X. BENEDICT COMMUNITY MEDICAL CENTER

Michael R. Summers, Business Administration Division, Pepperdine University, Malibu, CA 90263, 310-506-4536, msummers@pepperdine.edu

ABSTRACT

This is a teaching case study designed for upper-level undergraduate students in a basic operations management course. Prerequisites would include statistics and computer science. The purpose of the case study is to give students an opportunity to design a general layout for a service operation. Service operations generally utilize a process layout, where departments are set up to perform a particular function, similar to a job shop manufacturing system. The case study presents an interesting problem in a real setting, and students will be forced to consider the practical problems presented by a hospital as well as the quantitative analysis.

BACKGROUND

In 1958 Xavier Benedict, wealthy bomb shelter tycoon and philanthropist, endowed a new hospital, the X. Benedict Medical Center, in his Midwestern home town of 50,000 people. The hospital consisted of a 3-story building with 70,000 square feet on each floor and a 25,000-square-foot basement (located under the westernmost 100 feet of the building). It was located on a spacious lot with plenty of room for parking and expansion. In 1973 the hospital merged with the Community General Hospital, located about two miles away. At this time the old Community General building was converted to an ob-gyn and pediatrics center, while the original building housed all other functions. This allowed some much-needed expansion of all the departments in the hospital. The final expansion to date was made in 1998, when 5,000 square feet were added on the ground level to the emergency room.

With the town's population currently approaching 120,000, the hospital's directors have decided that now is the time for another expansion at the original site. Fund-raising has progressed to the point that the project has been given the go-ahead and serious planning has begun. Because of the site's configuration, the consensus is that the new wing should be on one floor directly adjacent to and connected with the west side of the existing building. There is already one door on that side of the building which can be used to connect to the new wing, and it shouldn't be too difficult to make other connections if needed. The plan is for the new wing to be approximately 25,000 square feet, although there is considerable flexibility in its total size and shape because of the space available. On the other hand, with construction costs running at about $400 per square foot (not to mention the cost of new equipment), the hospital's directors naturally feel the pressure to control costs.

The new wing will house the Cardiac Care Unit (CCU), the Intensive Care Unit (ICU), the Definitive Observation Unit (DOU), the Outpatient Lab, Outpatient Surgery, Radiology, and Surgery. There will also be a staff lounge and restrooms. The first floor of the old building will then have more space for administrative offices, doctors' offices, the pharmacy, the gift shop, and the Emergency Room. Upper floors will continue to house patient rooms and such departments as Oncology and Cardiology. There will be a little space freed up on these floors as some doctors' offices relocate to the first floor. The basement will continue to house the hospital cafeteria, records, utilities, and storage areas.

At this time the hospital directors have been collecting information regarding the needs of the various

departments to be placed in the new wing in order to get a better idea of the total area requirement and subsequent costs. They would like to be able to provide their architects with their ideal general layout for the new wing so that the architects can then flesh out the details.

Department Descriptions and Requirements

CCU: an intensive care unit for cardiac patients; consists of a nurses' station, 8 small patient rooms, an office area, a supply room, a nutrition room, a medications room, and a dirty utility room. Minimum desired area – 2500 sq. ft.

ICU: intensive care for noncardiac patients; similar to CCU but with 10 patient rooms and also a conference room and a waiting room. Minimum desired area – 3000 sq. ft.

DOU: a transition unit for patients going from CCU or ICU to regular patient rooms; consists of a nurses' station, 8 small patient rooms, and a supply room. Minimum desired area – 2000 sq. ft.

Surgery: contains a nurses' station, locker room, surgery suites, recovery areas, supply room, medications room, and dirty utility room. Minimum desired area – 5000 sq. ft.

Outpatient Suite: contains a check-in desk and waiting area of at least 1500 sq. ft. serving the Outpatient Lab, Outpatient Surgery, and Radiology.

Outpatient Lab: includes a blood-drawing room for outpatients and several labs serving both outpatients and resident patients. Minimum desired area – 2000 sq. ft.

Outpatient Surgery: similar to the Surgery unit but much smaller. Minimum desired area – 2000 sq. ft.

Radiology: serves both outpatients and resident patients; contains a variety of equipment, changing rooms, waiting area, administrative area, and records room. Minimum desired area – 2500 sq. ft.

Staff Lounge: contains an entertainment area, small library, kitchen, and small snacking area. Minimum desired area – 1000 sq. ft.

Restrooms: configuration is very flexible, but the minimum desired area is 1500 sq. ft.

Other Considerations

The hospital directors naturally would like to lay out the new wing in such a way as to minimize traffic congestion. Data have been collected showing the average number of trips made by outpatients and visitors and by doctors and staff between different departments during an average daytime hour. These numbers have all been rounded to the nearest whole number. Traffic during the evening and night is substantially lower overall, although there are probably some traffic patterns during these times that change more than others. Even during the daytime there is quite a bit of variability from hour to hour; for example, hospital workers need to go to the main building to the cafeteria mainly during the midday. Also, it is not clear whether different types of traffic should have different priorities. Is it more

important to minimize doctor and staff traffic or outpatient and visitor traffic?

Hallways in a hospital need to be wide enough to accommodate the moving of hospital beds and other large equipment while still providing room for others to pass. Also, for security purposes there needs to be a small check-in desk in the hallway at each entrance from the outside where outpatients and visitors are given badges appropriate to their business at the hospital.

POINTS FOR ANALYSIS

1. Consider whether the traffic from outpatients and visitors should be weighted differently than the traffic from doctors and staff. Based on this decision calculate the total traffic flows between departments.

2. Using a schematic diagram, find the arrangement of departments that will minimize the traffic flows.

3. Considering the area requirements and special requirements of all departments, construct an actual layout that matches your optimal schematic diagram. Draw a detailed and accurate layout of the new wing, including hallways, doorways, etc., and indicating all relevant dimensions.

4. (optional) How would your optimal layout change if you were to change the weighting of the two types of traffic?

5. Do you have any other suggestions for the hospital in improving their traffic flow? What are the cost implications of your recommended layout?

(Please contact the author for the data and teaching notes for the case study.)