

# Analysis of the Impact of Covid-19 on the Efficiency of Increased Bed Use Based on Barber Johnson's Graph in Hospital X, Bandung City

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## Abstract

Efficiency is an indicator that underlies the performance of all hospitals. The efficiency of hospital service management requires indicators used to calculate health statistics, including BOR (Bed Occupation Rate), AvLOS (Average Length Of Stay), TOI (Turn Over Interval), and BTO (Bed Turn Over). The four indicators, namely BOR, AvLOS, TOI, and BTO, can be depicted in a chart known as the Barber Johnson Chart. The purpose of this study is to dig deeper and find out in depth about the efficiency level of bed use based on the Barber Johnson Chart indicators at Hospital X Bandung City during the Covid-19 pandemic. This study uses descriptive qualitative analysis methods, data collection methods using observations and interviews. The population in this study is the daily inpatient census data on Covid-19 patients at Hospital X Bandung City in 2021 and the sample of this study is the third quarter of July, August and September 2021 at Hospital X Bandung City. Based on the results of the research in the third quarter, the four parameters meeting were outside the efficiency area, which means that the health statistical indicators based on the Barber Johnson Chart at Hospital X Bandung City are still not efficient.

**Keywords:** Efficiency, Bed Usage, Barber Johnson Chart

## 1. Introduction

Hospital is a place used to organize health efforts that aim to maintain and improve health status. Therefore, the hospital is able to provide good service to the community who use health services. According to the Law of the Republic of Indonesia No. 44 of 2009, a hospital is a health service institution that provides complete individual health services that provide inpatient, outpatient, and emergency services. Therefore, one of the measuring tools to determine the quality of medical services in hospitals is information or data from medical records.

According to Permenkes No. 269/Menkes/Per/III/2008, what is meant by medical records is a file containing notes and documents about patient identity, examination, treatment, actions and other services that have been provided to patients at health care facilities. Medical records that produce information for planning and decisions in health care facilities, data collection and data management for further use in reporting. Reporting is an activity carried out to convey matters relating to the results of work that has been carried out during a certain period. Hospital Reporting is an organizational tool that aims to produce reports quickly, precisely and accurately. Broadly speaking, the types of hospital reporting can be divided into 2 groups, namely hospital internal reports and hospital external reports. Hospital internal reports can be tailored to the needs of the hospital. The types of reports include patients admitted to the hospital, patients leaving the hospital, patients dying in

hospital, length of time the patient was treated, days of patient care (HP), and presentation of bed usage (BOR), delivery activities, and surgical and other medical procedures.

According to the Minister of Health Regulation No. 55 of 2013 concerning the Implementation of Medical Recorder Jobs, one of the competencies of medical recorders is health statistics. The indicators used to calculate health statistics include BOR (Bed Occupation Rate) to calculate the percentage of bed usage in a certain unit, AvLOS (Average Length Of Stay) to calculate the average length of a patient, TOI (Turn Over Interval) to calculate the average days where a bed is not occupied from being filled to the next time it is filled, and BTO (Bed Turn Over) to calculate the frequency of bed use in a period. The four indicators, namely BOR, AvLOS, TOI, and BTO, can be depicted in a chart known as the Barber Johnson Chart.

The Barber Johnson chart is a visual presentation tool that can clearly present the level of management efficiency in a hospital. The level of inpatient efficiency is not enough to follow the data from the daily inpatient census but must be reprocessed into inpatient indicators. Therefore, the Barber Johnson Graph as an indicator of the efficiency of hospital management is useful for comparing bed usage and comparing bed efficiency between units. According to the Barber Johnson chart, the efficiency of the hospital can be seen from the values set, namely BOR: 75%-85%, AvLOS: 3-12 days, TOI: 1-3 days, and BTO: >30 times. Together these four indicators have been used as indicators to assess bed use based on the Barber Johnson Chart. The Barber Johnson chart is also a prerequisite for assessment

by the Hospital Accreditation Committee team (Hendra, Ibnu, & Novia, 2018).

The Covid-19 pandemic is a massive global health crisis. The disease caused by the SARS-CoV-2 virus is spreading rapidly throughout the world. Because this pandemic creates an unstable and dangerous situation, it requires large-scale changes to health care providers, one of which is a significant spike in pressure on the use of beds. The Covid-19 pandemic has also brought changes to the quality of services in hospitals. Among them are changes in inpatient services to the number of beds available in hospitals. This research is supported by data from one of the X Hospitals in Bandung City which shows that there have been several bed changes. Based on this, the researcher wants to calculate and create a Barber Johnson Graph to determine the efficiency of bed use in July, August, September 2021 at Hospital X Bandung City.

Based on the description on the background above, this study will explore how the efficiency level of bed use is based on the Barber Johnson Chart indicator at Hospital X Bandung City during the Covid-19 pandemic. This research also contributes to a better understanding of whether there are problems that arise in making the Barber Johnson Chart indicator at Hospital X Bandung City during the Covid-19 pandemic. Therefore, the author is interested in conducting research submitted in a scientific article with the title "Analysis of the Impact of Covid-19 on the Efficiency of Increased Use of Beds Based on Barber Johnson Charts at Hospital X Bandung City".

## 2. Methodology

This type of research uses qualitative research. The method used is descriptive research method using a qualitative approach. Descriptive research method is a method used to describe or analyze a research result but is not used to make broader conclusions. Qualitative research is research that is used to examine the condition of natural objects where the researcher is the key instrument. The research location is a very important stage in qualitative research because the determination of the research location means that the object and purpose have been determined, making it easier for the author to conduct research. The location of the research conducted by researchers is at X Hospital Bandung City.

Population is a generalization area consisting of objects or subjects that have certain qualities and characteristics determined by research to study and then draw conclusions. The population in this study is medical record data, daily census of inpatients at Hospital X Bandung City. Sources of data were obtained from the Head of the Medical Record Unit, the reporting officer at the Medical Record Installation, and the reporting division officer at the inpatient unit, as well as the inpatient register book. The sample is part of the population that has the same characteristics as the population. The sample collection technique in this study was the daily

inpatient census recap data, namely in July, August, September 2021 at Hospital X Bandung City.

Data collection techniques used in this study were interviews (conversations carried out with a specific purpose to achieve a goal, interviews were conducted by 2 parties, namely the interviewer who asked the question and the interviewee who provided answers to the questions posed by the interviewer), observation (the activity of focusing attention on an object using all senses is carried out through systematic observation and recording of the symptoms studied), and documentation studies that aim to determine the amount of bed capacity during the Covid-19 pandemic at Hospital X Bandung City. The object of this research is the Barber Johnson Graph of Hospital X Bandung City. Instruments and tools in data collection used interview guides, writing instruments, recording devices, and calculators.

## 3. Research Result

Based on the results of observations at the Bandung City X Hospital, a daily census data of Quarter III inpatients was obtained for Covid-19 patients in 2021.

Month	Long Treated	Hospitalization Day (HP)	Patient Out Alive&Dead	Number of Beds
July	2858	3301	462	86
August	963	1105	154	86
September	179	217	42	86
Quarter III	4000	4623	658	258

From the table above, recapitulation data is obtained which will then be processed using the calculation of BOR, AvLOS, TOI, AND BTO using the Barber Johnson Graph formula, then there is data on the statistical component of Quarter III hospitalization in Covid-19 patients at Hospital X Bandung City Year 2021 as follows:

Quarter III				
Information	July	August	September	Quarter III
D	462	154	42	658
O	106	36	7	50
A	86	86	86	86
T	31	31	30	92
HP	3301	1105	217	4623

## 4. Conclusion Description

D = Number of patients discharged or discharged either alive or dead.

O = Average bed used.

A = Beds that are ready to use or available.

Calculating the average bed used (O):

$O = \frac{HP}{t}$

Information:

HP = Day of treatment.

t = Number of days in a certain period.  
 From the data obtained above, BOR, AvLOS, TOI, BTO can be calculated as follows:

**July 2021**

$O = HP/t = 3301/31 = 106$   
 DRILL  
 BOR formula:  $O/A \times 100\% = 106/86 \times 100\% = 123\%$   
 AvLOS  
 AvLOS formula:  $(O \times t)/D = (106 \times 31)/462 = 7 \text{ Days}$   
 TOI  
 TOI formula:  $((A-O))/D \times t = ((86-106))/462 \times 31 = 1 \text{ Day}$   
 BTO  
 BTO formula:  $D/A = 462/86 = 5$  Ext. For Value  $O = 1 \text{ Bed}$ .

To determine the AvLOS and TOI points in the BTO line are:  
 AvLOS =  $(O \times t)/D = (1 \times 31)/5 = 6.2$   
 TOI:  $((A-O))/D \times t = ((1))/5 \times 31 = 6.2$  Ext. For A-O Value = 1 Bed.

**August 2021**

$O = HP/t = 1105/31 = 36$   
 DRILL  
 BOR formula:  $O/A \times 100\% = 36/86 \times 100\% = 41.86\%$   
 AVLOS  
 AvLOS formula:  $(O \times t)/D = (36 \times 31)/154 = 7 \text{ Days}$   
 TOI  
 TOI formula:  $((A-O))/D \times H = ((86-36))/154 \times 31 = 10 \text{ Days}$   
 BTO  
 BTO formula:  $D/A = 154/86 = 2$  Ext. For Value  $O = 1 \text{ Bed}$

To determine the AvLOS and TOI points in the BTO line are:  
 AvLOS =  $(O \times t)/D = (1 \times 31)/2 = 15.5$   
 TOI:  $((A-O))/D \times t = ((1))/2 \times 31 = 15.5$  Ext. For A-O Value = 1 Bed

**September 2021**

$O = HP/t = 217/30 = 7$   
 DRILL  
 BOR formula:  $O/A \times 100\% = 7/86 \times 100\% = 8.13 \%$   
 AvLOS  
 AvLOS formula:  $(O \times t)/D = (7 \times 30)/42 = 5 \text{ Days}$   
 TOI  
 TOI formula:  $((A-O))/D \times t = ((86-7))/42 \times 30 = 56 \text{ Days}$   
 BTO  
 BTO formula:  $D/A = 42/86 = 1$  Ext. For

Value  $O = 1 \text{ Bed}$   
 To determine the AvLOS and TOI points in the BTO line are:

AvLOS =  $(O \times t)/D = (1 \times 31)/1 = 31$   
 TOI:  $((A-O))/D \times t = ((1))/1 \times 31 = 31$  Ext. For A-O Value = 1 Bed

**Third Quarter (July to September 2021)**

$O = \frac{HP}{t} = \frac{4623}{92} = 50$   
 BOR  
 BOR formula:  $O/A \times 100\% = 50/86 \times 100\% = 58,13 \%$   
 AVLOS  
 AVLOS formula:  $(O \times h)/D = (50 \times 92)/658 = 7 \text{ Days}$   
 TOI  
 TOI formula:  $((A-O))/D \times t = ((86-50))/658 \times 92 = 5 \text{ Days}$   
 BTO  
 BTO formula:  $D/A = 658/86 = 8$  Ext For Value  $O = 1 \text{ Bed}$

To determine the AvLOS and TOI points in the BTO line are:  
 AvLOS =  $(O \times t)/D = (1 \times 92)/8 = 11.5$   
 TOI:  $((A-O))/D \times t = ((1))/8 \times 92 = 11.5$  Ext. For A-O Value = 1 Bed  
 The graph of Barber Johnson for the third quarter of hospitalization for Covid-19 patients at Hospital X Bandung City in 2021 is as follows:



**Table 3 Grafik Barber Johnson's Analysis of Inpatient Quarter III Hospitalization for Covid-19 patients at Hospital X Bandung City in 2021:**

No.	Indicator	July	August	September	Quarter III	Barber Johnson Graph Efficiency Value
1.	BOR	123%	41,86%	8,13%	58,13%	75-85%
2.	AVLOS	7 Day	7 Day	5 Day	7 Day	3-12 Day
3	TOI	1 Day	10 Day	56 Day	5 Day	1-3 Day
4.	BTO	5 Time	2 Time	1 Time	8 Time	>30 Times

Based on the results of the data that the authors get from the head of the medical record unit and the reporting staff at X Hospital, Bandung City in the implementation of bed management is still not efficient. The efficiency level of bed use based on the Barber Johnson Graph during the Covid-19 pandemic, namely in July the BOR value was 123%,

the AvLOS value was 7 days, the TOI value was 1 day, and the BTO value was 5 times, to determine the BTO line point, the AvLOS value 6.2 and TOI 6.2. Then in August, the BOR value was 41.86%, the AvLOS value was 7 days, the TOI value was 10 days, and the BTO value was 2 times, to determine the BTO line point, the AvLOS value was 15.5 and the

TOI was 15.5. Then in September, the BOR value was 8.13%, the AvLOS value was 5 days, the TOI value was 56 days, and the BTO value was 1 time, to determine the BTO line point, the AvLOS 31 and TOI 31 values. For the total amount in the third Quarter of 2021 from July until September 2021, the use of beds obtained a BOR value of 58.13%, an AvLOS value of 7 days, a TOI value of 5 days, and a BTO value of 8 times.

If we look at the use of beds from July to September 2021, the BOR value has not reached the ideal value where the ideal value for a Hospital BOR is 75%-85%. The AvLOS value, which is the average length of stay in care from July to September, has reached the ideal value of AvLOS, which is 3-12 days. For TOI, which is the average length of bed vacancy from July to September 2021, which has an ideal value of July while August and September are above the ideal value, where the ideal value of TOI for a hospital is 1-3 days. And for the BTO value, namely the frequency of bed use from July to September 2021, it has reached the ideal value, which is > 2.5 times or > 30 times. For the third quarter of 2021, the BOR and TOI values are not ideal, where BOR is lacking and some is more than 75%-85%, while TOI is more than the ideal value and AvLOS and BTO already have ideal values.

## 5. Conclusion

Based on the results of research so far, there are no problems that arise in making the Barber Johnson Graph at Hospital X Bandung City, but during the Covid-19 pandemic there was a high BOR that exceeded the ideal value because the number of incoming patients was not proportional to the number of beds available and there were also the low BOR is less than the ideal value due to the reduced number of Covid-19 patients but available beds. At the Bandung City X Hospital, it is also different every month for the available beds because it follows the increase in the number of Covid-19 patients so that there is an increase and decrease in bed use. Therefore, this research is expected to be an effort to increase the use of beds and it is expected that Hospital X Bandung City, especially in the Medical Record Installation, can use the Barber Johnson Chart as a measuring tool for assessing the efficiency of inpatient services to be more accurate and efficient. Quality and assurance guaranteed.

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