MEMORANDUM

Date: March 22, 2006

Subject: Good Samaritan Hospital Layout

To: Professor Matt Ford

From: Jason Streety

Introduction

As requested, possible layout of Good Samaritan Hospital has been investigated. Three proposed layouts have been compared in an effort to minimize the total distance traveled by patients.

Findings

Cost, Volume, Distance results. Total daily distance traveled by patients was lowest in Layout C. The difference between the daily total distances of Layout C and other alternatives was due to a significantly low total distance traveled from Cardiology to other departments.

Recommended layout. Of the three alternatives, Layout C is recommended. Improvements upon this layout should be investigated in order to minimize the total distance traveled by patients.

Discussion

Method. Distances between six locations in the hospital (A, B, C, D, E, and F) were measured and the number of patient trips between six departments was estimated. Each department title can be found in Table 1. For each location, total distance to other locations was computed. For each department, daily total trips taken to and from were calculated. Three layouts, as seen in Figure 1, were proposed using this data. In Layout A, departments were arranged based on total daily trips taken by patients from each department. Departments with higher total trips from were placed in locations with lower total distance to other locations. In Layout B, departments were arranged based on total trips taken by patients to each department. Departments with higher total trips to were placed in locations with lower total distance to others. In Layout C, departments were arranged based on a combination of total trips taken by patients to each department and total trips taken from each department. Departments with higher total trips taken to and from were placed in locations with lower total distance to other locations. Using the cost, volume, distance approach and the data in Tables 2 and 3, daily total distance traveled by patients was computed for each layout. A sample calculation for Layout C is provided below.
**Total Distance of Layout C**

From Department 1 to Others = \((0*160) + (40*80) + (110*40) + (80*40) + (50*120)\)  
= 16,800  
From Department 2 to Others = \((0*160) + (0*80) + (50*120) + (40*100) + (120*40)\)  
= 14,800  
From Department 3 to Others = \((0*80) + (0*80) + (10*40) + (250*20) + (10*40)\)  
= 5,800  
From Department 4 to Others = \((0*40) + (0*120) + (0*40) + (40*20) + (90*80)\)  
= 8,000  
From Department 5 to Others = \((0*40) + (0*100) + (0*20) + (0*20) + (20*60)\)  
= 1,200  
From Department 6 to Others = \((0*120) + (0*40) + (0*40) + (0*80) + (0*60)\)  
= 0  
Total Distance = 16800 + 14800 + 5800 + 8000 + 1200 + 0 = 46,600 feet

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**Figure 1: Proposed Layouts**

**Layout A**
- Recovery (6)
- Reception Area
- Radiology (5)
- Pathology (2)
- Cardiology (3)
- OR (4)
- ER (1)

**Layout B**
- ER (1)
- Reception Area
- Pathology (2)
- Cardiology (3)
- C
- D
- E
- OR (4)

**Layout C**
- Pathology (2)
- Reception Area
- ER (1)
- F
- Recovery (6)
- C
- D
- E
- OR (4)
Cost, Volume, Distance Results. Total distance data comparing layouts A, B, and C can be found in Table 3. Daily total distance for Layout C, 46,600 feet, was lowest of the three alternatives. This total was about 30% lower than Layout A, and about 24% lower than Layout B. However, of the six departments, only total distance traveled by patients from department 3 was lowest in Layout C. Total distance traveled from department 3 to other departments was substantially lower in layout C, and this low distance is responsible for the large difference between the layouts.

Recommended Layout. The most favorable alternative is Layout C. Since total distance traveled by patients per day was lowest for Layout C, it is recommended. However, improvements in this layout should be investigated to reduce daily total distance traveled by patients. One such improvement could include further separation of Pathology and Cardiology. The distance between the two departments is 80 feet, but no trips are taken between them. Placing Pathology and Cardiology further from each other
could reduce total distance traveled from the two departments. However, such a change could have negative consequences if the total distance traveled from other departments were to increase as a result.

**Assumptions and Limitations.** Because distance between the reception area and each possible location was constant, distance and volume data for the reception area were ignored. It is also assumed that the cost of movement between all departments is the same. If this were not true, and the cost of movement between departments was different for each department, Layout C may not be the most cost effective alternative. It should also be noted that the provided volume data is based on projected departmental visits by patients. If these estimates are inaccurate, Layout C may not be the preferred alternative.