

Sonia Cedrés de Bello – Architect

# Remodelling healthcare facilities with limitations

This article analyses the design, project management and construction of the renovation of the emergency department and surgery suite of an old healthcare facility of high complexity which holds a School of Medicine and has high demand because it is located in the center of the metropolitan area of Caracas. The design, with an area of 3,000 m<sup>2</sup>, has limitations including security, site and surrounding location. This paper describes the diversity of the space use, distribution, density, proportions and equipping. Separation of internal traffic, and functional areas according to pathologies and critical stages, also are described.

In 2006 the Venezuelan Government launched a healthcare initiative called *Barrio Adentro III* which manages the renovation of existing hospitals, including implementing new technologies and building additions to meet new requirements. Priority areas to be updated included surgery suites, emergency departments and intensive care units (adults, pediatrics, neonatal). Emergency rooms are being remodelled in-line with current protocols of medical attention and to cope with growing demand caused by the increase in criminality, car accidents and the

deterioration of quality of life.

Hospitals and health systems are now deep into their post-reform planning on how to meet community needs and the rising number of patients that need treatment.

The Hospital Vargas, the oldest hospital of the city, and second of the country was included in this programme. The Hospital Vargas is a national referral public hospital that offers comprehensive medical and surgical services to adults and children; it is the site of a medical school and research institution. The original hospital, built in 1891, had a capacity for 400 beds and a pavilion scheme, following the design of the Lariboisière Hospital build in Paris in 1854. The hospital was declared as a national historic monument in 1979.

The hospital has a group of buildings, which were built over a long period of time, raising to 600 beds in 1974. In later remodelling in 2006, the number of functional beds was reduced to 441.

One of the additions to the original hospital is a three-floored building, built in 1963 and which started functioning in 1965,

housing facilities for surgery, emergency, intensive care unit and central sterile supplies. This building has a rectangular shape, with an area of 3,000 m<sup>2</sup> divided in three floors of 1,000 m<sup>2</sup> each. The last remodelling started in 2007 and concluded in 2013. It now houses adult and children emergencies, observation units, a surgical suite, central sterile supply and rooms for residents and staff.

The Emergency Department, receives around 100,000 emergency visits a year (in recent years this demand dropped 60% due to the partial closing of the facility during remodelling) and around 6,000 surgeries a year before the remodelling<sup>1</sup> (surgeries also dropped 80% due to remodelling). It was one of the busiest emergency centres in the city. In 2002 160,000 patients attended.<sup>2</sup> Due mainly to the location in the center of the metropolitan area of Caracas, surrounded by areas of high depression, poverty and criminality.

## Emergency entrances

The building is located in front of a street with a depth inclination that make it possible to have direct entrances to two floors, allowing for the separation of the pediatric and adult emergency departments, as required by the national norms and regulations of Venezuela.<sup>3</sup> The main entrance and façade of the hospital is over the same street.

At the south border is a contemporary tall building which holds imaging and lab services, and on the east side is the internal access to the hospital through a corridor



The Hospital Vargas is the oldest hospital of the city of Caracas.

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The paediatric emergency entrance.

which connects the ICU with the surgery suite.

Since the beginning, this hospital has also been the home of one of the main schools of medicine for the country, with academic and research activities, so there was also a need to reinforce the areas for residents, seminars, teleconferences and digital connections with the surgical suite.

In this project there were also strong limitations:

- The site, with no possibility of growth, had to accommodate existing demand in limited spaces.
- Two facades of the building are located under ground, limiting the possibilities of natural light and views in many areas.
- The entrance façade is located by the street sidewalk, limiting possibilities for patient drop off.
- Security control at the entrance.
- The hospital is located by the slope of a mountain, which has many creeks coming from it. One such creek, behind the building was producing high humidity on the interior walls.

**Overcoming limitations**

**Reinforcement of the structure:** The side was structurally reinforced. A soil study showed the absence of underground water. However, it did show high levels of humidity. Separation between the building wall and the side screen was only 1.5 m. A micropile system was used, mainly to avoid the high degree of humidity existing in the area of operating rooms, which are located almost at the same level as the bottom of the Creek adjacent on one side of

'Regulations require separate emergency areas for children and adults, but they do share the use of imaging equipment.'

the building. Being so old and narrow the creek could not be excavated by hand so deep as to build a concrete screen. The micropile system built by nailing 300-400 micropiles – one next to each other – with great care to build a screen.

**Security control at the entrance:** Doors, which separate the emergency entrance from the rest of the department, control the emergency entrance that leads to the trauma room. A police station is located beside the door and in the ambulance area there are

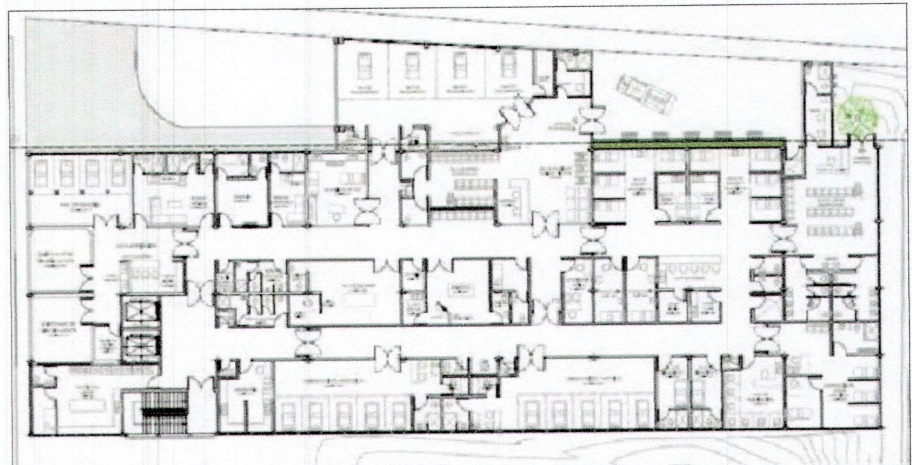
also security guards.

**Limited possibilities of natural light:** Because of the fact that this was a remodelling of an existing building with no possibility to expand its structure – because it is surrounded by existing buildings, the city street and the end of the site – the functional spaces needed to be adapted to the existing area, resulting in spaces without windows and with minimum area.

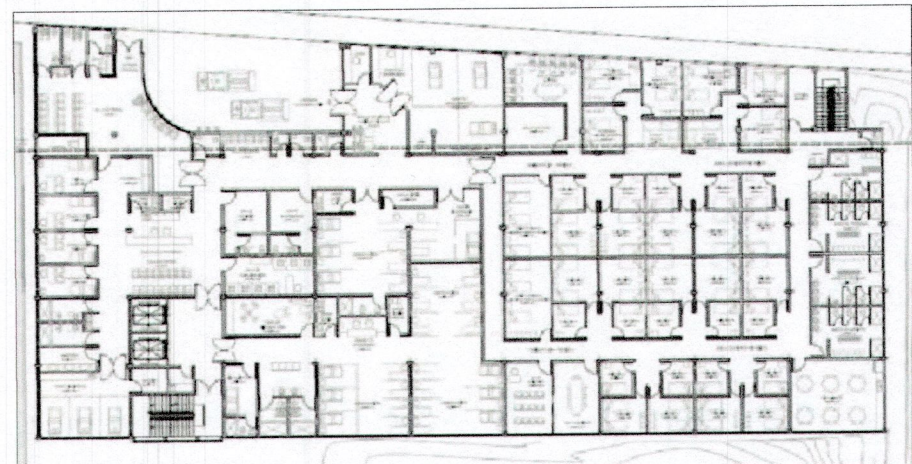
**Adult Emergency:** Occupies the third floor, and has direct access from the upper side of the street. There are two entrances – one for ambulances and the other for walking patients. The trauma room has capacity for four beds and has a separate waiting area.

The treatment area has eight separate cubicles for general use and two cubicles for special treatment. Another area, for special victims, includes three beds, a consultation room and bath, and two individual isolated rooms with private bath.

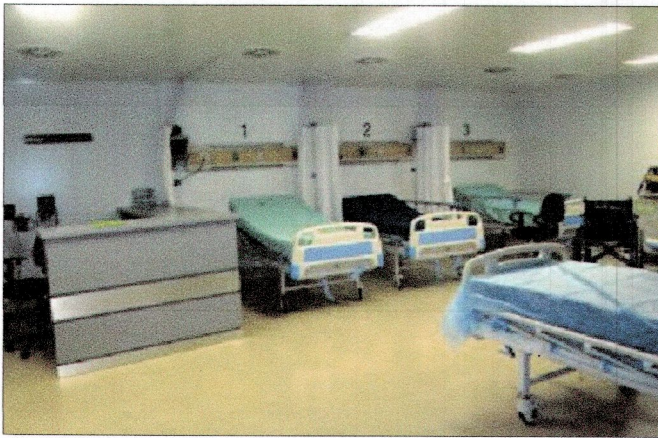
A respiratory therapy room has capacity for seven reclining chairs, and an observation unit with two large rooms separated by sex, each having space for five beds. An area for traumatology includes cast room, X-ray and tomography. Each of these areas has a decentralised nurse station. There are two consultation rooms, an office for the director,



The adult emergency area occupies the third-floor, with direct access from the upper side of the street. There are two entrances, one for ambulances and other for walking patients.



Paediatric emergency and doctors residences.



The newly remodeled preparation room in the surgery suite.



The new surgical suite.

emergency laboratory, blood bank, pharmacy, two surgery rooms with recovery area with four beds, and three rooms for staff on call. This department is connected, via elevators, with the ICU and the surgery suite, which is located in the first floor.

The layout features two main corridors with doors that separate the different sections, trying to control the traffic of people through the department, specially the relatives of patients that are allowed into the observation unit.

**Children emergency:** This area is located in the second floor. Regulations require separate emergency areas for children and adults, but they do share the use of imaging equipment. This department also has two different access points – one for ambulances with direct access to the trauma room which has a capacity for three beds and another for walking patients.

The trauma area is internally close with two rooms for intermediary care – one with two beds for critical patients and other with six beds, with a nurse station integrated. The walk-in entrance has a waiting area and a treatment unit. This treatment unit has a central nurse station and a sub-waiting space. Around this area, there is a station for weight and size, four consultation rooms, and a bath for babies, a procedures room with three beds, a respiratory therapy room with seven recliner chairs, and an isolation room. Further, in a separate area with natural light, there is an observation unit with capacity for 20 beds and cribs with a psychomotor room, baths and nurse station. In all these areas, parents are allowed, and indeed encouraged, to be with their children.

**Doctors residencies and staff rooms:** On this floor there is also an area designated for staff and residents. This has 12 beds for staff and 48 beds for residents that overnight in

the hospital, with study and meeting rooms for seminars and a dining room with kitchenette as well. The bathrooms are located at the end of the area because the surgical suite is located under and, norms and regulations (MSAS, 1996) state that there should be no water installations above these critical areas. At the far end of this section, a staircase connects the doctors residence with the old hospital to avoid them having to pass through the emergency areas.

**Surgical suite:** The first floor of the building holds the surgical suite, which connects directly with the ICU and inpatient rooms located in the old building through a corridor. There are eight operating rooms (OR) with a central corridor and a peripheral one to circulate the soil material that connects directly with the central sterile supply. At the suite entrance patients are transferred, from exterior to interior strollers, into the preparation room with nine beds. There is a recovery room with 16 beds. Ancillary spaces – a kitchenette, rooms for on call doctors, sanitary areas, meeting rooms, offices, and consultation area – are located outside of the restricted area close to the floor access.

The remodelling of this building took six years to complete. It began in 2007 and concluded in 2013. The first year the building was completely demolished, leaving only the structure. The structure was evaluated by seismic norms and was consequently reinforced. The problem surrounding humidity and the necessary construction of the external wall with a micropile system squeezed the budget. Construction ceased for almost a year, between 2009 and 2010, due to a lack of financial support. In mid 2010 remodelling was initiated, but with a change of contractors and in the project. The first project had included building a fourth

floor to house the educational and resident's facilities, but this idea was rejected in the new phase. Construction restarted in 2011 and some of the original work done had to be demolished to apply the changes made to the new project. The facility was finally finished and operations began 2013.

### Conclusion

The remodelling works had the effect of significantly reducing the number of operating beds in the facility. As of 2008, surgery was reduced to a minimum and shortly afterwards no surgery took place in the hospital until 2013. Surgical interventions during this period were carried out at the military hospital instead. An agreement allowed patients to be transferred to the center, operated by surgeons of the Vargas and then returned for recovery in the hospital.

The project demonstrates the serious impact and implications on the performance of the hospital, when such a massive intervention is undertaken without proper planning. The extension of the works – which lasted over five years – also had a devastating impact on the morale of staff and irreparable damage of the teams in all disciplines, with serious consequence on the quality of the services.

### References

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