EVALUATING HOSPITAL BEDS IN ADDAMER HOSPITAL-RIVER NILE STATE: SUDAN (A REPORT)

Abdalla Ahmed Alkhalifa Abdalla
Department of Statistics, University of Tabuk, Tabuk City, Saudi Arabia
aalkhalifa@u.edu.sa

ABSTRACT: *This paper deals with the evaluation of beds in Addamer Hospital in The River Nile State, Sudan, due to the overcrowding that occurs from time to time, especially with seasonal outbreaks of diseases or during emergencies. Indicators related to the beds were calculated, which indicated that the hospital does not operate at its full capacity of beds and that there are sufficient cadres compared to the current beds, except for physiotherapists and social service specialists, but there is a lack in the rates of occupancy and turnover of the beds. The same indicators were also calculated if the number of beds was completed to full capacity, which indicates that there is a need to increase the number of doctors, physiotherapists, and social service specialists and increase rates of occupancy and turnover of the beds.*

Keywords: Hospital emergencies, Addamer hospital, River Nile State

1.   INTRODUCTION

The local general hospital is the secondary level of care and a transfer point for primary care levels in the health district. The capacity of the local general hospital is 200–250 beds, it serves about 500 thousand people of the population, and it is located in an urban area [3]. Generally, River Nile State abounds with hospitals, whether educational, university, or rural, in addition to health centers and private hospitals, each providing services to the people of this state. One of these hospitals is the Addamer Educational Hospital, which is a local general hospital that was opened in 1969 and includes general surgery, orthopedics, internal medicine, obstetrics and gynecology, pediatrics, and dental departments. It's the main hospital in the Addamer locality, so there was an urgent need to evaluate the efficiency of the performance of the hospitals.

This research concentrates only on measures related to beds because there is a shortage of beds, mainly in seasons of disease. This is accomplished by defining a set of standards that the majority of researchers agree upon and which were developed in the form of equations or estimated patterns to be able to express their necessary objectives, whether quantitatively or descriptively that compare achieved with targeted results. In other words, an assessment of what has been accomplished in terms of success or failure in providing the health service that serves as the first necessity in the life of the individual through a comparison of actual performance with expected performance, highlighting the positives and negatives. The process of evaluating performance efficiency is of great importance and plays a prominent role in service organizations and productivity, and this importance is highlighted in hospitals in particular as part of a social health organization that provides preventive and curative care to all populations [1].

2.   METHODS AND MODELS

Some indicators will be used for evaluation, the following are the most important of these indicators used [4].

- **Bed days available** = Number of beds × Number of days in year (i.e.365 or 366)
- **Patient-days overnight** = No. of patient days, staying overnight
- **Patient days < 1 day** = No. of patient days, but not staying overnight
- **Patient days total** = Patient days overnight + patient days less than 1 day
- **Discharges** = Total of all discharged patients who completed their stay and left the hospital either alive or dead or against medical advice or transferred to other hospitals.
- **Admissions** = Total of all admitted patients during the year
- **Hospital bed** = No. of beds that are located in the hospital for use by an inpatient (excluding baby cots inwards and special care baby unit).

(Day Case beds are not included within the following formulas.)

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- **Patient-days < 1 days** = No. of patient days, but not staying overnight
- **Patient days Total** = Patient days overnight + patient days less than 1 day
- **Bed occupancy rate**: An increase in the bed occupancy rate may indicate the best use of hospital beds and available capabilities, and an indicator of the increase may be the demand for hospital services, and vice versa. It is preferable that the bed occupancy rate not exceed 85%–90% to reserve some beds that are empty in the hospital for the admission of emergency cases. And calculated as (total patient days)/(bed days available) × 100
- **Bed turnover rate**: This indicator shows the average number of patients admitted to bed during a specific period, which is usually a year. This rate is inversely proportional to the rate of hospital stay. That is, the higher the accommodation rate, the lower the bed turnover rate, and vice versa. A high bed turnover rate means using the best hospital beds and capabilities. And calculated as (Number of discharges)/(Number of beds).
- **Bed turnover interval** It is the period during which the bed remains vacant between the patient who is discharged from the hospital to the period in which another patient is admitted and calculated as (Bed days available – patient days total)/(Total discharges).
- **Average daily admission** = (Total admissions)/(Number of days in a year).
- **Average daily discharge** = (Total discharges)/(Number of days in a year).
- **Average length of stay** = (Patient days total)/(Total discharge).
- Also, the bed rate must be known for each of the workforce categories in the hospital (doctors, pharmacists, ... etc.), if we denote x for the category workforce, the rate will be:

Rate bed\x = (Number of beds in a given period)/ (Number of (x) in the same period)

The world standards for these rates are as below [2].

Table 1: Standard rates for beds

Rate	Standard
Bed/doctor	5/1
Bed/Nurse	4/1
Bed/Pharmacist	100/1
Bed/Lab technician	100/1
Bed/Nutrition specialist	100/1
Bed/occupancy	80%
Bed/Physiotherapist	75/1
Bed/Social service specialist	75/1

3. DATA AND DATA DESCRIPTION:

The source of data is the Department of Statistics and Medical Records in Addamer Hospital, River Nile State, Sudan. There are 45 doctors, 11 pharmacists, 98 nurse, 17 laboratory technicians, 2 specialists in nutrition one social service specialist, and no Physiotherapist, and 163 beds. Other data for the year 2022 is listed in the following table:

**Table 2: Data of beds in Addamer Hospital 2022**

Month	Admissions	Discharges	Average length of stay
January	799	764	3.5
February	709	668	3.5
March	872	828	3.5
April	753	711	3
May	702	676	3.3
June	720	662	3.6
July	894	850	3.5
August	684	655	3.5
September	842	723	3.5
October	717	675	3.5
November	658	620	3.6
December	898	870	3.9
Total	9248	8702	3.5

Source: Information and Medical records center in Addamer Hospital

From Table (2) the admissions range from 658 in November to 898 in December and the average of admissions\is 771 patient per month and 26 per day. While the discharged ranging from 620 in November to 870 in December and the average of discharged is 725 patients per month and 24 per day.

Data shows that not all monthly admissions are discharged, so the number of admissions in every month includes those who were not discharged in the pre-month.

The following chart shows the variability in admissions and discharges from one month to another and for all months the discharges were less than admissions:
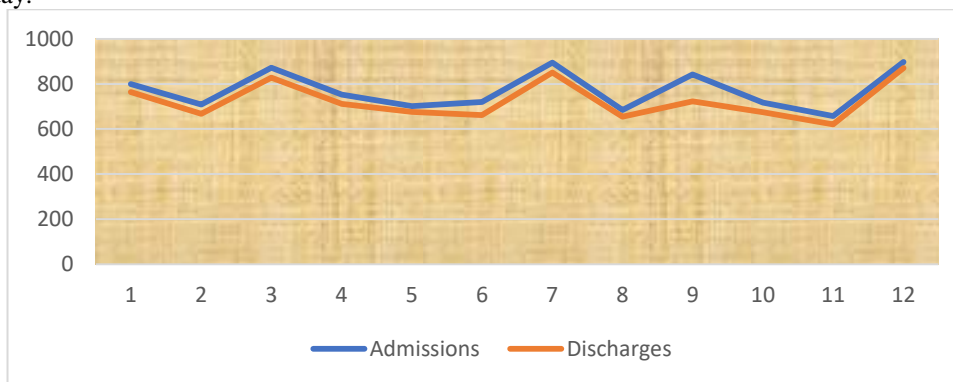
Figure 1: Admissions and discharged in Addamer Hospital 2022

Also, the Average length of stay is very low compared to the standard rate (7 days) This indicates that some of the hospital departments did not complete the required treatment for patients, especially in the departments in which the patient needs to stay for a long time.

Application:

Using the above formulas and the data the following results were obtained:

Bed days available = 163 * 365 =59495
Patient days total = 32368
Bed Turnover = 53
Bed Turnover interval = 2

Table 3: Actual rates for beds in Addamer Hospital 2022

Rate	Actual rate	Standard rate	Comment
Bed/doctor	4/1	5/1	satisfied
Bed/ Nurse	4/1	4/1	satisfied
Bed/Pharmacist	15/1	100/1	satisfied
Bed/Lab technician	10/1	100/1	satisfied
Bed/Nutrition specialist	82/1	100/1	satisfied
Bed/occupancy	54%	80%	Unsatisfied
Physiotherapist	163/0	75/1	Unsatisfied
Social service specialist	163/1	75/1	Unsatisfied

Source: Prepared by the researcher

From the results mentioned in Table 3, doctors are sufficient, nurses. pharmacists. lab technicians and nutrition specialists and the hospital can invest this sufficiency in adding more beds. but the bed occupancy indicator is less than the standard rate by 26%. Also, there is dissatisfaction among physiotherapists and Social service specialists. The bed turnover is 53 which indicates that the best hospital beds and capabilities have not been used and the bed turnover interval is 2 which indicates there is not enough space for emergency cases.

But the number of beds analyzed are the available beds in the hospital and the number of beds in a local hospital according to the Ministry of Health should be 250 beds for these types of hospitals. This means that there is a lack of beds by 87 beds.

So, the indicators are calculated again putting into consideration that beds are increased to full capacity to 250, to answer the question of needs from health cadres if the number of beds is raised to 250 beds.

In this case, beds days available = 250 * 365 =91250
Patient days total = 32368
Bed Turnover = 35
Bed Turnover interval = 6.7

Table 4: Rates for beds in Addamer Hospital assuming beds of 250

Rate	Actual rate	Standard rate	Comments
Bed/doctor	6/1	5/1	Unsatisfied
Bed/Nurse	3/1	4/1	Satisfied
Bed/Pharmacist	23/1	100/1	Satisfied
Bed/Lab technician	15/1	100/1	Satisfied
Bed/Nutrition specialist	125/1	100/1	Unsatisfied
Bed/occupancy	36%	80%	Unsatisfied
Physiotherapist	250/0	75/1	Unsatisfied
Social service specialist	250/1	75/1	Unsatisfied

Source: Prepared by the researcher

From Table 4, it is evident that if beds are increased to 250 beds, the number of doctors is unsatisfied, and nurses, pharmacists, and lab technicians are sufficient. There is a need for one specialist in nutrition to satisfy the standard rat 100 \ 1. Also, there is dissatisfaction among physiotherapists and social service specialists. The bed turnover is 35 which indicates not using the best hospital beds and capabilities and the bed turnover interval is 6.7 which indicates there are enough spaces for emergency cases.

4. RESULTS:
1. The number of beds in the hospital (163) is less than the planned (250) by 87 beds.
2. The average length of stay is 3.5 which is less than the standard (7), indicating that some hospital departments did not complete the appropriate treatment, especially in the departments in which the patient needs to stay for a long time.
3. For the available beds, there are sufficient doctors, nurses. Pharmacists. lab technicians and nutrition specialists.
4. Bed occupancy indicator is less than standard rate by 26% and this lower rate reflects a state of poor investment in the hospital as a whole or for one of its departments.
5. There is dissatisfaction in physiotherapists and there is a need for 3 Physiotherapists to reach the standard rate.

6. There is dissatisfaction with social service specialists and there is a need for 2 specialists.
7. Low rates for bed turnover and bed turnover interval.
8. **For planned beds** (250), nurses, pharmacists, and lab technicians are sufficient, but the number of doctors is unsatisfactory. and there is a need for 5 doctors to reach the standard rate. And bed occupancy indicator is less than the standard rate by 34% which is less than the available status, i.e., there will be more poor investment in the hospital as a whole or for one of its departments There is unsatisfaction in Physiotherapists and there is need of 4 Physiotherapist to reach the standard rate. Also, there is dissatisfaction with social service specialists and there is a need for 3 specialists.

5. RECOMMENDATIONS:
1. Increase the number of beds to 250 beds.
2. Increase investment in the hospital to increase the bed occupancy rate.
3. Increase the average length of stay to complete the appropriate treatment.
4. Increase the number of Physiotherapists now to 3 and 4 in case of full bed capacity.
5. Increase the number of social service specialists now to 3 and 4 in case of full-bed capacity
6. Increase bed turnover rate and bed turnover interval to increase chances for emergency cases

7. Plan to increase the number of doctors to 50 to satisfy the need for full-bed capacity

6.   REFERENCES:

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