HOW MANY OUTPATIENT SURGERY BEDS DO WE NEED?

HSHS SOUTHERN ILLINOIS

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Introduction

Objectives

- Determine the optimal capacity of the Outpatient Surgery Center (OSC) for a rural hospital based on the future demand.
- Analyze workflow processes for improved room turnover to increase throughput.
- Utilize Discrete Event Simulation (DES) to model the physical layout and flow of patients and colleagues.
- To provide scenarios for decision making to reach a cost-effective viable decision

Background

St. Joseph's Hospital in Breese, IL is a rural hospital and affiliate of Hospital Sisters Health System. St. Joseph's contains 46 staffed beds and receives over 1,400 admissions per year and is continuously recognized for the exceptional care of its patients. The facility is undergoing renovation in the Outpatient Surgery Center where the future OSC will be an addition to the current hospital.

Current State

- 13 rooms total
  - 4 for Treatment/ICU
  - 4 single rooms
  - 5 shared rooms

$\left.\begin{array}{l}\text{4 single rooms}\\ \text{5 shared rooms}\end{array}\right\}$ 14 beds

Proposed Plan

- 22 rooms total
  - 4 for Treatment
  - 18 single rooms for Outpatient Surgery and Treatment overflow

From July to December 2014, the average patient volume was 11 per day for surgery cases and 10 per day for treatments. However, Thursdays and Fridays could be scheduled with 19 surgeries.

Business Case

- Increasing the number of patient rooms will be able to accommodate future growth.
- Placing Treatment in the same area as the OSC will allow for less travel by nurses, have nurses readily available if help is needed, and will allow for versatility with room function.
- Creating single rooms is a patient satisfier and will increase patient satisfaction scores.
- Streamlining flow and minimizing waste to create an optimal workflow.

Methods

- Observations and time studies were performed in outpatient surgery holding rooms, treatment rooms, and operating rooms. The data gathered was used to determine locations of rooms, resources, and optimal workflows.
- A 3-D simulation software was used to import a floor plan and build a model to test with two different workflows: (1) with room reservation (patient brought back to the same room) and (2) with no room reservation (patient brought back to any room). Currently, the room reservation method is being used, but to increase throughput without significantly increasing rooms, an improved process must be utilized.

Methods (continued)

- Patient tracks were modeled within the simulation from the collected data which generated a real-world view of patient flow through the system.

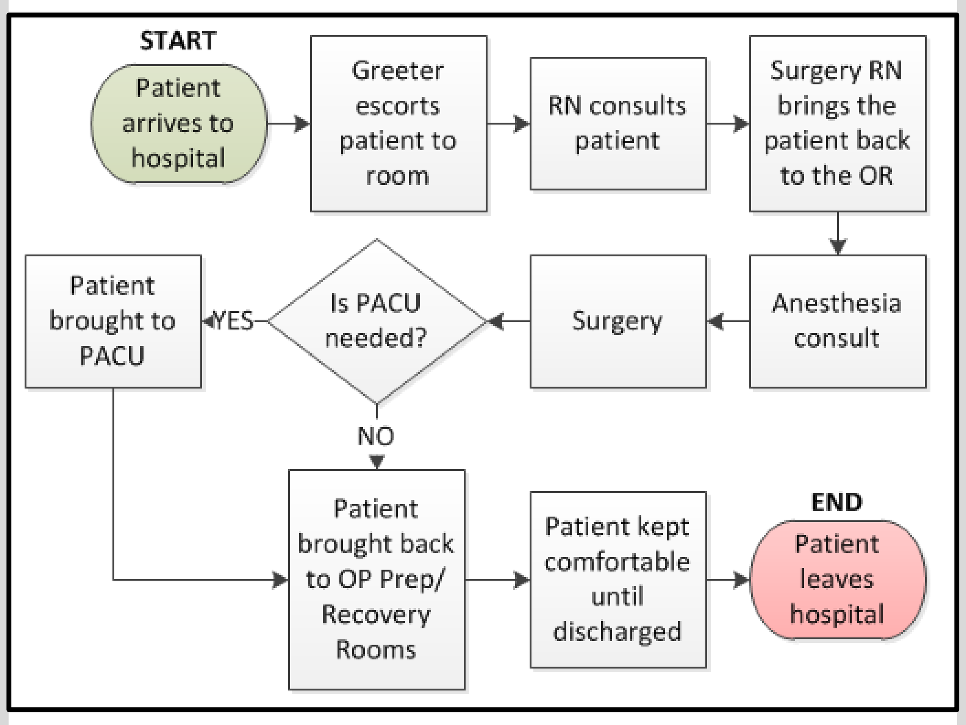

Figure 1. High level surgery process map.

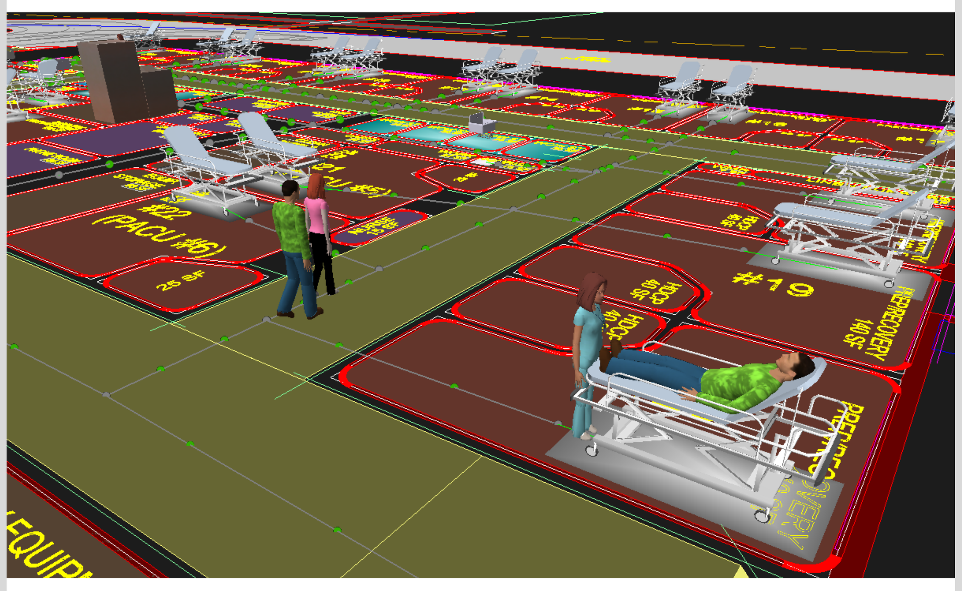

Figure 2. Example of 3-D simulation. Currently a patient is being escorted to a room while a nurse is consulting a patient.

Factors Impacting the Model

- There are several factors that will constrain the model. Experimental trials altering the factors will allow for an analysis on room utilization. The factors being analyzed are:
  1. Room reservation
  2. Number of beds
  3. Number of surgery patients
  4. Number of treatment patients

Assumptions of the Model

1. Staffing is not considered
2. All OR rooms have identical properties
3. Only use 5 of the 6 ORs
4. Treatment rooms could be used for surgery patients and vice versa
5. Random schedule was generated based on current appointment trends

Running the Model

- The model was run over the workday from 5 am to 5 pm, although the process in reality finishes when the last patient is recovered. The outputs were calculated based off of 8 replications.

Results

- The original model proposed 18 rooms designated for Surgery (Rooms 5-22) and 4 separate rooms (Rooms 1-4) in a common area for Treatment. Rooms would be filled based on a logical sequence for nurses.

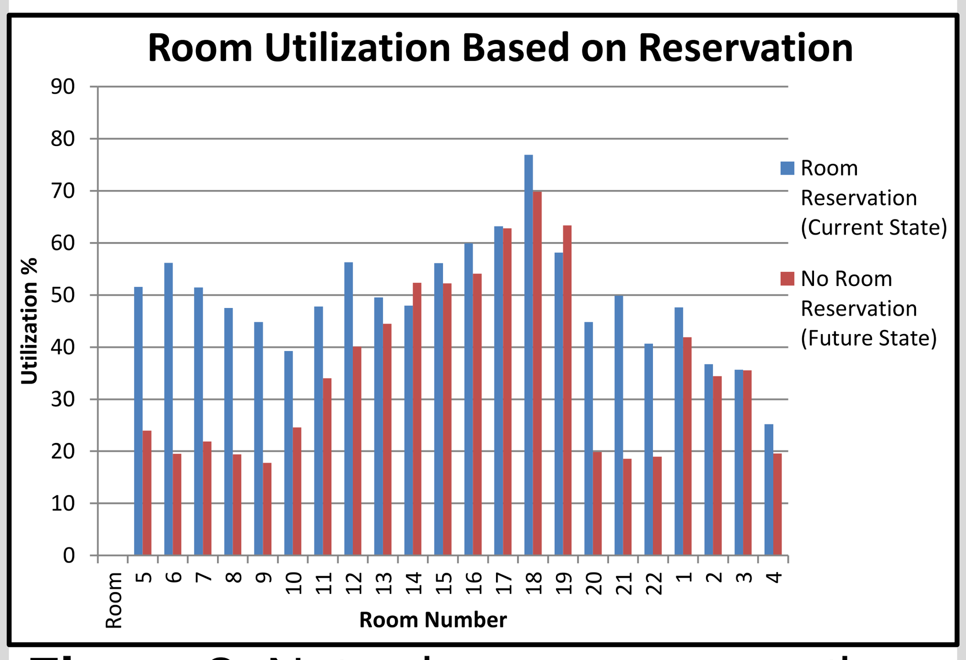

Figure 3. Not using room reservation is a more efficient process as it decreases idle time.

Results (continued)

- An additional model was created that treated all 22 rooms the same regardless of whether the patient was there for surgery or a treatment. This eliminated designated rooms and allowed for interchangeability.

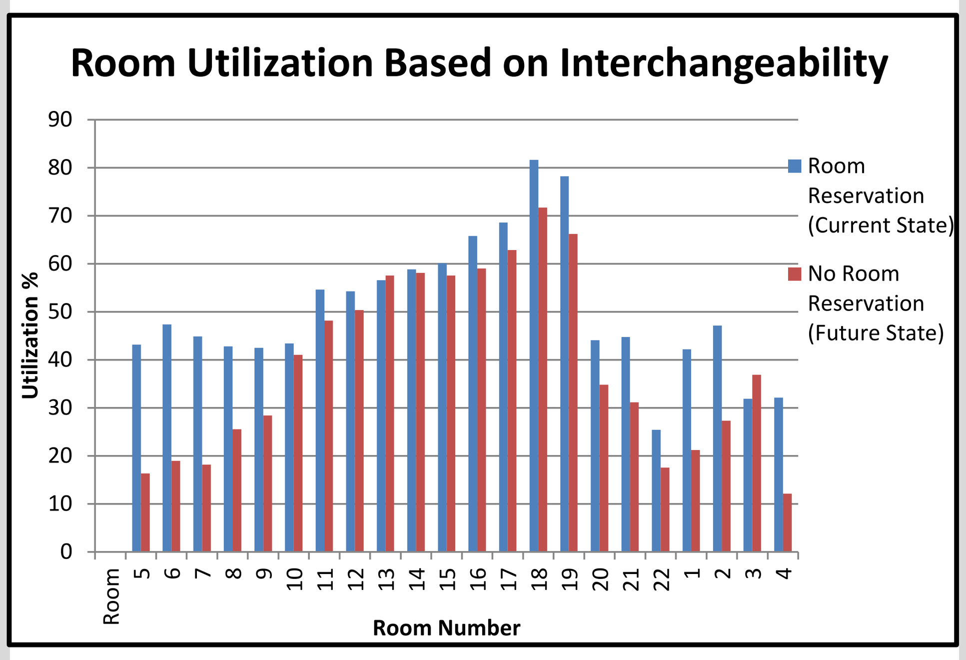

Figure 4. While interchangeable rooms didn't impact the utilization significantly, it would be beneficial to integrate treatment and surgical patients to add variety to RN responsibilities and minimize walking.

Sensitivity Analysis

- Using a large volume day of 20 surgeries and 13 treatments, a sensitivity analysis was conducted running the model with no room reservation and interchangeable rooms.

Table 1. Sensitivity analysis for impact on number of rooms. Changing the number of rooms did not significantly change the independent variable of LOS or decrease throughput.

Number of Rooms	Utilization (%)	LOS (mins)- Surgery	LOS (mins)- Treatment	Output - Surgery	Output - Treatment
22	38.7	330	90	16.9	11.3
21	39.7	330	88	17.0	11.4
20	40.7	329	88	17.1	11.3
19	42.2	331	92	17.0	11.1
18	44.0	330	89	16.8	10.7
17	46.0	335	84	17.1	11.1
16	48.7	331	86	16.6	10.5
15	52.8	341	92	16.1	10.4

Replication Analysis

- Utilizing 22 rooms, the 8 replications were analyzed to assess how many rooms were being left idle during the day.

Table 2. On average, almost 4 rooms were not being used with a maximum of 6 rooms.

Replication	Utilization (%)	Unused # of Rooms
1	49.1	4
2	45.5	2
3	50.2	5
4	45.6	3
5	49.0	6
6	47.3	4
7	42.2	3
8	37.7	3

- By running the simulations with an improved room turnover process and an increased patient volume, it was concluded that the optimal number of outpatient surgery beds was 17 instead of the 22 beds that were recommended by the marketing and planning department.

Conclusions

The optimal bed capacity allows for potential future growth and would maximize room utilization by limiting the number of idle rooms (idle rooms waste healthcare resources) while providing the best patient experience.

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