

## Customer Challenges

- Required effective master plan
- Uncertain equipment requirements
- Potential bottlenecks needing identification
- Patient wait times needing improvement

## PROJECT SUMMARY

A hospital administration was planning the construction of a new hospital. The building architects determined the structure of the hospital to encompass four departments - Emergency, Inpatient, Imaging and Surgery. To facilitate the most optimal utilization of these spaces, PMC was able to offer a simulation model so as to validate the capacity envisioned by the architects' plans.

The simulation used historical data to analyze arrival patterns and to evaluate the service time at every department, as well as provide a model of every area in all four departments. The model encompassed interdepartmental movements of patients: outpatients entering the hospital, registration, triage, inpatient movements, the appropriate operating / treatment room and also the pre operation / preparation process and the post operation / recovery process. Along with patient movements and key performance metrics such as utilization of different areas, patient lead time in every department was improved.

## SYSTEM DESCRIPTION

Emergency patients would arrive into the system each weekday and then be classified as either emergency or non-emergency. All patients were routed to triage and patients requiring specialized treatment such as isolation or decontamination were sent to specialty treatment rooms; if these rooms were unavailable, any normal treatment room would be converted into a specialty room. Patients requiring normal treatment would be sent directly to the unaltered treatment rooms, where they would be attended by a nurse and MD assessment.

Incoming patient treatment rooms could serve patients requiring any of 29 different types of specialty treatment such as PCU, ICU, neurological care, labor care, and pediatrics. Patients could also be moved from one type of treatment room to another should the situation require.

Imaging was offered for arrivals of outpatients, inpatients and those from emergency. Of the 13 different imaging services available each of them operated in a specific schedule in a day. Imaging services would seal access to an inactive imager, and imaging patients would complete a preparation and recovery process before and after the procedure.

Surgery patients flowed through the pre-op unit, the operating room, and the post-op unit. RIO and PCU were the two units serving pre-op and post-op patients and patients would go through either of these units or both. The number of operating rooms available at different hours of the day was different on every weekday.

# Case Study: Hospital Capacity Analysis Validates Master Plan

## OPPORTUNITY

The goal was to determine the right number of beds required in Imaging, Surgery and Inpatient areas. Validating the existing capacity of surgery and estimating the number of working hours required was necessary to cater to the needs of the forecasted number of patients. As well, testing different floor plan adjacency options (in cases where preparation and recovery would happen at the same location) would enable the master plan for the hospital.

Equipping for higher levels than necessary would increase capital outlay, lower resource utilization, and increase the medical centre's operating costs.

## APPROACH

The overall objective was to determine the minimum number of inpatient, surgery and imaging treatment rooms to be equipped while reducing patient waiting time in all departments. This was determined satisfy projected patient demand for a year at the hospital.

## SOLUTION

Outcome measures reported by the model that would aid in the decision-making process included: daily patient throughput, patient lead time, value added time spent by the patient in the system, and utilization of every treatment area and waiting room.

The recommendations of the study included:

- Reallocate the number of inpatient treatment rooms to different types (ICU, PCU, pediatrics etc.) considering high volume types
- Reduce the number of operating room capacity in surgery up to 60% considering low utilization as a result of high number of patients whose surgery is cancelled after pre-op.
- Reduce capacity at the admission, waiting room and trauma room can to 1 each in the Emergency department considering the volume of patients.

## BENEFIT

Based on these recommendations and implemented changes, the facility was well equipped to conduct the forecasted 102,000 patient interactions per year.

