**MSBA7004 Assignment 2: Shouldice Hospital**

1. Consider the linear flow chart consisting the following three steps: (i) Pre-surgery examination, orientation, etc., (ii) Surgery, and (iii) Recovery.

**Surgery**

(Day 2:

1hr surgery between 7:30am to 4pm)

**Recovery**

(Day 2-3:

exercise, lounge, removal of skin clips before discharge)

**Pre-surgery**

(Day 1:

arrive clinic between 1-3pm for brief examination, paperwork, blood and urine tests, orientation at 5pm)

1. What is the flow unit?

patients

1. What are the resources needed for each of the above tasks?

|  |  |  |
| --- | --- | --- |
| **Resources** | **Unit load (patient/day)** | **Capacity rate (patient/day)** |
| Beds (90) | 0.33 | 30# |
| Operating rooms (5) | 8\* | 40 |
| Surgeons (12) | 4 | 48 |

\*At most 8.5 hours of operations between 0730-1600, i.e. can handle at most 8 operations.

#Since each patient would take up a bed for 3 nights, therefore 90 beds can take care of 90 patients/3days, which translates to 30 patients/day.

2. Answer the following questions.

1. What is the weekly throughput rate of the hospital?

Since 30 patients are admitted on every Sunday, Monday, Tuesday, Wednesday and Thursday, therefore on average, the weekly throughput rate

= 30\*5 = 150 patients/week.

1. What is the average bed utilization?

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Beds required | | | | | | | |
| Check-in day | Mon | Tue | Wed | Thu | Fri | Sat | Sun |  |
| Mon | 30 | 30 | 30 |  |  |  |  |  |
| Tue |  | 30 | 30 | 30 |  |  |  |  |
| Wed |  |  | 30 | 30 | 30 |  |  |  |
| Thu |  |  |  | 30 | 30 | 30 |  |  |
| Fri |  |  |  |  |  |  |  |  |
| Sat |  |  |  |  |  |  |  |  |
| Sun | 30 | 30 |  |  |  |  | 30 |  |
| Total | 60 | 90 | 90 | 90 | 60 | 30 | 30 | 450 |

Average bed utilization = 450/(90\*7) = 71.42%

1. How many patients will be in the hospital during each day of the week? Draw an inventory build-up diagram with days of the week plotted on the horizontal axis and number of patients plotted on the vertical axis.

Using the info from (b), we can get:

3. The vice president of the hospital wants to increase the throughput rate of the hospital. He has a target of increasing the weekly throughput rate by 20% (as compared to the throughput rate of Question 2(a)). One option to increase throughput is to add Saturday operations (i.e., admit 30 patients on Friday for Saturday operation, while still maintaining 30 operations from Monday to Friday).

1. What is the average bed utilization?

After adding Saturday operations:

(new weekly throughput rate = 150\*1.2 = 180 patients/week)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Beds required | | | | | | | |
| Check-in day | Mon | Tue | Wed | Thu | Fri | Sat | Sun |  |
| Mon | 30 | 30 | 30 |  |  |  |  |  |
| Tue |  | 30 | 30 | 30 |  |  |  |  |
| Wed |  |  | 30 | 30 | 30 |  |  |  |
| Thu |  |  |  | 30 | 30 | 30 |  |  |
| Fri |  |  |  |  | 30 | 30 | 30 |  |
| Sat |  |  |  |  |  |  |  |  |
| Sun | 30 | 30 |  |  |  |  | 30 |  |
| Total | 60 | 90 | 90 | 90 | 90 | 60 | 60 | 540 |

Average bed utilization = 540/(90\*7) = 85.71%

1. How many patients will be in the hospital during each day of the week? Draw an inventory build-up diagram with days of the week plotted on the horizontal axis and number of patients plotted on the vertical axis.

From (a), we can get:

4. The surgeons and other hospital unions reject the idea of having Saturday operations. The vice president is determined to increase the throughput rate by 20% without changing the Shouldice practice (i.e., each surgeon still can operate on four patients per day; each operation still takes one hour; operating rooms can be used from 7:30 am till 3:30 pm; the hospital committed to three-day process).

1. Does any capacity need to be added to the hospital? If so, what resources need to be

added? How many of them need to be added?

Since the number of beds is the bottleneck, it should be added to increase the throughput rate. No. to be added is discussed in (b) below:

1. Suggest a plan to increase the throughput rate of the hospital by 20% while maintaining five-day operations and adding as few additional resources as possible (try to be creative and remember that healthcare resources are expensive!).

See plan below:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Beds required | | | | | | | |
| Check-in day | Mon | Tue | Wed | Thu | Fri | Sat | Sun |  |
| Mon | 40 | 40 | 40 |  |  |  |  |  |
| Tue |  | 20 | 20 | 20 |  |  |  |  |
| Wed |  |  | 40 | 40 | 40 |  |  |  |
| Thu |  |  |  | 40 | 40 | 40 |  |  |
| Fri |  |  |  |  |  |  |  |  |
| Sat |  |  |  |  |  |  |  |  |
| Sun | 40 | 40 |  |  |  |  | 40 |  |
| Total | 80 | 100 | 100 | 100 | 80 | 40 | 40 | 540 |

In the plan above, 40 patients would be admitted on Sun, Mon, Wed, Thu, whereas 20 patients would be admitted on Tue, which makes the total throughput rate = 180 patients/week, which is the target. And the number of beds added = 100 – 90 = 10.

1. Without adding more resource and changing the current Shouldice practice, what is the maximum throughput rate that can be achieved? (Only relax assumption (b))

See plan below:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Beds required | | | | | | | |
| Check-in day | Mon | Tue | Wed | Thu | Fri | Sat | Sun |  |
| Mon | 40 | 40 | 40 |  |  |  |  |  |
| Tue |  | 10 | 10 | 10 |  |  |  |  |
| Wed |  |  | 40 | 40 | 40 |  |  |  |
| Thu |  |  |  | 40 | 40 | 40 |  |  |
| Fri |  |  |  |  |  |  |  |  |
| Sat |  |  |  |  |  |  |  |  |
| Sun | 40 | 40 |  |  |  |  | 40 |  |
| Total | 80 | 90 | 90 | 90 | 80 | 40 | 40 | 510 |

In this plan, 40 patients would be admitted on Sun, Mon, Wed, Thu, whereas 10 patients would be admitted on Tue, which makes the total throughput rate = 170 patients/week.