

Lean Implementation And Its Advantage In Fransiskus Pavilion At RK Charitas Hospital, Palembang

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Abstract: This research aim to explore an implementation of lean in Fransiskus Pavilion of RK Charitas Hospital Palembang. This study start from step taken by the team, after training, was to prepare a process map of the pavilion, to identify flow of products that can in turn identify waste that has occurred. Waste identification allowed the team to see what improvement opportunities could be made. After preparing the VSM, we performed the PDCA (Plan, Do, Check, Act) cycles on whatever opportunities successfully derived from the process map. These results noticed an excess inventory in all groups, except for injection. 70% of other inventory in the form of Q-syte closed luer access device (BD) was reduced. While raw material and infusion were reduced by 57% and 31% respectively, while for embalase was reduced by 7%, embalase (33%), and disposable (30%). Infusion is also reduced by 30%. All of them experience reduction with no exception. The injection group is the least reduced i.e., only by 13%. This research show that lean implementations do manage to decrease inventory in certain items and overall items in the hospital. Nevertheless, the result in increasing the number of patients takes time, especially in the segment of patients with very high cost in the VVIP class which is an upgrade of the VIP Plus class.

Index Terms: Lean, Medical Inventory, Fransiskus Pavilion

1 INTRODUCTION

Toyota has long been the gold standard for the manufacturing industry through its well-known management philosophy, lean thinking [1]. With this system, Toyota has a product that has the fewest problems while being produced in the shortest time, has a supply chain with highest availability while having minimum inventory, has the fastest and innovative new product marketing time, and continues to grow over time. Toyota's management model has been adopted to share areas that include Tesco, Rolls Royce, The Royal Air Force, GE, Fujitsu, and major pharmaceutical companies [2]. Health service system is one of the areas that try to apply lean as mean to improve the quality of service provided. Lean implementation in the health service system was required so hospital might work in an integrated manner, so all elements of hospital can achieve acceleration in quality improvement without any conflict occurs among departments. Minimally, lean is used to minimize waiting time and eliminate hospital operational mismanagement [3]. RK Charitas Hospital Palembang is one of the hospitals in Indonesia that helps improving the quality of service using lean. This hospital is the largest hospital in Palembang with capacity of 392 bedrooms, consisting of 13 VVIP rooms, 14 VIP rooms, 91 class I rooms, 123 class II rooms, 91 class III rooms, 11 ICU, 4 HCU, and 45 TT Neonatal. In December 2016, RK Charitas Hospital has implemented lean on several segments at the hospital, one of which is the Fransiskus pavilion. RK Charitas Hospital has a number of positive prerequisites in lean implementation [4]. Lean has made improvements in the hospital's strategic plan within five years. In addition, this hospital has familiarized to focus on patients, reflected in the motto "*In Omnibus Caritate*" which means the real form of the implementation of love and healing carried out by God Himself by providing comprehensive services, competent ethical professional, excellent and safe service.

Prior to implementing lean, the team has conducted training on almost all staff and hospital health personnel, including in measuring and auditing to monitor performance metrics while implementing lean. The team has supported staff involvement, including commitment and totally involves in implementation activity. This article reports lean intervention carried out in the pavilion and its impact on inpatient performance observed from the inventory and number of patients' growth.

2 METHOD

Lean was implemented in this pavilion to reduce the amount of inventory while increasing the number of patients it could serve. The first step taken by the team, after training, was to prepare a process map of the pavilion, to identify flow of products that can in turn identify waste that has occurred. Waste identification allowed the team to see what improvement opportunities could be made. After preparing the VSM, we performed the PDCA (Plan, Do, Check, Act) cycles on whatever opportunities successfully derived from the process map. We also set up a patient safety alert system, checklist for mandatory patient care, and oversaw the production, preparation, as well as process of health care for inpatients. We arranged the interior design of the inpatient rooms in such a way that the flow of movement was not blocked and collided. For some things like file placement, we applied poka yoke (mistake proofing) in the form of a diagonal band, so there was no mistake in placing the file. On inventory issues, we kept supervising so no items deemed to be useless or excessive were in a stockpile.

3 RESULTS

2.2 Inventory

In the early stages, we noticed an excess inventory in all groups, except for injection. 70% of other inventory in the form of Q-syte closed luer access device (BD) was reduced. While raw material and infusion were reduced by 57% and 31% respectively, while for embalase was reduced by 7%. Overall, after the 5S process, inventories in January were reduced by 11% of the inventory in December 2016. However, in February, we had to increase the number of other inventories by 136% due to the huge need. As a result, the amount of other

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inventories was almost half of the former in December 2016. However, we managed to reduce by up to 36% in March. Another unavoidable addition was the addition of an embalase in February by 21% and an infusion by 6% in March. Despite changes due to uncertainty in consumer demand, the Wilcoxon test results (due to abnormal data) still found significant differences between inventory numbers before (December 2016) and after lean implementation (January, February, and March 2016), as shown in Table 1 and 2.

For further details, Table 3 is converted into graphic form as shown in Figures 1, 2, and 3. It appears that anomalies are found in embalase inventory and others that have increased, while other groups, such as embalases and raw materials tend to decrease.

Table 1 Result of t-Test on Baseline Inventory in Dec with Jan, Feb, and Mar.

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Des	,333	7	,018	,730	7	,008
Jan	,361	7	,006	,710	7	,005
Feb	,361	7	,006	,724	7	,007
Mar	,328	7	,022	,735	7	,009

a. Lilliefors Significance Correction

Table 2 Wilcoxon Test Results on Baseline Inventory Data in Dec with January, Feb, and March

Test Statistics ^a			
	Jan - Des	Feb - Des	Mar - Des
Z	-2,201 ^b	-1,992 ^b	-2,366 ^b
Asymp. Sig. (2-tailed)			,028 ,046 ,018

a. Wilcoxon Signed Ranks Test
 b. Based on positive ranks.

As demonstrated in Table 2, the change occurs below 0.05 so it is significant. The difference between March and December is $p = 0.018$ which means significant. When observing certain groups, there appears to be a considerable reduction. For example, raw materials have been reduced by 79% in March 2017, as well as in other groups (54%), embalase (33%), and medical devices (30%). Infusion is also reduced by 30%. All of them experience reduction with no exception. The injection group is the least reduced i.e., only by 13%.

Table 3 Progress of Fransiskus Pavilion Inventory

Perio d : 01- Dec- 2016	Perio d : 01- Jan- 2017	Period : 01-Feb-2017	Period : 01-Mar-2017		
Medical Devices		11.285.32	10.880.0	9.460.89	7.865.88
		5	76	9	2
Raw Materials		266.000	114.000	114.000	57.000
Embalase		807.840	753.984	915.552	538.560
Infusion		2.574.082	1.779.73	1.697.73	1.800.27
			3	2	7
Injection		255.118	255.118	255.118	220.960
Others		523.710	159.390	375.705	239.085
Total		15.712.07	13.942.3	12.819.0	10.721.7
		6	03	07	65

Figure 1 Changes in Inventories for Groups with Value below IDR 1 million

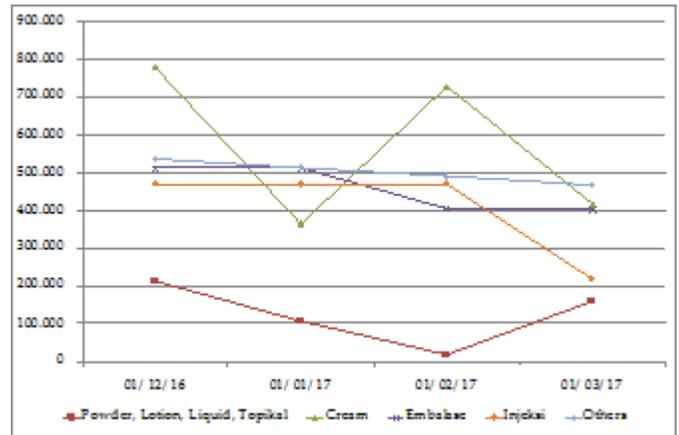


Figure 2 Changes in Inventories for Group with Value above IDR 1 million

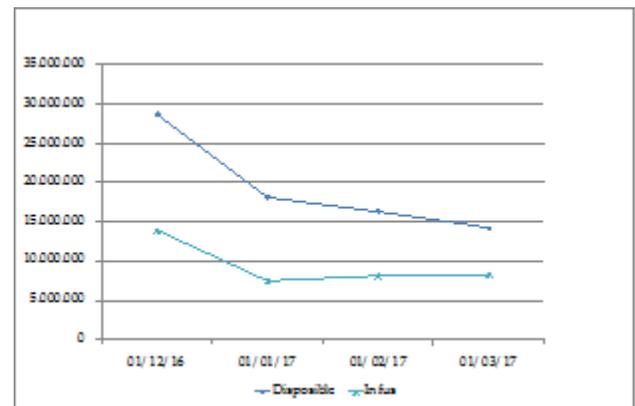
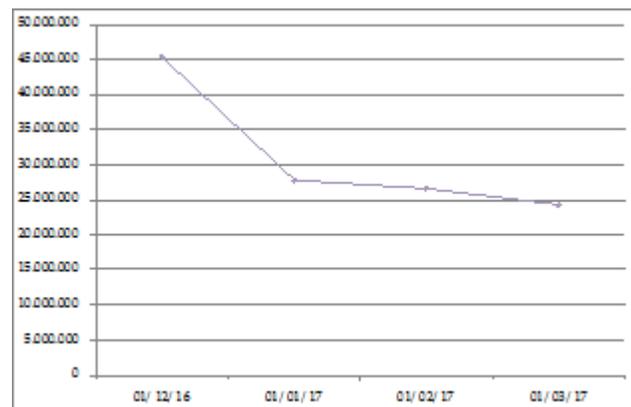


Figure 3 Overall Change in Inventory



In the patient's room, we observed that there was a waste in patient class typology. We observed that patients in the VIP class were divided into two classes, namely VIP Plus and VIP A, but one class was very unbalanced compared to the other class. Patient class VIP Plus consisted only by 56 people while VIP A was 283 people. Therefore, we recommend that shall VIP Plus be abandoned after all VIP Plus patients leave. But in February, the need of VVIP rooms arose, therefore, we returned VIP Plus to VVIP rooms. However, in four months of development (Dec 2016 - March 2017), there was no significant difference in the number of patients. The trend was very flat, with R2 very close to 0%, as can be seen in Figure 1. This is attributed to the substantial decrease in the number of VIP Plus patients. Converting VIP Plus to VVIP does not provide additional patients. In December 2016, VIP Plus patients were 56, but in February 2017 there were only 4 additional VVIP patients and in March there were only 14 additional VVIP patients.

Figure 1 Number of Patients Growth in December 1, 2016 - March 31, 2017

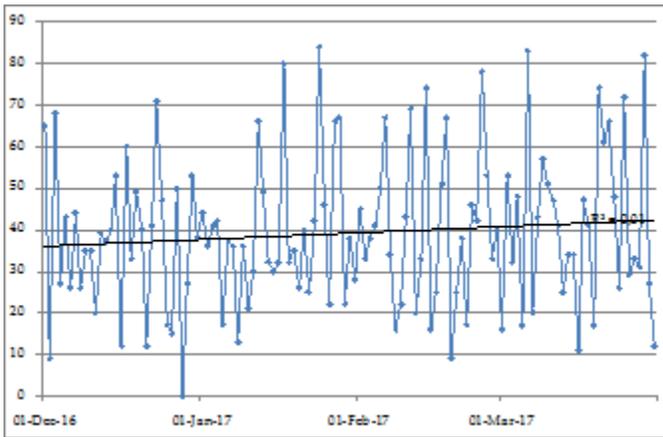
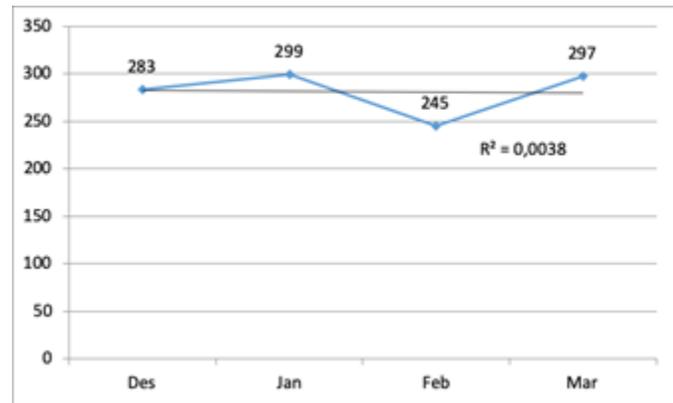


Table 4 shows the monthly detail of growth of the Francis pavilion patient showing that there is a trend of the number of patients declining from December to March. This trend is very small; it is shown in Figure 2 which shows only a downtrend value of 0.3%. However, we believe there will be an increase in the number of VVIP patients in the future because there is an upward trend of the number of patients in this category.

Table 4 Growth of Number of Monthly Patients

Month	VIP Plus	VIP A	VVIP	Total
Des 2016	56	283		339
Jan 2017		299		299
Feb 2017		245	4	249
Mar 2017		297	14	311

Figure 2 The Number of Monthly Inpatient Growth



4 CONCLUSION

The above results show that lean implementations do manage to decrease inventory in certain items and overall items in the hospital. Nevertheless, the result in increasing the number of patients takes time, especially in the segment of patients with very high cost in the VVIP class which is an upgrade of the VIP Plus class.

5. REFERENCES

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