

Statistical Indicators of Intensive Care Unit (ICU) Services in the Era of the Covid Pandemic 19: Literature Review

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DOI: 10.26821/IJSRC.9.7.2021.9714

ABSTRACT

The Covid-19 pandemic has had an impact on many aspects of health services, one of which is the change in statistical indicator numbers in the Intensive Care Unit (ICU). The increase in ICU occupancy rates in France, Spain, and Belgium reached the highest value (around 4.0%) during 21-27 March 2020 and decreased to 1.1%-1.6% gradually during 11-17 Apr 2020. For In New York State (USA), South Korea, and Japan, ICU occupancy rates decreased by an average of 1% during April 11-17, 2020 (Jen et al., 2021). In Australia, it was known that on April 7-10, 200 data were obtained that there were 100 positive cases, then it was known that there were 120 subsequent cases. The 20 new positive cases will require one ICU treatment. That is, the number of ICU beds needed is approximately 10% of the Total Positive Cases or 50% of the number of new positive cases. Australia has around 2,200 ICU beds whose occupancy will continue to increase if the community does not adhere to strict health protocols (Higgie M., n.d.). WHO estimates that 1 in 20 people infected with Covid-19 will require treatment in an intensive care unit (ICU), which involves the assistance of a ventilator (Anna, 2020). Methods: This study carried out the

preparation of a literature review with a systematic technique in selecting searches using international and national databases. Sources of data were obtained from journal searches using databases in journal applications such as PubMed (<https://pubmed.ncbi.nlm.nih.gov>), Elsevier (<https://www.elsevier.com>) and Google scholar. The library search technique uses keywords that match the research question. The first researcher reads the full text of the finding article and then performs a critical appraisal using CASP (Critical Appraisal Skills Program). Then the next step is screening, which is screening the articles of findings based on the title, abstract, and research inclusion criteria. The research article focuses on qualitative design to assess the quality of the article it is adjusted to the special assessment tools for qualitative research, namely the Critical Appraisal Skills Program (CASP). Australia noted that the average BOR in the ICU of the Hospital was below the ideal standard of 27.4%, as well as what happened in Saudi Arabia, namely the BOR of the ICU room as much as 50%. Brazil and Canada in the ICU room BOR are at 80% and 80.5%, which means they are still in the category of ideal standard values. Length of stay or Length of Stay (LOS) of Covid 19 patients in the ICU in Canada

an average of 14 days, in Mexico an average of 11 days, in Germany an average of 14 days, in the UK an average of 1.78-13,53 days, in China it varies between 4 – 53 days, in Arab it is an average of 6 days, and in Indonesia, it is an average of 14 days. In Spain, the number of empty beds (Turn Over Interval) in the ICU is on average 28-60 days. This of course can cause harm to the hospital considering that the available beds are more than the ideal standard number of 1-3 days. Conclusion: The Bed Occupancy Rate (BOR) has an ideal standard value of 75-85%, but in Indonesia and the UK, the ICU Bed Occupancy Rate (BOR) calculation for Covid-19 sufferers is above the ideal standard. The average length of stay or the ideal Length Of Stay (LOS) is 3-12 days, but in this Covid 19 case-patient, the average reaches 14 days, only in Saudi Arabia where the average length of stay is still within the ideal standard value, namely 6 days. For the ideal standard value of empty beds (Turn Over Interval) between 1-3 days but in Spain it reaches 28-60 days, this certainly does not fall into the ideal standard number.

Keywords: Bed Occupancy Rate (BOR), Length Of Stay (LOS), Turn Over Interval (TOI), Intensive Care Unit (ICU), Covid 19

Background

The COVID-19 pandemic has had an impact on many aspects of health services, one of which is the change in statistical indicator numbers in the Intensive Care Unit (ICU). The increase in ICU occupancy rates in France, Spain, and Belgium reached the highest value (around 4.0%) during 21-27 March 2020 and decreased to 1.1%-1.6% gradually during 11-17 Apr 2020. For In New York State (USA), South Korea, and Japan, ICU occupancy rates decreased by an average of 1%

during April 11-17, 2020 (Jen et al., 2021). In Australia, it was known that on April 7-10, 200 data were obtained that there were 100 positive cases, then it was known that there were 120 subsequent cases. The 20 new positive cases will require one ICU treatment. That is, the number of ICU beds needed is approximately 10% of the Total Positive Cases or 50% of the number of new positive cases. Australia has around 2,200 ICU beds whose occupancy will continue to increase if the community does not adhere to strict health protocols (Higgie M., n.d.). WHO estimates that 1 in 20 people infected with Covid-19 will require treatment in an intensive care unit (ICU), which involves the assistance of a ventilator (Anna, 2020).

Research methods

This research is compiling the literature review with a systematic technique in selecting searches using international and national databases. Sources of data were obtained from journal searches using databases in journal applications such as PubMed (<https://pubmed.ncbi.nlm.nih.gov>), Elsevier (<https://www.elsevier.com>) and Google scholar. The library search technique uses keywords that match the research question. The first researcher reads the full text of the finding article and then performs a critical appraisal using CASP (Critical Appraisal Skills Program). Then the next step is screening, which is the screening of articles based on the title, abstract, and research inclusion criteria. The research article focuses on qualitative design to examine the quality of the article, it is adjusted to the special assessment tools for qualitative research, namely the Critical Appraisal Skills Program (CASP).

Results and Discussion

1. BOR (Bed Occupancy Rate)

Bed Occupancy Rate (BOR) is the percentage of beds occupied from the number of beds available/available at inpatient services. The ideal value of BOR according to Barber Johnson's theory is 75 – 85% (Pecoraro et al., 2021). 1. Bed Occupancy Rate (BOR) in the ICU for patients with Covid 19 at the hospital on average above the ideal standard of 75-85% Australia noted that the average BOR in the ICU at the hospital was below the ideal standard of 27.4% as well as in Saudi Arabia, namely the BOR in the ICU room by 50%. Brazil and Canada in the BOR of the ICU room at 80% and 80.5. %, which means that it is still in the category of ideal standard value. The UK recorded a BOR at 100% and in Indonesia, in the second wave the increase in Covid 19 cases reached 98%. ICU room BOR above the ideal number resulted in a decrease in service quality in the ICU, increasing the percentage of death in the ICU and increases the risk of stress for medical staff.

2. Length Of Stay (LOS)

Length Of Stay/Average Length of Stay (LOS/ALOS/AVLOS) or the average length of stay of a patient is the average length of stay in one period. The ideal length of stay is between 6-9 days (Mandia, 2019). During the Covid 19 pandemic, the length of stay in the ICU for Covid 19 cases was quite varied, in Canada the average patient was hospitalized for 14 days, this refers to the recommendation for isolation for 14 days, then in Germany, the average length of stay for patients reached 14 - 20 days, Mexico recorded that the average length of stay for Covid-19 patients in the ICU was 11 days, the UK average length of stay for patients in the ICU was 1.78 – 13.53 days. China calculates that the average length of stay for COVID-19 patients in the ICU is between 4 and 53 days. Saudi Arabia recorded that the average length of stay for Covid-19 patients in the ICU is 6 days. In a study conducted in Korea, it was stated that

age and comorbidities (patient comorbidities) had an impact on the average length of stay for COVID-19 patients in the ICU. Patients in the age group of 20 – 39 years. The average length of stay for patients in the ICU is 17.8 days, for patients aged 65 and over the average length of stay is longer. In addition, the type of drug consumed by COVID-19 patients also has an impact on the length of stay of patients, patients using ARBs are treated for an average of 18.0 days, lopinavir/ritonavir are treated for an average of 15.5 days, HCQ is treated for an average of 17, 7 days, and the average interferon treatment was 17.7 days. The finding that MMA (a multi-mechanism approach) is designed that includes widely available drugs thought to target early immune modulation, anticoagulation, and viral suppression to prevent catastrophic cytokine release syndrome and the potential development of respiratory failure, shock, and multi-organ dysfunction. This MMA method being one of the methods that can be proven to reduce the average length of stay in the ICU by 5.4 days and up to 9 days in older patients shows that the application of this treatment protocol can enable the health care system to manage 60% more many COVID-19 patients with the same number of ICU beds.

When viewed from various countries, the average number of patients treated is quite diverse, but only Saudi Arabia whose average length of treatment falls within the ideal standard criteria of 6 days. In other countries, the Length Of Stay (LOS) value is still above the ideal value, but several countries have made several innovations including the provision of types of drugs that are considered able to reduce the length of stay of patients in the ICU. A study in Indonesia noted that a case study in COVID-19 patients who were given the drug Fentanyl for one week affected the length of stay of patients in the ICU, which was 14 days. This

illustrates that the type of drug given to the patient affects the length of stay of the patient in the ICU.

The length of stay for patients who are more than the ideal number results in a tendency to increase the number of Bed Occupancy Rates and the worst result is an accumulation of patients queuing for ICU beds due to the average bed in the ICU being used longer. However, it is necessary to re-analyze the patient's case because the length of stay of the patient above the ideal value could be due to the severity of the patient's illness due to comorbidities. In addition, the sophistication of medical equipment provided for services in the ICU also affects the length of stay of patients. Another risk was disclosed by a medical rehabilitation specialist at Semen Padang Hospital (SPH) Padang, Dr. Adek, SpKFR who stated that individuals exposed to Covid-19 were prone to experiencing impaired body functions when they were hospitalized for a long time. Medically, it is called deconditioning syndrome, which is a collection of symptoms that decrease functional capacity due to immobilization/long lying in bed. Based on the experience of patients undergoing treatment in the Intensive Care Unit (ICU) for days or even weeks, they can be at risk of experiencing various functional disorders (Dwinanda, 2021).

A high LOS value will certainly have an impact on the high cost of patient care considering that services in the ICU are not cheap. So that the longer the patient is treated in the ICU, the costs required during treatment are also high.

3. TOI (Turn Over Interval)

TOI (Turn Over Interval = Turnover) the average day that a bed is not occupied from being filled to the next time it is filled. This indicator provides an overview of the efficiency level of bed use. Ideally, empty beds are not filled in the range of 1-3 days (Pecoraro et al., 2021).

Conclusion

1. Bed Occupancy Rate (BOR) in the ICU for patients with Covid 19 at the hospital is on average above the ideal standard of 75-85%. Australia noted that the average BOR in the ICU at the Hospital was below the ideal standard of 27.4%, as was the case in Saudi Arabia, where the BOR in the ICU room was 50%. Brazil and Canada in the ICU room BOR are at 80% and 80.5%, which means they are still in the category of ideal standard values. The UK recorded the BOR at 100% and in Indonesia, in the second wave the increase in Covid-19 cases reached 98%. BOR is the ICU room above the ideal number results in a decrease in the quality of service in the ICU increases the percentage of deaths in the ICU and increases the risk of stress for medical staff.

2. Length of stay (LOS) of Covid-19 patients in the ICU in Canada an average of 14 days, in Mexico an average of 11 days, in Germany an average of 14 days, in the UK an average of 1.78 – 13.53 days, in China it varies between 4 – 53 days, in Arabic, it is an average of 6 days, and in Indonesia, it is an average of 14 days. The patient's length of stay can be caused by the severity of the patient's illness or drug therapy given to the patient. The sophistication of the equipment also has an impact on the quality of service which affects the length of stay of patients in the ICU. Patients who undergo treatment in the Intensive Care Unit (ICU) for days or even weeks can be at risk of experiencing various functional disorders in addition to having an impact on the high costs required for patient care considering that services in the ICU tend to be higher.

3. In Spain, the number of empty beds (Turn Over Interval) in the ICU is on average 28-60 days. This of course can cause harm to the hospital considering that the available beds are more than the ideal standard number of 1-3 days. There have not been many other studies, especially in

Indonesia that gave rise to Turn Over Interval figures, mostly only mentioning Bed Occupancy Rate (BOR) data.

Suggestion

1. Hospitals should apply the same standards in handling patients in the ICU, both for treatment therapy and on the equipment used.
2. In dealing with the Covid-19 pandemic, hospitals should consider the psychological aspects of medical staff with regular monitoring to minimize the impact caused by high work stress.
3. With an increase in the average occupancy of beds in the ICU room at the hospital, automatically the average empty beds, until they are filled again, will be very short, so the hospital should tighten the implementation of Standard Operating Procedures (SPO) in the provision of beds to minimize the risk of transmitting bacteria to the patient.

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