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REDUCING SERVICE WAITING TIME OF READY MEDICINE IN GENERAL HOSPITAL

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Abstract

Indonesian Ministry of Health had regulated standards for various healthcare services that must be adhered by all hospitals. This study mainly focuses on ready (packed) medicine in pharmacy sector and had chosen a general hospital in Bandung as the subject. The Ministry of Health set thirty minutes as the maximum duration for serving the required ready medicine to the patients.

After performing direct observation and collecting information for eight months, the data indicated that, serving process generally exceeded the limit given. To diminish the time taken for the whole process, in depth analysis of the duration of each activity involved in the process is necessary.

The staff allocated in the pharmacy changed each day resulted in varying value in the control chart. Hence, this study picked peak hour period with the most patient. Next, the duration data from this period were used to analyze each activity deeper. For each activity, the data must include only in-control data and the distribution type of the data had to be identified. After identifying the distribution and obtaining in-control data, the mean of each activity is recorded. The mean duration of each activity was summed up which result in total in-control serving process duration. It was found that the total in-control serving process duration still exceeded thirty minutes. This indicates that the normal performance of the staffs did not meet the standard, hence defects were present.

To analyze this issue, simulation by using iGrafX was done. The simulation showed that there were significant waiting times between activities, which indicated lack of staffs in the processes. Initially, staffs were allocated evenly every day. Several scenarios were then tried in the simulation to prove that rescheduling of personnel will positively contribute to the issue.

The simulation required distribution type for each activity, which had already been identified before. After performing the simulation, it was found that one scenario where allocating more staffs at peak hour and providing different break time reduced the time significantly. Therefore, this shows that rescheduling the shift of staffs diminishes the time taken for the whole process of serving the ready medicine. In conclusion, by having a more appropriate distribution of staffs throughout the day will help pharmacy of the hospital to achieve the standard set by the Ministry of Health which in turn will increase customers' satisfaction.

***Keywords*:** Ready Medicine, Waiting Time, Pharmacy, Ministry of Health.

1. Introduction

Indonesian Ministry of Health has set up certain benchmarks for healthcare services. Many sub-sectors are heavily regulated and one of the sub-sectors which needs to fulfill the standard is pharmacy service which includes patient's waiting time. The most common waiting time in pharmacy sector is waiting time for ready (packed) medicine. The Indonesian Ministry of Health (2018) has set a standard of less than or equal to thirty minutes of waiting time. Based on collected data and analysis, it is unfortunate that average service time exceeds the limit. According to Zhenzhenet al. (2017) longer waiting time often results in less satisfied patients. Moreover, less contentment will adversely impact patients' convenience, henceforth will diminish the willingness of that particular patient (Radito, 2008) to utilize the service of the hospital in the future (Pratiwi, 2017). This will eventually cause potential financial loss of the hospital. Since lengthy waiting time causes adverse impact towards financial conditions of the hospital, this study aims to diminish the time taken to serve the patients.

2. Methodology and Analysis

The initial step taken to reduce excessive waiting time was inspecting the whole process by using Business Management Model Notations (Stephen, 2014). The primary data collected by having interview with management and staffs offer the mapping of the process. The mapping process of serving ready medicine is displayed in the form of flowcharts and shown below in Figure 1.

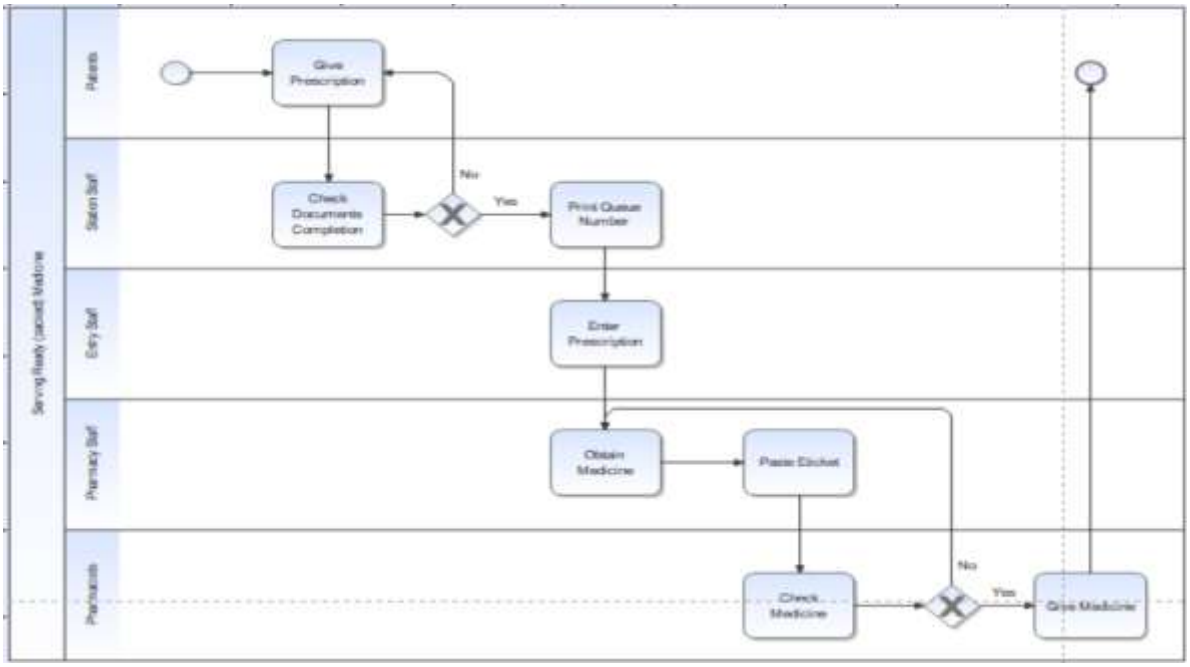
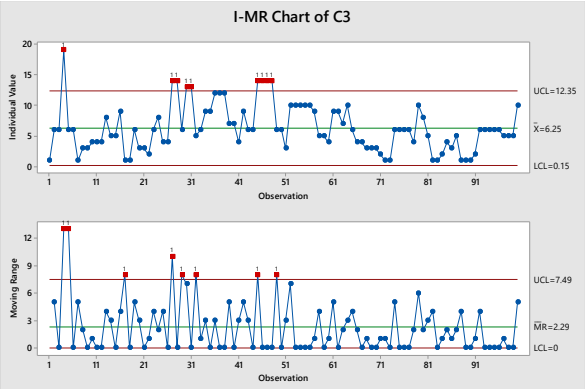


Fig. 1

The next step was to identify each activities' (box) duration. This was essential as the durations will be required in simulation analysis. The secondary data regarding service waiting time of each patients were collected from the hospital's information system. The data provides timings for every patient for five days in each month.

Nevertheless, the staff allocated in the pharmacy changed each day hence resulted in non-standardized process. Therefore, this study chose peak hour period with the most patient to be analyzed deeper. Next, the data from this period were used to obtain each activities' duration. For each activity, the data which are going to be simulated must include only in-control data and the distribution type of the data had to be identified. Minitab is employed to attain both

distribution type and in control data.To acquire only in-control data, Control Chart (Shah, 2014) is used. Figure 2 shows "Packing" as one example of out of control and in-control activities.



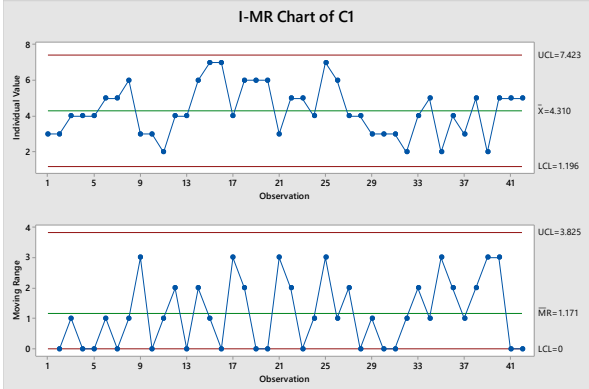


Fig. 2 Out Of Control In Control

The mean of each activity was then recorded. The mean duration of each activity was summed up which result in total in-control serving process duration. It was found that the total in-control serving process duration still exceeded thirty minutes. This indicates that standard performance of the staffs did not meet the standard, hence defects were present. Thus, to tackle this problem the root cause must be identified.

To discover the root cause, simulation analysis (Rende & Heizer, 2010) by using iGrafX was performed. Validation and verification were effectuated prior to conducting the simulation analysis. This is to ensure that the simulation resembles real situation to a large extent. The simulation showed that there were significant waiting times between activities, which indicated lack of staffs in certain processes. Henceforth, several scenarios were then tried in the simulation.

3. Proposed Solutions

In Table 1 below, current allocations and schedules will be termed as Baseline which serves as the comparison for the proposed scenarios. Furthermore, all the durations displayed in the existing and suggested scenarios will be based on in-control data solely. The results in the table below indicates that despite the fact the performances were standardized, the existing distributions of staff and schedule did go over the time limit in both average and peak conditions of patients' arrival. The average serving time of each scenario could be seen on Average Cycle.

Shift	Notes	Staff				Avg. Cycle Time (min)	Avg. Wait (min)	Staff with Largest Wait	Avg. Utiliz a-tion (%)	Staff(s) With Largest Utilization
		# of Statio n Staffs	# of Entry Staffs	# of Pharmacy Staffs	# of Pharm acists					
Peak 0800-0900	Baselin e	1	1	2	3	36.85	13.5	Pharmac y	63.75	Station
Peak 0900-1700	Baselin e	2	3	4	6	33.83	11.56	Pharmac y	62.97	Station & Pharmacy
Average 0800-0900	Baselin e	1	1	2	3	31.57	8.29	Pharmac y	51.57	Pharmacy
Average 0900-1700	Baselin e	2	3	4	6	31.53	8.33	Pharmac y	52.43	Pharmacy& Pharmacists

Table 1

Therefore, this study proffers efficacious and beneficial scenarios for each targeted condition. The targeted conditions include average and maximum number of patients' arrival. Due to the exceeding waiting time, alterations which involve rescheduling and/or allocating and/or adding staffs are required.

To decide which strategy to be used, the initial step is to pinpoint which group of staff possesses the highest average waiting time. This shows that the process was hindered in that certain activity. Next is to identify the group(s) of staffs owning high average utilization. The number informs that the staff(s) is overwhelmed with the workload. Thus, staff(s) with relatively lower utilization should be diverted to the most occupied group of employees. Henceforth, decisions taken will be based on these two parameters.

For instance, the scenario of average number of arrivals in 0800-0900 went beyond the limit slightly. Therefore, adjustment is needed. In Table 1, Pharmacy Staff is placed in both highest waiting time and utilization. This indicates that Pharmacy Staff requires more personnel. One option could be diversion of Pharmacists towards Pharmacy Staff. However, the Pharmacists has high utilization as well which cannot be allocated into different sector. Station and Entry staffs merely given one staff each who are unable to be diverted as well. Ultimately, rescheduling staff from next shift will be the best choice. Table 2 shows the result of the proposed solution which successfully diminishes the time taken.

Shift	Notes	Staff				Avg. Cycle Time (min)	Avg. Wait (min)	Staff with Largest Wait	Avg. Utilisation (%)	Staff(s) With Largest Utilisation
		# of Station Staff	# of Entry Staff	# of Pharmacy Staff	# of Pharm-acists					
Average 0800-0900	Baseline	1	1	2	3	31.57	8.29	Pharmacy	51.57	Pharmacy
	Reschedule	1	1	3	3	28.77	4.26	Pharmacy	61.57	Pharmacy

Table 2

4. Results

The steps taken above are applied to obtain the most beneficial and appropriate scenario for each condition. The results will be shown in Table 3 below.

1. Peak number of patients' arrival
    a. 0800-0900 : Rescheduling staffs from the next shift and different allocation.
    b. 0900-1700 : Allocate differently and add staffs.
2. Average number of patients' arrival
    a. 0800-0900 : Rescheduling one staff to start earlier.
    b. 0900-1700 : Different allocation only.

Shift	Notes	Staff				Avg. Cycle Time (min)	Avg. Wait (min)	Staff with Largest Wait	Avg. Utilisation (%)	Staff(s) With Largest Utilisation
		# of Station Staff	# of Entry Staff	# of Pharmacy Staff	# of Pharmacists					
Peak 0800-0900	Baseline	1	1	2	3	36.85	13.5	Pharmacy	63.75	Station
	Allocate	1	1	3	2	36	12.38	Pharmacy	75.9	Station & Entry
	Reschedule	2	2	3	2	33.67	10.96	Pharmacy	68.29	Pharmacy &Pharmacist
	Reschedule	2	2	5	4	30.86	7.57	Pharmacy	71.03	Pharmacy &Pharmacist
	Allocate	2	1	5	5	29.13	7.18	Pharmacy	70.54	Entry
Peak 0900-1700	Baseline	2	3	4	6	33.83	11.56	Pharmacy	62.97	Station & Pharmacy
	Allocate	2	2	5	6	32.84	10.31	Pharmacy	71.69	Entry & Pharmacy
	Add Staff	2	2	7	6	30.65	8.31	Pharmacy	78	Entry, Pharmacy, Pharmacist
	Add Staff	2	3	7	7	29.94	7.6	Pharmacy	74.68	Pharmacy
Average 0800-0900	Baseline	1	1	2	3	31.57	8.29	Pharmacy	51.57	Pharmacy
	Reschedule	1	1	3	3	28.77	4.26	Pharmacy	61.57	Pharmacy
Average 0900-1700	Baseline	2	3	4	6	31.53	8.33	Pharmacy	52.43	Pharmacy
	Allocate	2	2	5	6	28.42	5.36	Pharmacy	61.49	Pharmacy

Table 3

5. Sensitivity Analysis

The most suitable and functional scenarios will then undergo sensitivity analysis. This is to ensure how durable can the scenarios be, given a surge in demand of patients. The sensitivity of each scenario is detailed below at Table 4.

Shift	Staff				Change in Patients' Arrival	Avg. Cycle (min)
	# of Station Staff	# of Entry Staff	# of Pharmacy Staff	# of Pharmacists		
Peak 0800-0900	2	1	5	5	Increases by 10%	30.63
					Increases by 8%	29.9
Peak 0900-1700	2	3	7	7	Increases by 10%	31.13
					Increases by 8%	31.13
					Increases by 5%	29.9
Average 0800-0900	1	1	3	3	Increases by 12%	30.27
					Increases by 11%	29.77
Average 0900-1700	2	2	5	6	Increases by 50%	30.33
					Increases by 48%	29.84

Table 4

The results specify that scenarios for peak arrivals has relatively low durability as they may only withstand eight and five percent increase in demand. Nevertheless, the maximum condition used as peak hour merely happen 1 day throughout the year. There were only 4 days which possess approximately same number of arrivals. Hence, the scenarios given are still effective for the rest of the year.

Whereas, scenarios for ordinary days have larger ability to withstand drastic increase of demand. The scenario of afternoon shift is able to withstand almost 50% of increase in patients' arrivals. Therefore, it can be concluded that number of staffs are sufficient to serve most the days.

Conclusion

All in all, it has been proven the timing issue in serving ready medicine is possible to be eradicated. This can be done by having adjustments within the process which are changing the allocation of staffs, rescheduling and adding more new personnel. By following the proposed scenarios, the hospital will be able to improve its service as the average time taken successfully meets the standard set by the Indonesian Ministry of Health. This will eventually result in satisfied patients which lead to higher economical benefits. Furthermore, the suggested scenarios are proven effective as they are capable in withstanding certain percentage of increase in demand. Therefore, the proposed solutions are deemed practical and beneficial for the hospital.

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