

Hospital Architecture



Hospital Planning **An Architectural Perspective**

Hospital is very complex, critical and unique infrastructure type providing healthcare services. Successful hospitals are based on a triad of better infrastructure, dedicated medical staff and visionary administration. Hospitals do not exist in a vacuum and they are influenced by the manifolds of demographic, epidemiologic, economic and socio-cultural settings within which they operate. Therefore, it needs a unique effort to plan a hospital.



An architect, who gets involved in hospital planning, should have an understanding of the healthcare system within which the hospital is being built. It is high time to put in well-directed efforts, innovative ideas and appropriate technology in hospital planning; especially in developing countries like India where hospitals are in demand to serve a large and diversified population.

Hospital Planning

Hospital planning needs to focus on various components like financial resources, infrastructure, medical staff, patient care, government regulations, social responsibility, community participation etc. It has various stakeholders like owners, administrators, physicians, support staff, patients, visitors, technicians, designers, vendors, society, government agencies etc. During hospital planning, the planner needs to understand stakeholder's needs, preferences and related constraints. Hospital planning involves articulating a trade-off to achieve maximum objectives through use of optimum resources. Better hospital planning should help to develop the ability for better patient care through efficient utilization of resources and community service, which are the measures of successful hospital. This article focuses on hospital planning from an architectural perspective to create healthcare infrastructure for efficient utilization and long-term usability.

Hospital Design

Hospitals are the most

complex building types. Each hospital is comprised of a wide range of functional units and services. These include diagnostic and treatment functions such as clinical laboratory, radiology department, emergency room and operation theatre; hospitality functions like food service and housekeeping and the fundamental inpatient care function.

Ideally, the design process incorporates direct inputs from the owner and the key hospital staff early on in the process. The architect needs to be an advocate for other stakeholders like the physicians, patients, visitors, support staff, technicians and vendors who may not generally have direct inputs into the hospital design. Good hospital design integrates the functional requirements with the human needs of its diversified users. Therefore, architect needs to design hospital with consideration of various aspects of usability during planning, if one aims at optimum utility and benefits from the infrastructure. For creating hospital infrastructure, large volumes of precious resources are utilized. So, hospital planning is an important activity and needs a time; at least 6 months to plan a hospital which may support healthcare services for next 20 years. There should be flexibility in planning so that it can adapt to changing user needs as well as technology. Architects may use generic design of rooms and interstitial floors to facilitate the future expansion, maintenance, hygiene, sterility for the better patient care.

Functional Zoning

Hospital design is almost totally

based on complex functional requirements. The form and the layout of hospital facilities have to meet the criteria for sterility, segregation of workflow, unobstructed emergency routes, nurse observation, patient/staff safety and many others. This does not mean that architect has no room for architectural design, quality and aesthetics. To the contrary, aesthetics are more needed in hospitals where medical staff and patients are always under stress. However, the challenge is to apply the elements of aesthetics without compromising the requirements for sterility, workflow and space utilization.

Patients, staff, visitors and material should move throughout the hospital according to certain criteria that meet the requirements of segregating the soiled traffic from clean traffic, think about establishing dirty corridors. Another basic principle is functional proximities and relationships where certain department is required to be adjacent or close to other department for reason that relate to patient and staff movement, in both planned and emergency situations. For example, the supporting services such as radiology department, laboratories and

Entrance Zone	Service Zone
Ambulatory Zone	Administrative Zone
Diagnostic Zone	Research Zone
Intermediatory Zone	Residential Zone
Critical Zone	Others

Fig. 1: List of Zones

blood bank should be adjacent to Intensive Care Unit (ICU). For better planning of a hospital, the zoning scheme can be applied and then the zones can be integrated in such a way that they are segregated,

Hospital Architecture



but are nearer to each other. From architectural perspective, the zones are suggested as follows (Fig. 1).

Hospital Space Planning

An architect needs to determine the number of operating rooms, outpatient clinics, endoscopy rooms, laundries and kitchens. Over-sizing the hospital costs unnecessary capital and running expenses and under-sizing leads to operational problems and deficiencies. The architect should arrive, through calculations, at the right-size of the facilities and functional units such as number of operating rooms and clinics as per the bed strength. Broader corridors should be provided for staff, patient and public movement along with movement of medical devices and supplies. A bigger and spacious entrance and parking facility should be provided.

Examples of Planning at Departmental Level

An architect needs to plan even at departmental level as discussed ahead:

Inpatient Wards

An architect should study many options in the layout of inpatient wards (Fig. 2). The basics of ward configuration may include the parameters such as number of beds per ward, nurse walking distance, patient room layout and facilities provided.

Delivery Department

The objective in planning of the delivery department is to recognize the functional requirements with pleasant healing environment. It is a place for family to rejoice the newborns and not to recover from illness. The architect should design this department as homely as possible without compromising clinical needs.

Intensive Care Unit ((ICU)

ICU is specialty-nursing unit designed, equipped and staffed with skilled personnel for treating very critical patients. Ideally, the ICU should be on the ground floor and not far from the casualty department. If ICU is at higher floor, it may compel the patients to use

elevator and as a result, increases the dependency on power supply and maintenance of the elevator. Because of the unavailability of a standard location and easy pathway to reach the ICU, the patients and their relatives may have to search for it, which can result in delays in patient care.

Current Concepts

Healthcare organizational advances, medical technology developments and patient expectations are continuously changing and the design response to them manifests itself in emerging planning concepts and ideas such as -

Modular Construction

There is a dire need for faster, more efficient forms of construction to keep pace with the healthcare modernization process and for better quality outcomes in lesser time. The use of modular construction is directly influenced by the client's requirements for speed of construction, addition of new departments, least disturbance to existing facilities, quality and added benefits of economy of scale as well as single point procurement.

Patient Centered Healthcare

The healthcare system must accommodate the health requirements of an individual's life cycle, from cradle to grave. This requires a shift in focus from a continuing emphasis on acute care facilities to a vision of health care delivery that is balanced between hospitals, community based primary care and long-term care delivered in a variety of settings. There should be an increased focus on the social determinants of health. There should be greater

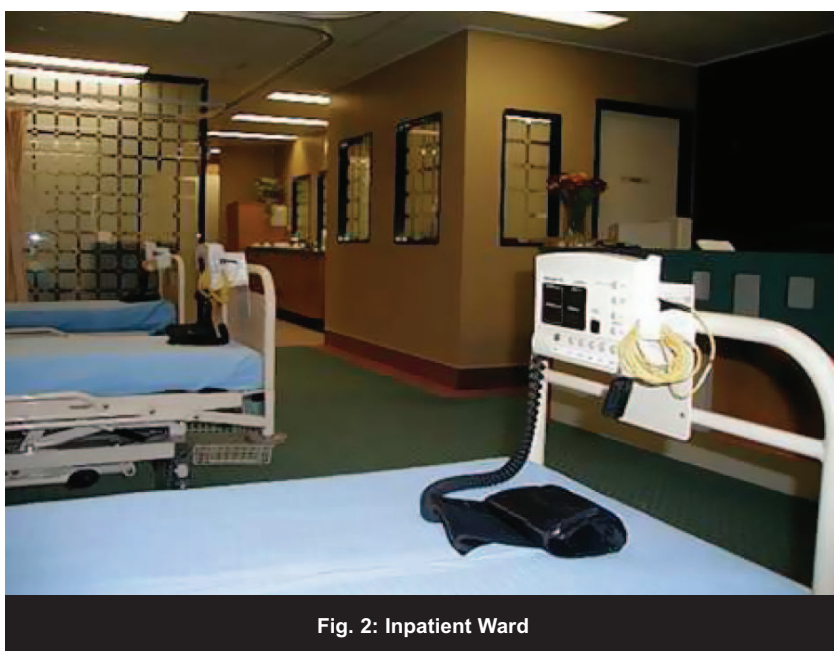


Fig. 2: Inpatient Ward

Hospital Architecture

resources devoted to community-based health care delivery. There should be increased patient education and awareness.

Digital Hospital

A digital hospital is a real-time and pervasive computing environment. It makes technology integral to the delivery of healthcare services. It has a support of a high-performance digital network, security infrastructure, teleconference and video conference systems as well as desktop and printing facilities. It takes healthcare organization from a world dominated by handwritten notes and tedious data entry to a real-time health information environment - where information is no longer a bottleneck in healthcare processes but a driving force in its success. It links together systems so that medical

staff has simple and fast access, with enhanced security features to all of the information needed. All rooms may have patient beds equipped with the Patient Portal to keep patients entertained and

informed. All aspects relevant with architectural design need to be considered in hospital planning by architects and other stakeholders to improve the quality of healthcare. +



Dr Shahaji Deshmukh

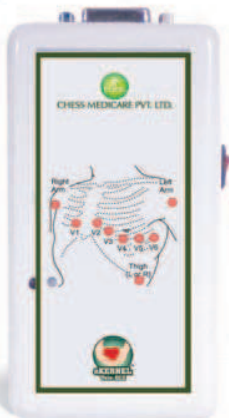
Dr Shahaji Deshmukh is a Professor of Surgery at Bharati Vidyapeeth University Medical College, Pune. He has many years of teaching & administrative experience of managing an 800 bedded teaching hospital. During these years, he has planned extensive upgrades & addition of new departments in the medical college hospital. He is also a teacher of Healthcare Management. He has a portal on hospital planning and can be contacted for further assistance and consultancy.



Ganesh Bhutkar

Ganesh Bhutkar is Academician and Usability Researcher. He is M E (Comp. Engg.) and MBA from University of Pune. He is currently pursuing PhD in Medical Usability at Industrial Design Centre (IDC), IIT Bombay. He is also an Assistant Professor at Vishwakarma Institute of Technology, Pune. He has about 15 years of academic experience and has published many research papers. He is a member of reviewer board with International Journal of Human-Computer Studies - Elsevier.

Low cost Indigenous Handheld 12 Lead TELE-ECG DEVICE



eKERNEL™ Tele-ECG

Applications & Features

- 12 Lead ECG
- Records ECG via Bluetooth & transmits through Mobile phone (having Bluetooth and J2ME support)
- Can also be used as Standalone 12 Lead ECG Machine with any PC/Laptop & LAN
- ECG's can be recorded in remote / rural locations & transmitted to Specialists Mobile for diagnosis / interpretation located in any part of the country
- At the Receiving Doctor / Specialist's mobile, no software required, ECG received as an MMS
- Acquisition, processing, storing & visualization of ECG in real time
- Transfer of ECG data using secure GPRS connection
- Works on rechargeable battery
- Handheld device, fits in to pocket

Also Available: Digital Radiography Systems,
Portable Bone Densitometry Systems & DEXA



For Statewise Distributorship Contact

CHES MEDICARE PVT. LTD.

3rd Floor, Gaurav Plaza, Above Saraswat Bank, RRT Road, Mulund (W),
Mumbai - 400080. Fax: +91 22 2562 2773, Cell: +91 93226 76992, +91 98203 87087,
E-mail: chessmedicare@gmail.com, vijhay@chessmedicare.com, www.chessmedicare.com

Distributors: Punjab - Medical Mart India Tel: 0931 6093325, W.Bengal- Technology for Medicine
(T for M) 09831594045, North East-Health Circle Pvt. Ltd. Guwahati Tel: 0361 222907 / 2235763