



Original Article

The impact of the pandemic on neurosurgical services: A study from a coronavirus disease 2019 referral hospital in Surakarta

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ABSTRACT

Background: A decrease in hospital visits including neurosurgery cases during the coronavirus disease 2019 (COVID-19) pandemic has been reported by many countries. This study aims to reveal important data regarding the effect that the COVID-19 pandemic has on services, neurosurgical surgery, and inpatients before and during the COVID-19 pandemic.

Methods: This comparative study compares neurosurgical services, neurosurgical patients, outpatient visits, and monthly inpatients assessed from January to December 2020 (onset of the pandemic) with those of the same period in 2019.

Results: The average number of outpatient visits per month during the pandemic (January to December 2020) was 369 visits per month, compared to 397 visits in the same period in the previous year. The lowest outpatient visits occurred in May 2020 with 227 outpatient visits. There was a decrease in the number of neurosurgical patients in January-December during the pandemic period compared to the same period in 2019. A significant decrease in outpatients during and before the pandemic was noted with $P = 0.046$ ($P < 0.05$).

Conclusion: There are differences in the number of visits by outpatients, neurosurgical patients, and inpatients during the pandemic compared to the period before the onset of the pandemic.

Keywords: Coronavirus disease 2019 pandemic, Neurosurgical service, Referral hospital

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease that occurs due to the acute respiratory tract infection syndrome of coronavirus-2 severe acute respiratory syndrome coronavirus 2 (SARS-COV2). Based on the history, coronavirus had threatened the society previously causing the SARS outbreak in China. The first COVID-19 case was discovered in December 2019 in Wuhan, China.^[1] COVID-19 is a respiratory pathogen with common symptoms such as common cold, fever, dry cough, shortness of breath, and SARS in severe cases.

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Other symptoms that appear less frequently include cough with phlegm and gastrointestinal complaints.^[2,6] The World Health Organization declared COVID-19 as an epidemic in early March 2020. The President of Indonesia also signed Government Regulation No. 21/2020 to implement large-scale social restrictions to control the spread of the disease in March 2020. Non-essential activities have been limited and only essential public facilities kept open, such as shopping centers, gas stations, pharmacies, and hospitals. The steps taken in Indonesia are not as strict as those taken by China, the epicenter of the disease, where extreme steps are taken such as lockdown.^[4]

Dr. Moewardi General Hospital is a tertiary referral hospital in Surakarta, Central Java, Indonesia. The neurosurgery department in this hospital provides services to patients with trauma, vascular, tumor, neuropediatric, and neuroinfection cases.

Many countries have reported a decrease in total hospital visits since the COVID-19 pandemic.^[2] Health centers in China, Austria, and Italy reported a downward trend in hospital visits, even for emergency cases.^[3,5,7] Further, the US health center reported a 50% reduction in emergency visits during the pandemic.^[9]

This study aims to uncover data showing the effects of the COVID-19 pandemic on neurosurgical services at tertiary referral hospital. The results of this study are expected to be useful for policymakers during the pandemic.

MATERIALS AND METHODS

This is an analytical observational study used a retrospective case-control approach. The total sampling method was used by involving the entire population of neurosurgery patients from January to December 2020 (during pandemic) and January to December 2019 (before pandemic).

Statistical data were analyzed using the Kruskal-Wallis nonparametric comparative test. Analyses were performed using the Statistical Package for the Social Sciences for Windows version 25.0 by IBM in New York, USA. The difference in the number of outpatient visits was statistically calculated and considered significant if $P < 0.05$. The same method was used to analyze the differences in the number of neurosurgical patients and inpatients in the two periods.

RESULTS

The data collected from tertiary referral hospital in Surakarta were analyzed. The average number of outpatient visits per month during the pandemic (January to December 2020) was 369 visits per month, compared to 397 visits in the same period in the previous year. The lowest outpatient

visits occurred in May 2020 with 227 visits. The number of monthly outpatient visits is shown in [Figure 1].

There was a decrease in the number of outpatient visits from January to December 2020 during the pandemic period compared to the same period in 2019, except in January, February, March, and June where the number of outpatient visits during the pandemic was more than that in the same months in 2019. The number of outpatients each month during the pandemic period and the same period in 2019 is shown in [Table 1].

The number of neurosurgical patients has also decreased. Based on the data collected, 67 operations were performed per month in 2020, compared to the same period in the previous year which amounted to 73 operations per month. The lowest number of neurosurgical operations occurred in April 2020 was 32. The number of monthly neurosurgical patients is shown in [Figure 2].

Based on [Figure 3] shown that there was a decrease in the number of opname patients from January to December 2020 during the pandemic period compared to the same period in 2019, except in January, February and June where the number of opname patients during pandemic was more than that in the same month in 2019. The number of neurosurgical patients

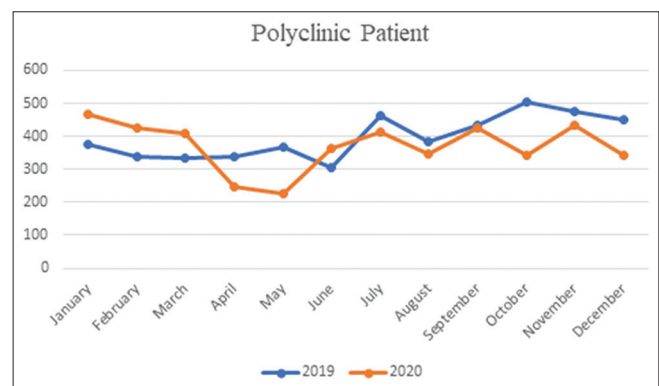


Figure 1: The number of outpatient visits.

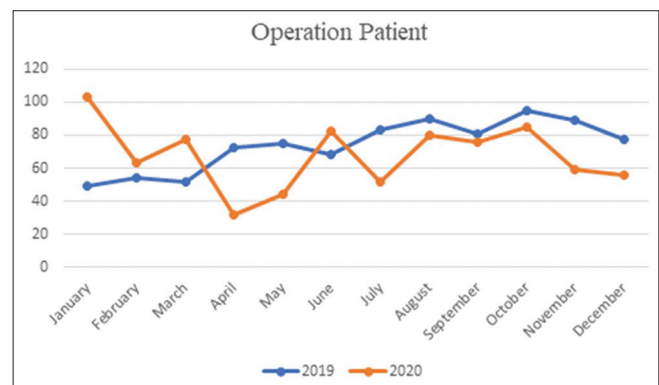


Figure 2: The number of neurosurgical patients.

from January to December 2020 and the number of patients in the same months in 2019 is shown in [Table 2]. Based on the results of the nonparametric Kruskal–Wallis comparative test for the number of outpatients and neurosurgical patients during January–December in the pandemic period with the same months in 2019, the results were not significant. Although the results were not significant ($P > 0.05$), there were differences in the number of patients during and before the pandemic.

Based on the results of the nonparametric Kruskal–Wallis comparative test data on inpatients at tertiary referral hospital, there was a statistically significant decrease ($P < 0.05$). [Table 3] shows that the number of inpatients was higher in the prepandemic period compared to the pandemic period. There was an increase in the number of inpatients in June 2020 (pandemic) compared to June 2019 (before pandemic).

DISCUSSION

Based on the findings, from January to December during the COVID-19 pandemic, there was a decrease in the number of outpatient visits in each month compared to that in the same period the previous year. The number of outpatient visits, operations, and neurosurgical inpatients in the January–March during the pandemic decreased compared to that in the same period the previous year. Based on the results of the nonparametric comparative test, the result was not significant ($P > 0.05$). However, there was a decrease in the number of outpatient visits and neurosurgical surgery patients during the pandemic period compared to the prepandemic period.

Our results regarding the number of inpatients in the period before and during the pandemic showed a decrease in the number of inpatients. Based on the nonparametric Kruskal–Wallis comparative statistical test, a statistically significant result ($P < 0.05$) was obtained for inpatients in the pandemic period compared to the prepandemic period. There was an increase in the number of inpatients in June 2020 (pandemic) compared to June 2019 (before pandemic). The increase in patients in June 2019 before the pandemic could be due to the increase in the number of patients after the national holidays.

Our results show that in January and March 2020 (pandemic period); the number of patients was higher than in the same months before the pandemic [Figure 3]. This can be because in January and February 2020, people were still not educated

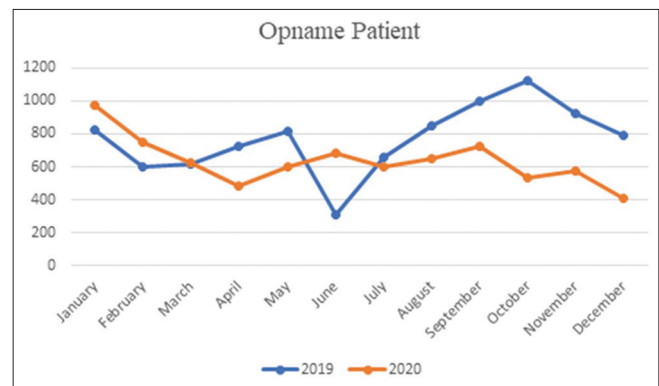


Figure 3: The number of inpatients.

Table 1: The number of outpatient visits.

Year	Month												P-value
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	
2019	377	339	335	338	369	307	464	384	432	503	475	450	0.564
2020	465	426	408	247	227	363	415	345	424	343	434	341	

Table 2: The number of neurosurgery patients.

Year	Month												P-value
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	
2019	49	54	52	72	75	68	83	90	81	95	89	77	0.453
2020	103	63	77	32	44	82	52	80	76	85	59	56	

Table 3: The number of inpatients.

Year	Month												P-value
	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	
2019	827	597	618	721	814	310	657	845	1002	1122	920	794	0.046
2020	975	745	624	486	597	684	598	652	724	537	571	413	

*P is significant if $P < 0.05$

about COVID-19 and the number of COVID-19 cases in Indonesia was still relatively small. The government had not issued an appeal to reduce activities outside the home in January and February 2020 (pandemic period), so there are still many patients who come to health-care centers.

The results of this study are like a study conducted in Austria by Metzler *et al.*^[5] who reported that there was a decrease in hospital admissions in Austria since the COVID-19 pandemic. The Hong Kong study by Tam *et al.*^[7] also supports our findings with the same conclusion that there is a decrease in the number of visits to the emergency department compared to the same period in the previous year, even for emergency cases and life-threatening situations such as coronary syndrome.

Another study that supports our findings is a study conducted by Lazzarini *et al.*^[3] reporting a decrease in the number of pediatric emergency case visits, even in cases of acute infection and trauma. A study conducted by Hartnett *et al.*^[2] and Wong *et al.*^[9] at a US Research Center also reported a 50% decrease in the number of visits to the emergency department at the national level.

Research from the UK by Thornton^[8] reported a 25% reduction in visits to pediatric emergency departments during the COVID-19 pandemic. However, there has been an increase in the number of pneumonia cases since the lockdown due to the COVID-19 pandemic.

The decrease in the number of outpatient and neurosurgical visits could be due to the following reasons. First, government regulations impose large-scale social restrictions that were only signed in March 2020. Non-essential activities are limited, and only essential services are allowed, such as shopping centers (households), gas stations, pharmacies, and hospitals. Other activities such as face-to-face schools, concerts, and activities that have the potential to generate crowds are prohibited.

Fewer outpatient and neurosurgery visits at tertiary referral hospital in Surakarta can also occur because of the Decree of the Mayor of Surakarta Number 443.76/28 of 2020 concerning the Determination of the Status of COVID-19 as Extraordinary Events (KLB) in Surakarta City. This had led to a decrease in outpatient and neurosurgical visits from March to April in 2020. The decrease in the number of neurosurgical patients from June to July 2020 and the decrease in the number of outpatient visits from July to August 2020 can occur due to the number of health workers who are positive for COVID-19.

Another factor contributing to the decrease in the number of outpatient and neurosurgical visits is the appeal of the Indonesian Association of Neurosurgery Specialists (PERSPEBSI) in response to large-scale social restrictions. They appealed to the public to postpone visits to neurosurgery

or hospitals unless there are emergency conditions such as head trauma and postoperative control patients.

Future research is expected to find out the proportion of decreasing outpatient and neurosurgical visits that are unavoidable, such as conditions that threaten the limb or are life threatening, conditions that cannot be handled in primary health-care facilities, and conditions that require periodic and special observations. There are several limitations to this study, such as the need for more than two research centers to improve the quality of research and enrich data variability.

The advantage of this research is that the use of primary data and research locations as the highest reference for COVID-19 patients.

CONCLUSION

There are differences in the number of outpatient, surgical, and inpatient visits in neurosurgery during the pandemic period compared to the period before the onset of the pandemic.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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