Effect of Lean Management Application in Pharmaceutical Inventory Stella Maris Hospital Makassar

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Abstract

This study aimed to analyse the effect of lean application in pharmaceutical inventory Stella Maris Hospital Makassar. The study used qualitative method through action research approach and the data were collected through triangulation. The numbers of informants are seven informants. Data were collected by document review, observation and deep interview. The results showed that application of lean management in drugs such planning reduced Non Value Added (NVA) activities 26%, ordering reduced NVA activities 2%, inventory storage reduced NVA activities 69% and distribution processes NVA activities 22%. In all cycle of management of pharmaceutical inventory reduced 30,01% of drugs stagnant and 14,79% of drugs stock out and also increase value to waste ratio of 15% until 34%.

Keywords: Drugs Management; Stockout; Stagnant; Lean Management.

1. Introduction

Pharmaceutical installation is one of the hospital facilities that take large amounts of funds for repeat purchases. The purpose of the hospital inventory system is to ensure that the amount of existing stock can meet the demand so that inventory disruptions can be prevented.

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To prevent inventory from being disturbed it requires regular analysis and to apply inventory management tools with strict supervision for items that are categorized as important so that the budget can be used by more patients [1]. In the health field, there is a set of waste that should be eliminated. Pharmacy with all of its activities has a big role in creating waste [2]. Lean management method can eliminate waste used in hospital pharmacy installations and has reaped satisfactory results include: Royal Hospital in Bolton has experienced 30% reduction of work time, 50% of pharmacy stock and reduction of errors and rework [3]. Kemang Medical Care has experienced an increase in pharmaceutical TOR from 1.6 to 2.5 (average of 12-day storage) after 3 months of implementation and an increase to 6.1 (average of 5-day storage) after 6 months of Lean implementation [4].Value Stream Mapping (VSM) has reduced total work time and wastage. It can be seen by the increased patient capacity of 33%, spare time is reduced by 51% and the use of time increases from 47976 to 63968 seconds at a clinic in Johor Malaysia [5]; and the University of Minnesota Medical Center has successfully made an annual cost savings of $ 289,256 by applying lean management approach in the inpatient pharmacy [6]. Stella Maris Hospital is a private hospital with entire financing comes from the hospital's operating income. Therefore, the efficiency of inventory is an important thing to consider. Based on the data received, it indicates the existence of stagnant and stockout incidents in Pharmacy Installation Stella Maris Hospital Makassar during 2016 while the Stockout standard of the MOH in 2002 was 0%. This of course also affects the hospital's finance because the funds used are not included in financial planning. Based on the description of the problem mentioned above, the focus of this research is to know the effect of lean management application to the supply indrugs inventory and medical devices at pharmaceutical installation of Stella Maris Hospital Makassar.

2. Materials and Methods

This research is done by using qualitative design through action research approach. Action research refers to action as a method of research, established on the assumption that theory and practice can be covertly integrated with learning from planned interventions after a detailed diagnosis of the context of the problem [7].This research is intended to get the illustration of the process of drug management with a focus on planning, procurement, storage and distribution of pharmaceutical supplies Stella Maris Hospital Pharmacy in 2017. Informants in the study are those involved in the process of planning, procurement, storage and distribution based on the principles of informant criteria so there are 7 informants (seven) in total. The data used in this study are primary data, secondary data and observation results of researchers in the field. Primary data comes from interviews with informants, secondary data comes from the hospitals that closely related to the research undertaken. The data analysis technique in this study follows the instructions from Miles and Huberman [8] through data reduction, data presentation and conclusions. Presentation of research results data is in the form of interview quotes, tables and accompanied by narration.

3. Results

3.1 Diagnosing Action

Based on the result of in-depth interviews with several informants related to the Planning needs of drugs in

IFRS Stella Maris Makassar using the method of consumption, for all this time the drug planning is only based on the consideration of the pharmacy itself, there is no specific policy managing the purchase of drugs. According to informants, planning activities at IFRS Stella Maris are in accordance with applicable planning requirements. The occurrence of drugs which are out of stock and stagnant due to inaccurate early data and distributors factors. Based on the results of the interview about the planning, it is known from the three informants, who all said that the planning activities are good and in accordance with the provisions.

The result of the document review shows that the percentage of pharmaceutical inventory planning fund has not met the existing standard (100%). While the percentage deviation planning is 12.99% and this figure is still below the maximum allowable standard that is 20-30%. This means that pharmaceutical inventory planning is in compliance with existing regulations. Thus, it can be deduced that basically, pharmaceutical supplies inventory plan of IFRS Stella Maris is good enough and is expected to prevent the occurrence of stock out and stagnant drugs.

Based on the result of document review conducted by the researchers, it is known that the Frequency of Procurement of each item of IFRS Stella Maris drug belongs to the medium category (average of 12 times/year) while the percentage of the number of drug items planned is 87.01% which has not met the specified standards (100-120%). According to the result of interviews with the informant researchers, the cause is as described in the deviation indicator of planning which is the out stock in the PBF due to the limited stock in the PBF so that orders cannot be met 100%.

Based on the observation, there are 8 storage items that have not complied with the standard. Drug arrangement at the Stella Maris hospital pharmacy warehouse is still not up to standard due to mixed oral and injectable drugs. The arrangement of drugs with attention to drugs *Look Alike Sound Alike* (LASA) and *High Alert* also has not been done regularly. Some stickers are blurry and unclear. In fact, there are still drugs that do not fit the alphabet and the name of the drug on the shelf. Lack of existing facilities and infrastructure causes stockpiling. Stored goods are not equipped with the identity of the goods and they still use the remaining cardboard to store goods.

The stored drugs are not neatly arranged, there is a buildup of administrative items mixed with the medical equipment warehouse, the placement of documents is not neatly arranged. It can be said that the management has not done well and the level of drug treatment awareness is not high enough.

In the process of distribution, based on the results of the document review, it is known that the percentage of stagnant value against the value of hospitalization and total drug items respectively 18.3% and 54.7% and have not yet met the standard, which is 0%. Furthermore, there is often a discrepancy in the number of drugs. Due to the narrow storage conditions make the movement disturbed so that the preparation process for distribution is also slightly hampered. Based on the recapitulation of in-depth interviews with informants, it is known that from 5 (five) informants interviewed said that distribution activities cannot run well because of the physical condition of the warehouse that is less supportive. The rooms were cramped and not well laid out. So when filling stocks in a hurry, some items sometimes mixed and there is difference between the stock cards with the real amount.
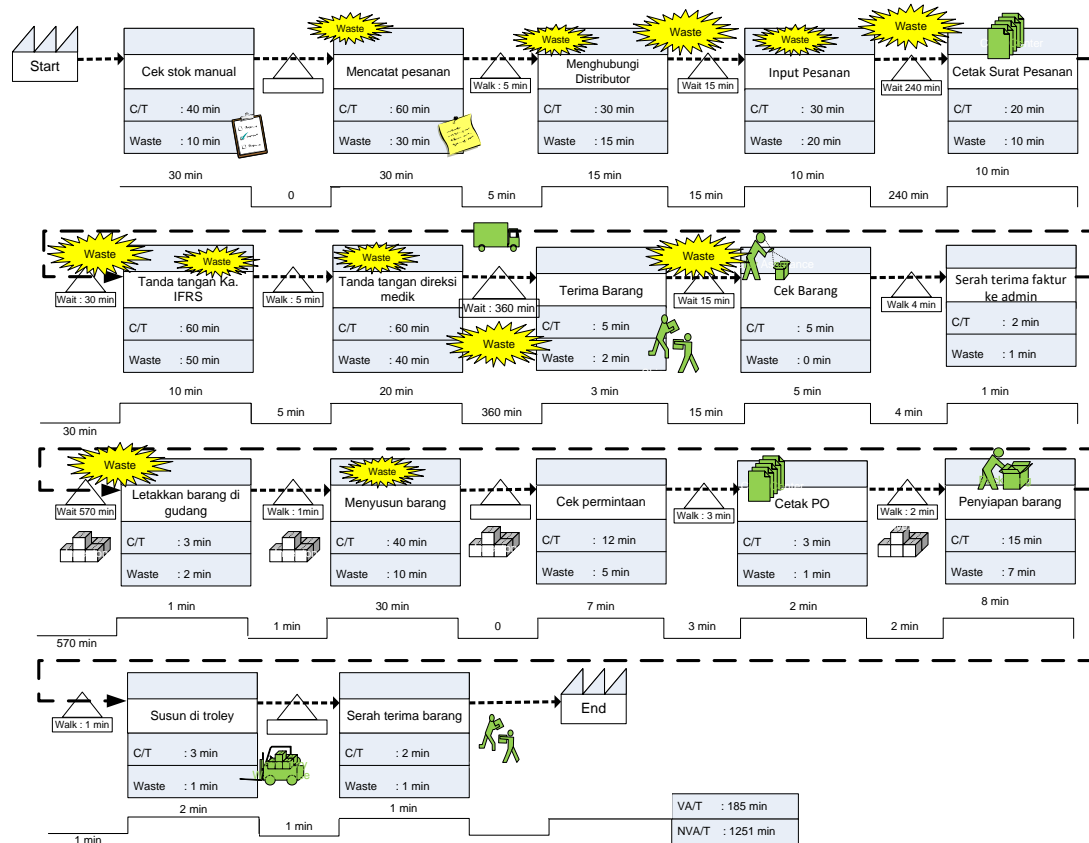
Figure 1: Current State Value Stream Map (VSM)

In the meantime, despite the availability of visual management tool but it is not well practiced, as seen from the storage of drugs with not accordance with the label on the shelf and on the label name. This, of course, causes confusion for the personnel because of the difference in the contents of the shelf with the label listed. So that the visual management with the initial goal to reduce waste and facilitate the implementation of the work becomes a source of waste. Based on unstructured interviews during observation, it is known that pharmaceutical warehouses are divided into 5 (five) locations with quite long distance from one warehouse to another. This will make it difficult for the responsible person and the warehouse implementer to monitor and evaluate (monev) on pharmaceutical stock.

Based on the Current Value Stream Map (VSM), there are 17 steps in the process of inventory management of pharmaceutical found waste in 6 steps that have high enough and 6 times between processes. The whole process gives a total non-value added time of 87% and a value added of 13% as shown in Figure 1. Where the waste most often appears is *wait*.

From the instrument of waste identification, found waste related to pharmaceutical inventory management, Confusion, Motion, Waiting, Processing, Inventory, Defects, Over Production. After the waste identification, the problems are then grouped into a fish bone diagram to parse the root cause of the problem that is grouped into the components of man, method, machine, and also the material shown in Fig. 2.
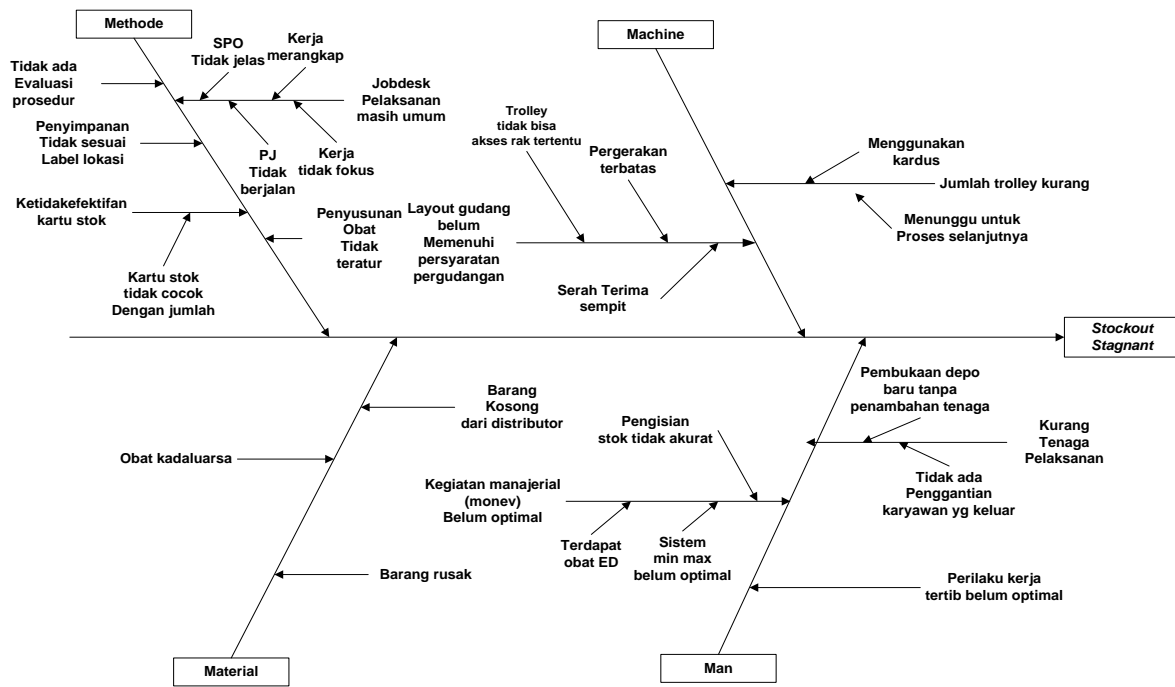
Figure 2: Fish Bone Analysis

3.2 Planning Action

Based on the result of root problem analysis in brainstorming process together with related parties (Directors, Head of Pharmacy Installation, Warehouse Responsible and Implementer) hence obtained some design proposal improvement:

1.   The addition of personnel in IFRS

The addition of personnel needs to be done in the near future to replace employees who resign. In addition, the need is due to the addition of workload which comes from the opening of the storehouse in the new building care unit.

2.   *Visual Management*

The addition of visual management from the entrance to the warehouse. Create visual management at the entrance, handover location, addition of name of drug on shelf which not yet have label and replace the damaged label of the drugs, each rack is given visual management according to type of medicine/preparation, make directions and name of each room. Furthermore, SLA (Service Level Agreement) needs to be created and documented separately as a measure of quality of service to customers. Agreement on the implementation of warehousing activities at IFRS is available but in practice, it has not been properly adhered especially from internal customers.
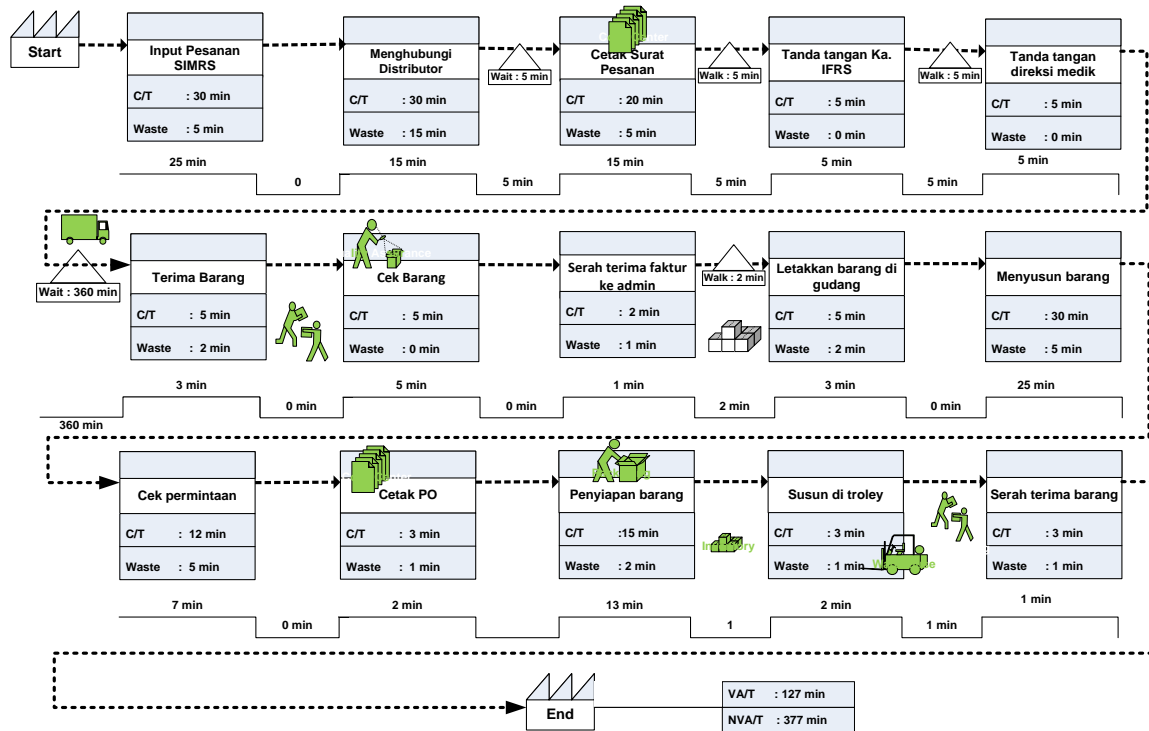
Figure 3: Future State Value Stream Mapping (VSM)

3.   Implementing 5S Working Culture

5S is a collection of methods to make the workplace to be more orderly so that all items can be found easily and problems that arise can be addressed immediately.

4.   *Relayout*the old warehouse

Some improvements suggested by the researcher as improvements such as moving matters relating to archiving and managerial activities into one location, changing the cabinet layout so as to gain wider space for warehouse personnel movement and replacing storage shelves that do not qualify anymore.

3.3 Taking Action

Improvement design Implementation is conducted over a period of one month from May 26 to June 30, 2017. This starts from setting up storage racks, redesigning warehouses and applying new pathways to reduce waste based on future State Value Stream Mapping (VSM).

3.4 Evaluation Action

In this evaluation stage, researchers observed the results of lean application after the improvement. After the implementation of lean management on inventory management of pharmaceutical supplies, there was a reduction of Non Value Added activity in the planning process by 26%, in the procurement process by 2%, the storage process by 69% and the distribution process by 22%. In the entire pharmaceutical inventory

management cycle, it can reduce 30.01% of drug stockout and 14.79% stagnant drug and increase the ratio of value to waste from 15% to 34%.

4. Discussion

The results showed that Stella Maris Hospital Pharmacy Installation has conducted pharmaceutical inventory planning activities in accordance with the existing provisions. Thus, it can be concluded that basically, pharmaceutical supplies inventory plan IFRS Stella Maris is good enough and is expected to prevent the occurrence of stock out and stagnant drugs. However, in the analysis using lean tools, found in Current State Value Stream Map (VSM) in the planning section, there is waste in two drug checking and order recording. This is because both activities are still done manually, even though there is a facility of the hospital in the information system is available, but it is not yet maximally utilized. As a method of improvement, the researcher rearranges stocks on IFRS and adjusts existing stocks with the stock listed on the hospital's Management Information System (MIS) so that the planning department no longer needs to manually check and record the drugs to be ordered. By optimizing the utilization of available RS SIM technology, it can save the time of completion of the task and can reduce the activity of Non Value Added by 26% as shown in Figure 3. This is in line with research at Orthopaedic Department of Odense University Hospital (Denmark) emergency unit where with the application of lean tools, it can reduce non-value added activities and can reduce the waiting time from 122 minutes to 52 minutes [9], this is supported by research by [10] that the implementation of lean management in Nethersole Hong Kong emergency department service can reduce waiting time from 54,76 minutes to 24,45 minutes so that service to patient becomes faster.

Implementation of lean management on pharmaceutical inventory in Stella Maris Hospital Makassar is done in line with the concept of lean in general which states that all forms of activities that do not bring customer value is a waste and must be eliminated or minimized [11].

Waste analysis indicates one of the found wastes is *waiting*. Waste waiting happens because the process has not run properly. After conducting a joint brainstorming activity with the management and structural officers and implementers of the Strait of IFRS Stella Maris, it has been agreed that some processes that have long waiting time before the process does not have high enough added value, it will be reduced or eliminated.

Based on current state value stream mapping, it is known that waste in the storage section occurs when the preparation of goods takes a long time due to unnecessary movement to lift the goods. This is in accordance with the analysis of waste performed that indicates one of the waste found in the storage activity is an unnecessary motion. It is any movement of people or machines that do not add value to goods and services to be delivered to customers, but only add costs and time. This is due to the lack of adequate space so that some supplies must be placed in different locations at risk of damage and loss. In addition, the problem that occurs is a lack of human resources, because there are some employees who resign and there have been no replacements.

In Lean Management, a structured system for managing work areas and standards for improving employee productivity is called 5S i.e. sorting, storage, shining, standardize, self-discipline, in Japanese called *seiri,*

seiton, seiso, seiketsu, shitsuke or in Indonesian means Ringkas, Rapi, Resik, Rawat, Rajin. Which according to the study of Gomes and his colleagues [12] who found that 5S is one of the most widely used lean tools and techniques in health care.

After some improvements, 14.79% of the drug stock out and 30.01% of stagnant drugs were decreased until the fourth week. The results of this study are in line with the study of Papalexi and his colleagues [13] which found the storage of the product reduced to 56.8% and has saved warehouse costs by 71.8% after the application of the *kanban lean* system to pharmaceutical logistics. This research is in line with the research by Venkateswaran, [14] about lean application with 5S tools in health care warehouse save 15.7% of space by reducing storage shelves.

Due to the lack of personnel available at IFRS so far there has been no special personnel in the distribution of drugs. The personnel in charge of each service unit, the drugs room, and the warehouse take the drugs by themselves to the pharmacy logistics room. This resulted in logging activities in the logistics room cannot be accounted for because the personnel who fill the stock card always changes and also sometimes make mistakes in the calculation of the number of drugs out and remedies. This can degrade the quality of drug use and may effect stagnant and stock out drug. Good records can be used as a basis for monitoring the amount of drug stocks that can reduce the incidence of stagnant and stock out of the drugs.

Implementation of lean management has a good impact that can reduce the activity of Non Value Added (NVA) in the planning process by 26%, procurement process by 2%, storage process by 69% and distribution process by 22% and increase the ratio of value to waste from 15% to 34% in figure 3. This is in line with research in the Indian Health Care Sector, the process of improvement by using a value stream map in the hospital is proven to increase value-added activity and decrease non-value added activities [15] . The benefit of this improvement is that hospitals can manage pharmaceutical supplies by using less time, money, inventory, and space to increase the value from a patient perspective [16]. It is supported by Kovacevic and his colleagues [17] who saidthat the application of lean in pharmaceutical installations can make the distribution of pharmaceutical inventory to the unit to be more orderly so as to decrease inventory stocks that have reduced cost impact.

In this case, the goal of lean to continuously improve customer value through continuous improvement of value to waste ratio can be said to be achieved because it has met the minimum standard according to Vincent Gasperz that is 30%. This is supported by research by Khodambashi, [18] that the key to lean transformation is to build a culture of Continuous Improvement (CI) and organizational learning culture (learning organization).

5. Conclusions

The application of lean management to the pharmaceutical inventory planning process at Stella Maris Hospital of Makassar provides a good impact by facilitating the installation head to plan the medicines or drugs to be ordered and submitted to the procurement department. The application of lean management to pharmaceutical inventory management reduced the Non-Value Added activity in the planning process by 26%, the procurement process by 2%, the storage process by 69% and the distribution process by 22%. In the entire pharmaceutical

inventory management cycle, it can reduce 30.01% of drug stock out and 14.79% of stagnant drug and increase the ratio of value to waste from 15% to 34% so that the management of pharmaceutical supplies in IFRS Maris Makassar can be said as *lean*. It is suggested to hospital management to make a long-term repairmen for the warehouse to facilitate the personnel in giving better service. Continuous Improvement is needed and they also need to build an organizational culture to gain greater impact on lean management implementation at IFRS Stella Maris and to continuously monitor and evaluate the implementation of lean management in pharmaceutical installations for better impact. Also, the measurement of performance indicators is required to obtain more measurable results that can be used as information for management in decision making. For further research, the application of other management methods together with lean method can be done to improve the overall performance.

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