Operating Delivery
dd) Intensive Care unit
e) Critical ward
ff) Inside Comfort Design Conditions
gg) Summer - Temperature & Relative humidity
hh) Winter - Temperature & Relative humidity

Refrigeration

1. Refrigerators - in nursing units & departments.
2. Deep freezers - in pathology
3. Cold storage plants (walk in) - in dietary, pathology, medical stores and mortuary.

Telephone and Intercom

1. Land line connections
2. EPBAX
3. PA system

Steam and Hot Water system

1. Boilers
2. accessories- feed pumps, heat circulating pumps, condensate return pumps & waste heat.
3. Hot water need for clinical, dietary, & patient use
5. Heating for operating, delivery, birthing, labour, recovery, intensive care, nursery & general patient rooms.

Water Supply

1. Requirement - 400 to 650 litres per bed per day
2. Source
3. Municipal supply
4. Ground water-Tube well
5. Storage - at least two days requirement
6. Underground - capacity / units
7. Overhead - capacity / units
8. Distribution network
9. Filtration system - potable water
10. Dosing / bleaching powder
11. RO Plant- if installed purifying capacity
12. Proper Covering provision to Storage tanks
13. Overflow of water from Fire compartments
14. Functional planning requirements
15. Pump room – pumps
16. Forced ventilation
17. Analysis Report
18. Physical characteristics
19. Chemical characteristics
20. Bacteriological Qualities
21. Final statement about water fitness

Fire Protection

1. Fire fighting installation- approval obtained
2. Control room - location, control panel & manned, PA equipment, connected with detection system or fire alarm system.
3. Pumps and pump room
4. Electric and diesel pump - LMP & head
5. Pressuring Jockey electric pump – LMP
6. Forced ventilation
7. Arrangement of filling Fire tenders
8. 4 way fire inlet
9. Proper access for Fire tender to fire tanks
10. Fire Drill
11. Yard Hydrants
12. Ring main and yard hydrants at strategic locations.
13. 2 way fire heads to charge the ring main
14. Landing Hydrant & Hose reels
15. Wet riser system
16. First aid Fire fighting appliances
17. First aid equipment cabinets
18. Escape routes - escape stair
19. Sprinklers system - basement & bldg. above 15 M in height
20. Automatic Smoke detectors / heat detectors
21. Fire Alarm System
22. Fire extinguishers
Rain Water Harvesting

1. Water table
2. Satisfactory provision made
3. Is it mandatory as per concerned Civic body?

Effluent Treatment Plant

a) Anaerobic up flow sludge blanket system
b) Aerobic system
c) Environment control in the vicinity/ landscaping

Maintenance Operation

a) Routine maintenance
b) Planned maintenance
c) Preventive maintenance
d) Breakdown maintenance
e) Predictive maintenance
f) Corrective maintenance
g) Emergency maintenance

General Remarks and Recommendations

a. Following recommendations are offered:
b. General cleanliness and maintenance of all the buildings and surrounding structures needs to be scheduled and carried out. These shall include checking and correcting water spillages, seepages, provision of concealed wiring, concealed water pipes and covered drains, giving clean and aesthetic looks to walls, ceilings, doors and windows by way of painting and polishing, upkeep and maintenance of faulty taps and sanitary appliances for proper functioning, cleaning and repairs/ replacement of window pans on regular basis, and proper repair of technical fitments and appliances.
c. All clinical areas along with supportive services shall be interconnected through covered corridors. All isolated blocks used by patients need to be connected with min hospital building through all weather proof covered links.
d. Dietary and Laundry services if so desired need to be replanned with requisite functional elements and flow. Proper covered food trolleys need be procured for transporting cooked meals to patient dining areas.
e. Toilet facility for inpatients, outpatients, staff and visitors / attendents need to be replanned and provided at appropriate
locations and their upkeep and maintenance shall be accorded priority.
f. Nursing units in all areas which are planned to be renovated shall be provided with safe environment, positive and negative isolation rooms. Placement of beds in the ward shall be of rig pattern i.e., beds arranged parallel to windows for affording better view to patients. All beds shall be provided with convenience electrical outlets, nurse call system. Provision of telephone facility in the nursing unit and TV facility on common basis to patients in a ward be considered.
g. The Surgical suites, Delivery suites needs to be replanned with due consideration of four well defined zones of varying degree of cleanliness. They are sterile, clean, protective and disposal zones. Surgical suites shall be grouped between 8-10 OTs in one location for easy control and operational efficiency. Some of the OTs may be planned with individual AHU, HEPA filter and Laminar flow. The requirement of OT planning and internal facility to be provided in each OT was explained to the surgeon, nursing staff and PIU staff. If funds permit minimum of 2 OTs with modular / prefab. material units available may be provided, so as to provide seemless interior.
h. In the Imaging suites- Radiology department, there is a need to create change rooms for male and female patients going in for plain X-ray. This will curtail the service time for X-ray as more than double number of patients can be imaged. It is advisable to locate the dark room / automatic processor for easy access from all X-ray rooms.
i. The PIU shall work in consonance with hospital administration and facilities incharge / users. It is further recommended that before planning a specialized facility the concerned planner shall visit better similar facility area in the region. Technical inputs (medical) shall also be provided by top medical management. For early implementation of proposals, PIU shall be so organised so that the procedural delays are curtailed.
j. The Flooring, skirting and dado shall be provided as per the facility need. They shall be easily maintainable. The skirting and dado shall be kept flush with wall surface to avoid dust collection.
k. At present the ambulances are parked near the entrance canopy near emergency. All ambulances need to be provided a covered parking bay with the emergency and ambulance control room. It shall have communication facility with the emergency and ambulance control room.
l. Medical store needs to be replanned with adequate space & ample shelving for storage of drugs & care needs to be taken to prevent dampness by proper maintenance. Locked areas for storage of high risk medicines with proper compliance need to be provided in
the store, pharmacy dispensing unit & nursing stations. The present cold storage needs to be expanded for enhanced capacity.
m. It is advisable to provide dedicated hospital engineering cells under the Medical Superintendents of Hospital / Dean of Medical College. The engineering department [compact] shall comprise of civil engineer, electrical engineer, specialised hospital air-conditioning engineer, public health engineer and bio-medical engineer..
n. General recommendations (continued)
o. All patient care areas as well as staff areas need a proactive planned maintenance schedule and breakdown maintenance policy espacially for electrical, sanitary and civil work.
p. Provision of BILINGUAL sign posting of all service, directions, instructions, study, and education material across the organisation shall be made. This shall comprise proper planning of level 1, 2 and 3 display boards.
q. It is suggested that full and semi Fowler beds be provided in emergency area, ICUs, HDUs, Pre and post operative, observation areas and in some wards. Additional provision of wheeled beds need be considered in emergency, ICU, and post operative areas where the whole bed with patient and fitments can be moved rapidly to other areas by the management for certain valid reasons.
r. Provision of Crash Carts for CPR and other emergency managements be made across the whole of organisation. These may be controlled by the pharmacy services and cared for by the user units. The carts shall be kept sealed attending an emergency life threatening event and is meant for single use after which it is replenished and made ready for next patient.
s. Water supply installations comprising of underground storage sumps, overhead storage tanks, and pump house shall be centrally grouped for easy control and maintainability. Stand by pump not available at present, shall be provided on urgent basis. Total water requirement be assessed as per laid down norms. Water shall be checked and tested both at the source storage and point of consumption in respect of physical, chemical and biological tests as per laid down regulations.
t. Electrical installations comprising of incomer, transformers, HT panel, LT panel, Generator sets, office and storage area shall provided and maintained as to have electricity round the clock. Total load of the hospital shall be assessed and shall match with transformer and generators provisions.
u. A well designed and excellently maintained stand by genet will take some time to come on load. In the present day situation of power supply which is full of aberrations, the UPS (uninterrupted power supply) system offers a viable solution. For such an health care institute, it is suggested to go in for the system as many sophisticated electronic equipments may need uninterrupted power.
At present the Air-conditioning system is of split units, and window air conditioners. For such an establishment central Air-conditioning / HVAC system is mandatorily required for surgical suites, Delivery suites, critical care units, imaging suites, laboratory services etc.

Fire protection measures do not exist in this Hospital. This shall be planned in consultation with the local fire officer / authority.

Horticulture and proper plantations need advance planning and execution.

**INDICATORS FOR EVALUATION OF QUALITY OF SERVICES**

1. Number of complaints from the patients about lighting, ventilation, air conditioning, water supply (hot / cold), leaking taps
2. Number of complaints from the departments about slip / trip or fall with or without any injuries
3. Number of complaints from the departments about malfunctioning of equipment or nurse call system
4. Frequency of power failure and time taken for restoration of power (should not be more than 10 seconds)
5. Frequency of cancellation of surgical / other procedures due to lack of power supply
6. Incidence of fire / other hazards such as collapse of building / plaster falling off the ceiling / walls, short circuiting, gaseous explosion
7. Response time for attending to and restoration of operational status
8. Incidence of malfunctioning of equipment during a procedure
9. Observations by the equipment audit committee
10. Incidence of lifts getting stuck and time taken for rescue of passengers
11. Observations from the regulating authorities about non-compliance of legal provisions
12. Frequency of complaints from OT / cardiac cath. Lab / labor room / nursery about faulty temperature / humidity control.

**SUMMARY**

Engineering services of a hospital are the key to conversion of all the inputs into a successful output. Quality assurance is outcome oriented and process driven. It is outcome, i.e. the patient improvement and satisfaction, which is the most important. However, outcome depends on the effectiveness of the process of delivery of patient care which in turn depends on the efficiency of the engineering department. Although some components like electric supply, communication and information technology (IT) are of crucial significance (without which patient care will come to a standstill), all components are important in the sense that any problem with any component is going to affect the outcome of patient care and satisfaction. For effective and optimum level of functioning, therefore, it is essential that the infrastructure be of high quality. Every hospital must have a
proper well staffed and equipped department of engineering services and must implement the maintenance program in a well planned and efficient manner.

This is one department where one can say with certainty that a penny spent is worth a pound saved.

THANKS

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