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Evaluation of the Operation Scheduling Application (SIJO) in an Effort to Reduce the Number of Cancellation of operations at Dr. Mohammad Hoesin Hospital Palembang

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ABSTRACT

The high rate of surgical cancellation has an impact on the low hospital performance assessment. Based on the results of the first semester achievement of 8.75% with a score of 0.5, it shows that it is far from the target achievement < 1%. This study aims to evaluate the application of the SIJO application in an effort to reduce the cancellation rate at Dr. Mohammad Hoesin Palembang Hospital using mixed methods with a quantitative research design using cross-sectional and qualitative research design using Miles and Huberman. The results of quantitative research showed that there was a significant relationship between the number of cancelled operations with laboratory results (COVID-19) (p-value 0.0001); did not get anesthesiologist approval (p-value 0.0001); ICU room availability (p-value 0.017); and blood availability (p-value 0.0001), and there was an insignificant relationship between the number of cancelled operations and the unavailability of pharmaceutical equipment (p-value 0.227). From the results of qualitative analysis conducted by in-depth interviews with research respondents, it is known that the Operation Scheduling Application (SIJO) is useful in the regularity of scheduling operations, effective in reducing the number of canceled operations. The most common obstacles encountered in using the SIJO application are swab results that sometimes do not appear automatically which have an impact on the operation scheduling process, the passwords of all users are the same so that misuse of SIJO accounts can occur and the slow RSMH internet network.

1. Introduction

Operating theater is one of the most important services provided by the hospital. Around 40% of the hospital expenditures are centered on the operating theater and its supporting facilities.[1] The operating theater of Dr. Mohammad Hoesin Hospital Palembang is managed under the Central Surgical Installation (CSI) serving both elective and emergency surgeries. The CSI operates 10 operating theaters in the CSI building, 2 emergency operating theaters, and additional 4 operating theaters located in another building within the hospital premises.[2]

The operating theater efficiency can be assessed through the utilization rate, anesthesia care time, the time of the first surgery of the day, the cancellation rate per day, turnover time, and both underrun and overrun times.3 Higher cancellation rate of the surgery negatively impacts hospital performance. The internal data showed the 2022's first semester cancellation rate was 8.75%, much higher than the < 1% target rate.

Table 1. Causes of Elective Surgery Cancellation

No	Causes	Amount	%
1.	Patient condition	232	54,0%
2.	Swab positive	46	10,7%
3.	Patient is not MRS	36	8,4%
4.	Refused surgery	28	6,5%
5.	No acc anesthesia	17	4,0%
6.	No GICU	9	2,1%
7.	No equipment	9	2,1%
8.	No blood stock	8	1,9%
9.	Postponed by operator	8	1,9%
10.	Change in assessment	8	1,9%
11.	No PICU	7	1,6%
12.	BPJS Administration	6	1,4%
13.	Patient died	6	1,4%
14.	Postponed there is an elongated op	6	1,4%
15.	Operator is absent	4	0,9%
	Total	**430**	

Source: Central Surgical Installation Report[4]

The major cause of surgical cancellation in our institution is the condition of the patients at the time of the surgery. Another major cause of procedure cancellation at the planned day is the positive result of COVID-19 test.4 Both conditions should be mitigated through meticulous planning and condition screening at the time of the surgery. Worsening patient condition due to the length of waiting period, COVID-19 test results, unavailable ICU bed, and other conditions may delay elective surgeries.5 Utilization of the open-source computerized scheduling application, SIJO, is able to allow more flexibilities in patient scheduling while in the same time facilitates coordination and the flow of the patients. Thus, this study aims to evaluate the application of the SIJO software utilized to reduce the number of cancelled surgeries at the Dr. Mohammad Hoesin Hospital Palembang.

2. Methods

This study is conducted as a descriptive study combining cross-sectional, quantitative study and the qualitative, structured interview based on Miles and Huberman. This study was conducted at the Central Surgical Installation, Dr. Mohammad Hoesin Hospital Palembang in November 2022. This study involved all records of patients between October 1st and October 31st, 2022 for the quantitative study phase and the users of the SIJO application for the qualitative phase. The interviews were conducted against attending surgeons and anesthesiologists, operating theater staffs in direct supporting role, laboratory personnel, intensive care nurses, and pharmacists. This study involved 906 records of the subjects in the study period and 38 interviewees. The data was analyzed through descriptive statistics and analysis of the interview records.

3. Results

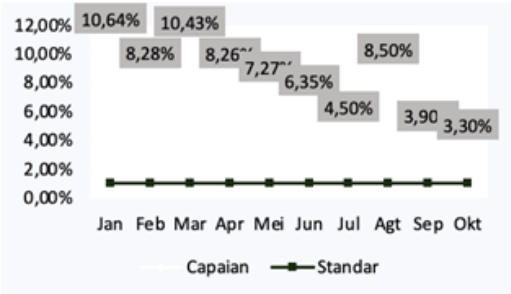

Figure 1. Operation Cancellation Rate Chart Jan-Oct 2022

Source: Central Surgical Installation Report[4]

The decrease of surgery cancellation rate was observed after the SIJO application started to be utilized hospital-wide between September, 2022 and October, 2022.

Table 2. Frequency Distribution of Patients by Surgery Status, Anesthesia Status of patients, Laboratory Results (COVID-19), and Anesthesia Status

	Frequency	**%**
Surgeries		
1. Continued as planned	868	95.8
2. Cancelled	38	4.2
	Frequency	**%**
Reasons for Cancellation		
1. Deterioration of the patient condition	25	65.8
2. Positive COVID-19 test results	4	10.5
3. Patient refusal	2	5.3
4. Anesthesiologists did not approve surgery	3	7.9
5. Unavailability of medical supplies	1	2.6
6. Surgeon on the leave	1	2.6
7. Patient passed away	2	5.3
Laboratory Result (COVID-19)		
1. Positive	4	0.4
2. Negative	902	99.6
	903	99.7
	3	0.3

Source: Central Surgical Installation Report[4]

The overall cancellation rate was 4.2% (38 cases). Deteriorating patient condition became the major reason of the cancellation of the procedure. Deterioration of the patient is the reason for the cancellation in 65.8% or 25 cases (table 2). The positive COVID-19 status results in the cancellation of 10.5% or 4 cases. Anesthesiologist refused 7.9% or 3 cases.

Table 3. Frequency Distribution of Patients by ICU Room Availability, Pharmacy Equipment vailability, Availability of Blood Bags for Surgery, and Reasons for Unavailability of Blood Bags for Surgery

Variable	**Frequency**	**%**
ICU Room Availability		
1. Available	107	11.8
2. Not available	0	0
3. Not in Need	799	88.2
Pharmacy Equipment Availability		
1. Available	162	17.9
2. Not available	6	0.7
3. No special tools required	738	81.5
Availability of Blood Bags for Surgery		
1. Available	6	0.7
2. Not Available	559	61.7
3. No need for blood	341	37.6
Reasons for unavailability of blood products for surgery		
1. Have found a replacement donor	25	4.5
2. Delay in request to UTDRS	38	6.8
3. Already fulfilled from outside the hospital	6	1.1
4. Long request, blood not taken	1	0.2
5. Other	489	87.5

Source: Central Surgical Installation Report[4]

Majority (88.2%, 799 cases) does not require postoperative intensive care. Around 11.8% or 107 cases required postoperative intensive care, in which all of them are available for those patients. Around 18.5% or 168 cases requires special equipment. The equipment unavailability becomes the reason for the cancellation of 6 (0.7%) of the cases. The blood products are required in more than 62% of the cases, but only fulfilled in 6 cases. Late paperwork submission is involved in 6.8% of the cases requiring blood, while in the 4.5% of the cases the blood products are provided by other means. Clear majority (87.5%) of the cases has "other reasons" as the cause of blood products unavailability.

Table 4. Fisher's exact test to analyze the relationship between surgery and laboratory results, anesthesia, ICU availability, and equipment availability

Variable	**Surgery Status**				***p*-value**
	Surgery		**Cancelled Surgery**		
	n	**%**	**n**	**%**	
Laboratory Result (COVID-19)					0.0001
1. COVID-19 positive	0	0	4	0.4	
2. Negative COVID-19	868	95.8	34	3.8	
Anesthesia Status					0.0001
1. Ready for Anesthesia	868	95.8	35	3.9	
2. Not Anesthesia Ready	0	0	3	0.3	
Variable	**Surgery Status**				***p*-value**
	Surgery		**Cancelled Surgery**		
	n	**%**	**n**	**%**	
ICU Room Availability					0.017
1. Available	107	11.8	0	0	
2. No need	761	84	38	4.2	
Equipment Availability					0.227
1. Available	37	0.05	863	95.3	
2. Not available	1	0.1	5	0.6	

Source: Central Surgical Installation Report[4]

Table 5. Chi suqare test to analyze the relationship between surgery and the blood product availability

Blood product availability	**Surgery Status**				***p*-value**
	Surgery		**Cancelled Surgery**		
	n	**%**	**n**	**%**	
Available	6	0.7	0	0	0.0001
Not Available	559	61.7	0	0	
Does not require blood	303	33.4	38	4.2	
Total	**868**	**95.8**	**38**	**4.2**	

Source: Central Surgical Installation Report[4]

Based on the results of in-depth interviews with research respondents, several important points arose. Those findings are summarized below.

Benefits operation scheduling application (SIJO) is useful to decrease the rate surgery cancellations. Most users preferred the SIJO application due to easier scheduling system, makes provide certainty of surgery to the patients, and the scheduling is more transparent and well-organized.

Effectiveness majority of respondents (79%) stated that the operation scheduling application (SIJO) is effective to decrease the rate of surgery cancellations because the application allows prediction of the surgery cancellations. The respondents alo stated

that the SIJO can be relied on for patient safety while the delays can be avoided through SIJO.

Constraints the issues encountered in the use of the operation scheduling application (SIJO) according to the results of in-depth interviews, among others:

Swab results are sometimes not available or the positive COVID-19 swab results are not informed to the patient, Slow connection in several areas in our institution, Late admission or inability to contact the patients resulted in unavailable COVID-19 swab results, Patients cannot register online using the "daftarinaja" application because the officer contacts the patient prior the schedule, Emergency surgeries are not recorded in the SIJO due to the lack of standard procedure. All emergency surgeries are recorded with the old system, Attending physicians in some instances assess the patients just before the surgery, resulting in unregistered cases, All users' passwords are the same, risking the misuse of the accounts, Emergency surgeries are sometimes referred to other hospitals due to inflexibility in the regulations and SIJO application.

Solution based on the analysis related to the issues found in the implementation of the operation scheduling application (SIJO), several solutions are proposed: coordination with the IT Department for better network connection, capability to password, and integrating the laboratory information system (LIS) through the SIJO application.

4. Discussion

From 38 surgery cancellations, 4 cancellations were directly linked with the positive COVID-19 test. Our institutional policy stated that the emergency surgeries for COVID-19-positive patient should be carried in the emergency room surgical theater. Thus, emergency surgeries for COVID-19-negative patients are sometimes conducted in the CSI while the decontamination procedure are carried out. Non-emergency surgeries are sometimes cancelled because of the unavailability of the surgical theater in the CSI due to the location change of the surgical procedure. Our experience is as expected as it is; as many as 2,367,050 operations per week were canceled or postponed due to disruptions caused by the COVID-19.[5]

Three surgeries were cancelled due to patient condition; the patients were not cleared to be under anesthesia due to the clinical conditions. Amurwani (2018) concluded that 43% of the surgery cancellations were related to the patient condition making them unsuitable to be under anesthesia.6 On the other hand, Vahwere (2021) found that anesthesia-related factors became the last in the list of the reasons for elective surgery cancellations.[7]

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Six cases were conducted despite the equipment unavailability, while only one cancellation occurred when the equipment was unavailable. This study is in line with Indriyadi (2020), showing that 5.06% of surgery cancellations were related to the lack of necessary equipments.[11] However, research by Prin et al. (2018) showed that 84.8% of surgery cancellations were attributed to the lack of infrastructures or equipments,[12] highlighting the disparate resources availability.

Our data found that blood is unavailable in 61.7% of the cases. Okeke (2020) found that the 47.5% of the surgery cancellations were attributed to the patient-related factors, including unavailability of the blood products.[13] Kajja (2014) also found that unavailability of the surgical theater was responsible to the surgery cancellation of the surgery in 33.1% of

the cases, while the lack of blood products were related to the cancellation of the surgery in 30.1% of the cases.[14] On the other hand, Vahwere (2021) found that only 3.3% of the surgery was cancelled due to the lack of the blood products.[7]

5. Conclusion

There is relationship between the number of cancelled operations and COVID-19 status, inability to tolerate anesthesia due to patient conditions, unavailability of the ICU rooms and equipments, and the unavailability of blood. The operation scheduling application (SIJO) is beneficial in the surgery scheduling while simultaneously reducing the rate of the surgery cancellations. Issues faced when SIJO application is used for the surgery planning includes unavailability of the COVID-19 laboratory test results, common password shared by all users, and slow network access.

We recommend better network access, capability to change the password, and integrating the laboratory information system (LIS) to the SIJO application. We also recommend better optimization of the patient condition prior to the planned surgery date to decrease the rate of cancellations due to the patient conditions. Blood products unavailability is still a major issue; further improving the donation rate should be the major priority to reduce the cancellation rate.

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