Predictive Simulation Analysis Improves Surgical Division Room Utilization, Avoids Potential Expansion, While Maintaining Satisfactory Patient Wait Time

Emory Healthcare – Surgical Division

Success Story

Healthcare

MedModel

CHALLENGES

The Head of Emory Clinic Facility Operations received a request from one of Emory's surgical divisions' administrators for construction of additional exam rooms at the request of their physicians. In order to accommodate their patient volume, the physicians felt that they needed more than the current 3 or 4 rooms per physician. Before investing capital to expand the division, Facilities leadership requested an objective data driven analysis be performed.

Current policy states that while a patient is in radiology, the treatment room is held for the patient, even though there is not a live patient in the room, causing reduced room utilization. Lower utilization of rooms means more patients in the lobby, increasing wait times. The primary objective therefore was to analyze how many rooms each physician needed to best utilize available rooms while maintaining or reducing current patient wait times. Clinic Leadership needed to account for the business side of healthcare yet not compromise the patient experience.

OBJECTIVES

- Identify and analyze system bottlenecks and performance metrics
- Understand room utilization statistics and Radiology wait times and queues
- Recommend room allocation and/or scheduling changes to improve room utilization in order to avoid facility expansion while maintaining a positive patient experience

Patient Wait time in Lobby – 3rd Floor – All Providers

RESULTS

Considering different room allocation numbers for physicians, it was found that assigning 2 rooms per physician resulted in a 120 % increase in wait times while assigning 3 rooms per physician resulted in just a 28% increase in wait time from the current 4 rooms per physician setup.
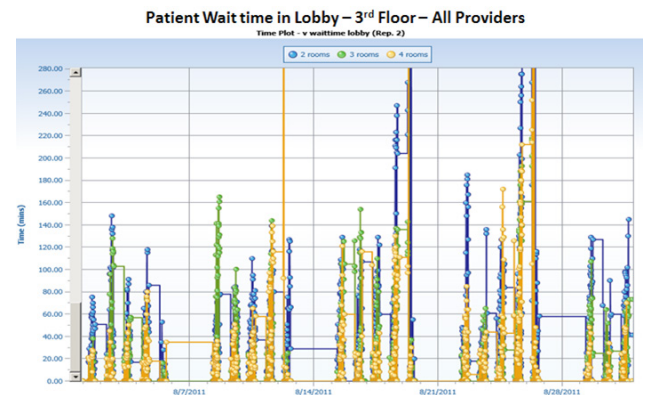
With the addition of more detail and further analysis to the model, Clinic Operations support determined room allocations needed to be adjusted by physician by hour of the day. The optimum room allocation recommendations were:

- Dr. A – 4 rooms justified for majority of clinic days
- Dr. B – 3 rooms for each session (AM or PM)
- Dr. C – Schedule for entire day and share Pod with Dr. D (Wednesdays only)
- Dr. D – 3 Rooms sufficient on Mondays and Thursdays

This enabled the surgical division to increase patient volume enough in order to demonstrate to the physicians that additional rooms were not required, while still maintaining acceptable patient satisfaction standards. Additionally, they gained insight into the impact on patient experience from having both doctors and residents interact with patients. As an academic, or teaching hospital, this was extremely important.

SOLUTION

The Emory Clinic Operations Support Department conducted a simulation analysis of patient flow by building a process simulation model in MedModel, validating and verifying it against historical data and identifying opportunities to improve various elements of existing processes like resource utilization and patient wait times.

A four-Physician Sub Model was used to obtain a detailed visualization of process flow, room holding patterns and patient waiting count.
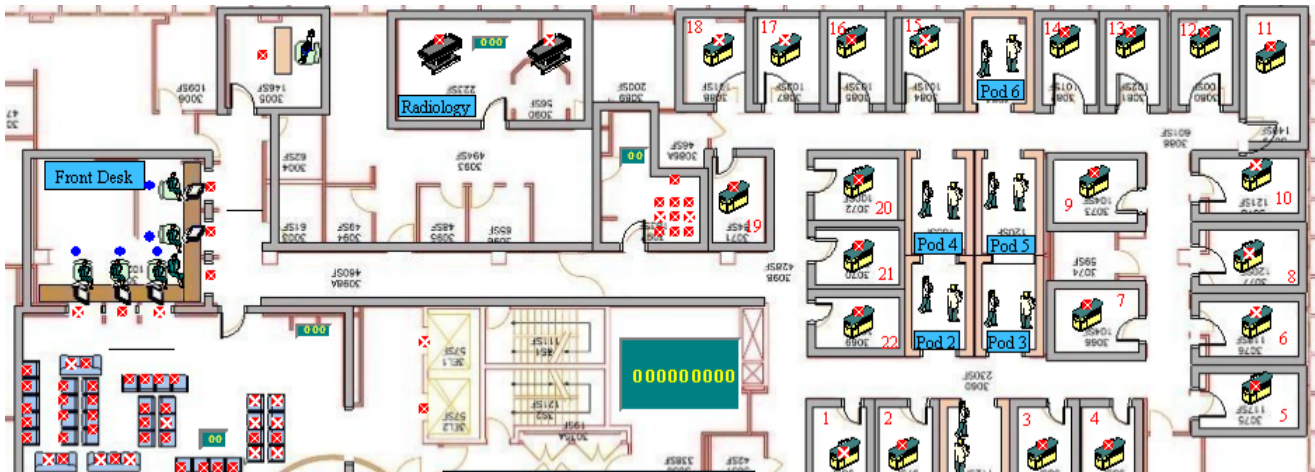
A diagram of the 3rd floor of the surgical division modeled in MedModel.

An Excel spreadsheet was also used to display the hour-by-hour room utilization numbers by physician. The scheduled number of rooms was compared to actual patient arrival and room utilization numbers to provide a clear understanding of frequency and resource demand on an hourly basis. This spreadsheet also displayed the number of rooms required at each hour of the day to achieve the corresponding utilization percentage and patient wait times.

This data allowed them to design an optimal room allocation schedule including a counter-intuitive strategy of designating some exam rooms as floating rooms to be shared by two to three different physicians during peak hours of the day.

Date	Hour of Day	No. of allocated Slots	No. of booked slots	No. of Available Slots (unfilled)	No of arrived patients	Average room Utilization per pod (rooms 16,17,18,19)	Number of Rooms required for utilization
8/2/2011	6:00 AM	0	0	0	0	0	0
	7:00 AM	0	0	0	3	10%	1
	8:00 AM	4	4	0	4	44%	2
	9:00 AM	4	4	0	2	70%	3
	10:00 AM	4	1	-3	1	64%	3
	11:00 AM	1	1	0	1	76%	4
	12:00 PM	3	1	-2	2	57%	3
	1:00 PM	3	3	0	2	54%	3
	2:00 PM	3	2	-1	2	54%	3
	3:00 PM	0	0	0		34%	2
	4:00 PM	0	0	0		7%	1
	5:00 PM	0	0	0		3%	1
8/4/2011	6:00 AM	0	0	0		0	0
	7:00 AM	0	0	0		0	0
	8:00 AM	3	2	-1	5	21%	1
	9:00 AM	4	4	0	3	59%	3
	10:00 AM	4	4	0	3	84%	4
	11:00 AM	4	4	0	3	95%	4
	12:00 PM	1	1	0	1	93%	4
	1:00 PM	4	4	0	3	93%	4
	2:00 PM	2	2	0	1	91%	4
	3:00 PM	0	0	0		70%	3
	4:00 PM	0	0	0		25%	1
	5:00 PM	0	0	0		1%	1