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IN FOCUS

PPP: SOLUTION TO INDIA'S HEALTHCARE WOES?

HOW BAPS YOGIJI MAHARAJ HOSPITAL INCREASED EFFICIENCY

DEBATE: DOCTORS VERSUS SUPPORT STAFF

MEDICALL 2013

A LOW-DOWN

CASE STUDY

MAKEOVER OF PARAS HMRI

DR BS AJAI KUMAR, CHAIRMAN, HEALTHCARE GLOBAL ENTERPRISE, ON MAKING CANCER CARE PROFITABLE

AGAINST ALL ODDS

HMRI's makeover story

Redeveloping Paras HMRI Hospital in Patna was a formidable challenge for which the team had to return to the drawing table

BY DR GOPAL SHARAN AND AR. MANU MALHOTRA

Establishing a hospital is a complicated process requiring much effort—right from choosing an appropriate site to designing a good hospital building. Putting up the hospital is a design charrette and is even more challenging if it involves redesigning an existing hospital. It is more than just putting new skin over an existing skeleton. In such projects, the design is often not easily reconfigurable.

We realised this when we decided to upgrade and redesign a brownfield project—The Hai Medicare and Research Institute (HMRI) in Patna. In 2011, HMRI entered into an operations and management agreement with our company, Paras Health Care Pvt Ltd, for redevelopment of the project into a 350-bed multi speciality hospital.

We are redesigning the hospital as per the 'Paras experience' and are investing over Rs120 crore in the project that will be commissioned by July 2013.

WINDS OF CHANGE

We encountered many obstacles while redesigning the project. The existing grid size of the building was irregular and the floor-to-floor height was just 2.85 metres. The building shell was severely rigid and clearly not designed keeping in mind future expansion, advancements or flexibility. Getting an uninterrupted department was a challenge and needed a lot of thinking.

Floor plates: The existing floor plate was small (only 18,000 square feet) and not consistent with the new medical programme. This meant adding new floor space. For this we had two choices: horizontal expansion or vertical expansion by putting up an independent tower. We went with the second option and the floor plate was increased to 30,000 square feet. This also allowed enormous energy savings by utilising natural daylight. No corridor in the new hospital is without natural daylight.

Floor height: The existing floor height of 2.85 metres (approximately 9'-3") resulted in restric-

An artistic impression of the upcoming Paras HMRI Hospital, to be commissioned in July 2013

tions on accommodating most functional areas. This meant that duct sizes had to be reduced and it further caused an increase in number of Air Handling Units (AHU). The AHUs were designed to operate flexibly. The areas served by single AHU were chosen carefully and engineered intelligently from an operational point of view. Depending on the usage of daytime operations, we planned the location and the size of the AHUs. Meaningful and tangible performance criteria were used to design the services.

The low height also meant that innovative structural solutions had to be worked out for constructing newer floor plates. In one such instance, we adopted post tensioning instead of convention structural systems to avoid beams and yet allow passage of services.

Design of hospital shape/ footprint: The shape of a hospital has a profound effect on its energy consumption. In urban areas, the size of plot usually restricts saving energy in terms of building orientation. Limitations are further placed when the task involves retrofitting. We took advantage of the natural light and shading to reduce energy consumption by using 'lean buildings' instead of opting for simpler 'fat building'. During daytime, the usage of artificial lighting has been reduced by over 80 per cent. The air conditioning load has been considerably reduced by using courtyards and recessed windows that provide shade. The cladding on external walls reduces heat gain caused by direct solar insolation.

Patient rooms: Artificially controlled environment has its advantages in recovery, but it also has a negative impact on the patient's psychological health. We designed all the rooms/wards to receive natural light and that allowed the patients to get exterior views while being confined to beds. The view was either of the courtyard or the city. For inpatients, who would be mobile, we created courtyards that allowed them to interact with others as we believe this would aid in healing.

Visitor areas: Since IPD and OPD visitors have different needs and traffic patterns, we wanted a clear segregation. We incorporated this need by restricting the OPD blocks to two floors with a dedicated entry. Despite this segregation, the clinical staff and the doctors have unrestricted access to other parts of the hospital. The plan developed is fully compliant with travel distance restrictions as per the fire norms. The elevators in these OPD areas are dedicated and other elevators have limited stoppages on OPD floor.

Blood banks: For blood banks, we created a

ABOUT PARAS HMRI

Type: Multi super speciality hospital
Nature of the project: Brownfield project, developed by Gurgaon-based Paras Hospitals
Built up area: 2,60,000 square feet
Commissioning date: July 2013
Cost of the redeveloped project: Rs150 crore (inclusive of equipment)
Bed strength: Phase one will have 265 beds, and phase two will add 85 beds
Plans: Installing latest medical equipment and providing necessary infrastructure, such as MRI, CT Scan and a modern pathological laboratory for up-gradation of the hospital. This facility will house a PET scan equipment and two linear accelerators, a first in the state of Bihar. Apart from cancer- related medical care, the hospital will also house equipment suitable to other specialities. Future plans include housing a medical college in the campus.

The old hospital building posed many design challenges for redevelopment

The aesthetically designed waiting area outside the ICU

The state-of-the-art ICU

The OPD block is designed keeping in mind patient comfort

The reception area of the hospital is planned to look inviting

separate access for donors. Since blood bank generates a voluminous hazardous liquid bio waste, its collection is separate from rest of the hospital. For integration with hospital, connectivity has been planned for direct approach (access) and dispensing.

Fire & smoke: After the recent incidences of smoke/fire related deaths and the risk involved for both patients and management, comprehensive planning to reduce such risk has been undertaken at the Paras HMRI. The ICUs have been placed on higher floors near the OTs from the operational point of view, but this poses a challenge if patients have to be evacuated from such higher floors. A refuge area has been designed and located, so that it allows access from lower terraces and would aid in evacuation. On the smoke control front, an extraction system has been designed and is further aided by a system of differential pressures in corridors and rooms.

Site movement, wayfinding and signages: One of the most important design elements of this hospital was establishing site movement and external signages. Since the site is located on a heavy traffic road, the possibility of a user taking a wrong entry cannot be ruled out. It meant putting up visible signage and tighter access control. The OPD and visitor entry was physically separated from the emergency department entry.

The entry for staff and doctors was separated and an area was demarcated for them to park their vehicles. A separate emergency entry was provided with sufficient parking for ambulances and emergency parking. The site movement also allowed for fire tender movement and adequate turning radius for all vehicles. The signage was also designed for proper functioning and visibility at night.

Oncology: Since oncology equipment needs unique structural requirements and space, the unit will be housed in the new block. The new basement was made to house two linear accelerators, Brachy-Therapy Bunker and other advanced equipment. The PET scan was housed with a Gamma Camera room. The oncology department was spread over three floors.

The treatment area and healing area were designed based on their needs. The chemotherapy area allowed the privacy needed and, at the same time, was provided with spaces that could be used by patients for interaction.

Structural designing: The most challenging aspect of the retrofitting project has been the structural designing, which involves visualising the unseen and unforeseen reinforcement and foundations. In the absence of complete set of structural drawings and the deviation (from the drawings) made during construction, added to the challenge. Further, the existing building was made in three different phases and therefore had expansion joints at odd locations. Joining of new and old concrete has its own set of challenges. Columns had to be jacketed and beams strengthened for newer loads. The water table being high (almost 14') complicated the entire scenario and effective solutions were adopted to ensure water proofing, especially in areas adjacent to existing building.

Constructability: When retrofit construction commences, unforeseen difficulties emerge. Planning that seemed perfect on paper doesn't seem so in reality. For instance, in some locations the existing foundation was inadequate for new loads. This meant adding pile foundations next to the existing piles. But the location was such that no tall equipment could reach without demolition of the entire slab panel. Such instances required new solutions to be worked out within confines of the budget.

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