

ARTICLE

IDENTIFYING PROCESS IMPROVEMENT OPPORTUNITIES IN GYNECOLOGY CLINIC BY VALUE STREAM MAPPING

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ABSTRACT

Introduction: Value stream mapping is one of the most important and useful tools of lean thinking to determine non-value adding activities and improve service delivery process. The present study aimed to identify improvement opportunities in visit process in the gynecology clinic using value stream mapping. **Methods:** This was a descriptive case study. In this study, flowchart of outpatient visit was drawn through observation and confirmed by semi-structured individual interviews with those involved in this process. Current value stream map was drawn and discussed in a focus group discussion. Various types of wastes, root causes and elimination strategies were evaluated. Then, future value stream map was drawn using Edraw. **Result:** Only 20% of current value stream map of outpatient visit in the gynecology clinic consisted of value adding activities. The patients spent between 79% and 85.2% of their time on waiting depending on type of the patients. The number of value adding steps increased from 20% to 33% while the number of non-value adding steps reduced from 73.3 to 33% in future value stream map. **Conclusion:** most wastes in outpatient visit process in the gynecology clinic can be detected and compensated by minimal costs. This requires scientific tools like lean thinking [e.g. value stream mapping] for process improvement.

INTRODUCTION

Increasing costs of global health care systems is one of the main concerns of managers and decision makers in the health system [1]. Iranian health system as other health systems is facing the challenge of increased costs. Accordingly, health care cost has increased 71 times during the last twenty years [2]. Despite various investments, health system faces such challenges as poor quality of services and healthcare, medical errors, long waiting time, low levels of patient satisfaction and wastes in health care services [3]. A significant portion of health care processes (between 30% and 60%) added no value to the patients [4].

In this regard, a variety of quality improvement methods are developed to address the inadequacies reported in healthcare services. Lean thinking is one of these methods, which has emerged from manufacturing industry. Lean thinking is a management strategy universally applicable across all organizations because it deals with work processes. Lean is a set of theories and practices, which create maximum value for the patient by reducing wastes and waiting times [5]. Lean management can be summarized as five principles of Specify value from patient perspective, identifying value stream, Make the process and value flow, creating a pull system and a Pursue perfection [6]. The most important and most widely used lean tool is value stream mapping [VSM], which is referred to as a bridge between lean concepts and methods [7]. VSM is a visual representation of the flow of materials, information and people from the beginning to the end of a process. This includes all activities in that process categorized in three categories of value adding [VA] activities, non-value adding [NVA] activities and essential non-value adding activities [8, 9]. Value adding activities directly meet customer needs [10]. Essential non-value adding activities add no value to the customers but are currently inevitable due to technical knowledge and available assets [10]. In addition, any activity that spends time, space or resources but does not create any value for the customer is called non-value adding activity [10]. VSM visualizes the whole process in the system and delineates wastes and sources of wastes. This is an effective tool for improvement in communication process [9]. This tool helps managers to identify priorities for process improvement. VSM presents a visual display that enables the stakeholders (physicians, senior managers and accreditation assessors) to understand the given process easier and more comprehensively. There are two types of value stream map: a) current value stream map (CVSM) that displays current state of material and information flow in the system; b) future value stream map (FVSM) that shows ideal state of the system [11].

Outpatient department (OPD) is the first one who is in contact with the hospital and is one of the most important aspects of the health system. Nowadays, a major part of diagnosis and even treatment is performed on an outpatient basis with great advances in medical technology. This has increased the size, variety and severity of outpatients [12]. OPD deal with various problems such as over crowding and delays that lead to dissatisfaction of the patient [13]. OPD department is less considered than other wards and departments in a hospital despite growing importance of this department in the hospitals. Most OPD departments are not prepared to meet probable challenges. Various studies should be conducted in the field of personal and organizational changes in OPD departments [14]. Long waiting time and complexity of services in the studied hospital increased the sensitivity of making decision on promoting quality of this

KEY WORDS

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process. The present study aimed to determine improvement opportunities in visit process in a gynecology clinic in a large public teaching hospital in Tehran using VSM.

MATERIALS AND METHODS

This was a case study performed in a gynecology clinic in teaching hospital in Tehran in 2015. Visit process at the gynecology clinic was evaluated in this study with participation of personnel. A sample of 30 individuals were selected using convenience sampling method to determine patient flow and measure waiting time in the clinic. The patients were selected based on Jimerson's recommendations. He believed that selection of 30 samples gives reliable results for evaluation of process engineering [15].

Data was collected through observation, interviews, documentation review and focus group discussions at multiple steps. First, flowchart of visit process at the gynecology clinic was drawn through observation in. The scholar attended the clinic and accompanied the patient from the beginning to the end of the process [from admission to discharge from the gynecology clinic]. Accuracy of the flowcharts was confirmed through semi-structured individual interviews with the participants. Patient waiting time and cycle time of each activity was measured using a chronometer. The collected data was logged into collection forms, which were a combination of the forms used in the studies conducted by Rodriguez and Casey [16, 17]. Accordingly, a draft of value stream map was prepared. The CVSM was evaluated in a focus group discussion where VA activities, NVA activities and barriers to process improvement were identified. Improvement strategies were offered after identifying root causes and evaluation of wastes. The value stream map was drawn at the final step using Edraw version 7.6.

Data validity or credibility was confirmed through reflecting on participant review. Data reliability was confirmed through peer review. The study design was confirmed in the Research Ethics Committee in Shahid Beheshti University of Medical Sciences with Approved Act No 66000474 on 11/2/2015.

RESULTS

The findings showed a typical patient would wait 143.3 minutes when visiting the gynecology clinic for the first time to receive medical services, which lasted for 28.7 minutes according to the value stream map.

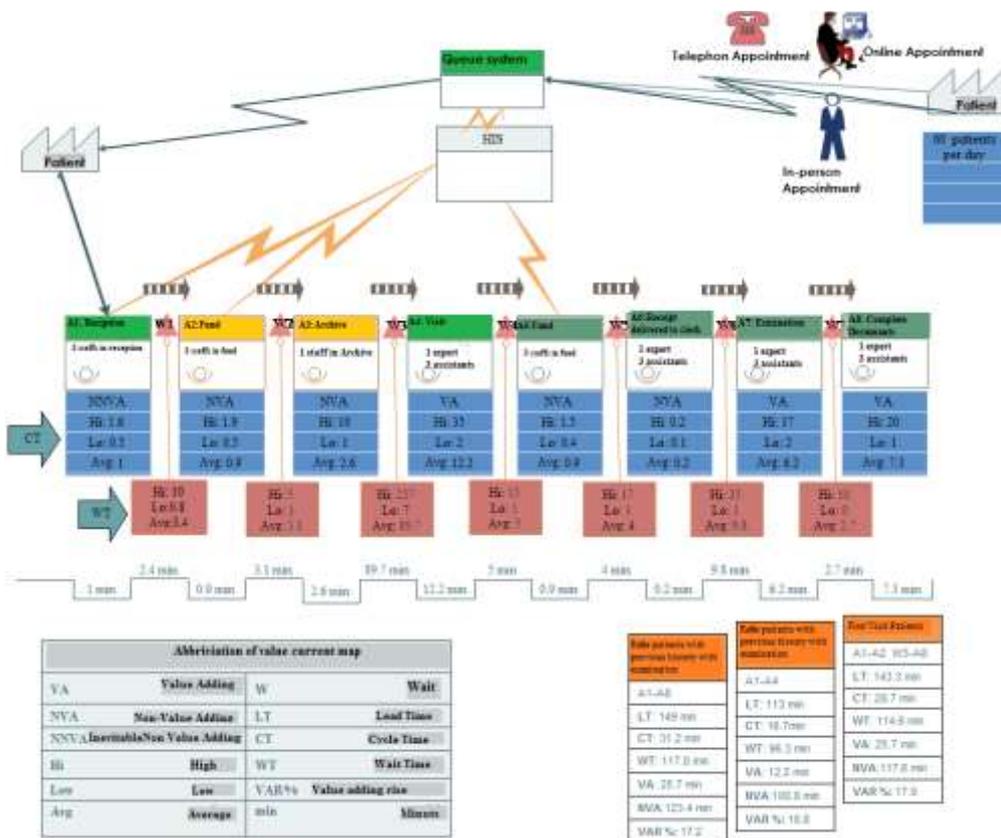


Fig. 1: Current value stream map for outpatient visit in the gynecology clinic

In other words, 80% (114.6 minutes) of the patient time is spent on waiting on the system and only 20% (28.7 minutes) of the patient time was spent on receiving medical care by the personnel on average.

Waiting time for follow-up patients t who were both visited and examined was calculated as 79% (117.8 minutes) on average. Waiting time for the patients who were only visited and not examined was calculated as 85.2% (96.3 minutes). VA activities time for these patients were respectively 17.9% (25.7 min), 17.2% (25.7min) and 10.8% (12.2 min). Then, CVSM was drawn [Fig. 1]. This map was studied during a focus group discussion and available wastes were identified from a lean perspective. Effective strategies were proposed to eliminate or reduce these wastes.

There was no continuous flow in visit process due to waiting time between various activities. In addition, visit process in the gynecology clinic followed a push system in which the patient should wait between different activities. The patients were driven from one activity to another one throughout the value stream regardless of readiness of personnel to offer health care services. The push system results in accumulation and waiting of the patients between different activities.

The FVSM [Fig. 2] aimed to draw continuous patient flow of the outpatient visit. If impossible, the activities were linked to each other through a pull system. Work cells was the first step to avoid push system in order to reorganize the activities and eliminate waiting time between different activities. A continuous patient flow is developed by eliminating unnecessary waiting times, increasing NVA activities and reorganizing the activities.

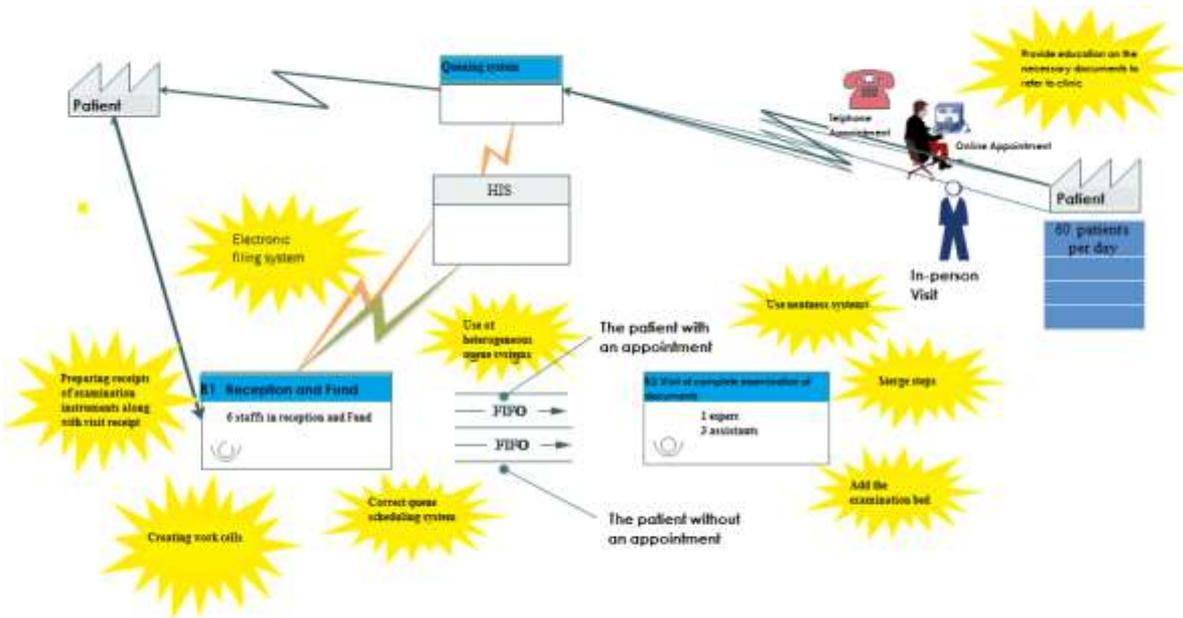


Fig. 2: Future value stream map of outpatient visit in the gynecology clinic

Electronic filing system was used to not only eliminate the archive step and the waiting time before this step but also eliminate the wastes caused by additional movements, correction and transfer. Delays identified in the CVSM were caused by additional movements and transfer, which were eliminated using 5s as well as identification and control of required papers and items at the beginning of the shift. These issues were eliminated in the FVSM.

The highest waste in visit process in the gynecology clinic was detected in waiting time prior to physician visit, which was accounted for 60% of total Cycle time on average. This issue was resolved in the FVSM using heterogeneous queuing system and modification of queue scheduling system.

The FVSM consisted of two activities after reorganizing the activities and developing work cells. These two activities were attached to each other using FIFO lines in the proposed map to avoid a push system and create a pull system. FIFO lines are suitable to attach movements in visit process in order to implement a pull system. This is because the patients are stable in visit process in contrast to emergency cases. Thereby, the process is organized using FIFO lines, which are scheduled using appointment system.

A mixed-registration-type appointment system was proposed in this study. Thus, 50% of available time slots were assigned to scheduled patients in a heterogeneous and alternative manner. Other appointments were assigned to walk-ins patients. In previous appointment system, walk-ins were visited after the patients with prearranged appointments. Thereby, they waited shorter time to be visited. Thus, two FIFO lines were defined for the clinic secretary. The first line belonged to pre-scheduled patients and the second line belonged to walk-ins patients. Therefore, the patients were called from the first line at first. If no patient answered, the second line would be called.

When maximum number of patients [predefined by the system] was detected in FIFO lines or at least one patient had spent the highest possible time on waiting [predefined by the system], a reactive plan for reallocation of resources would be implemented. The residents were asked to help to maintain a continuous flow in the visit process due to low number of patients in the clinic for prenatal care and prevention and treatment of cancer and plenty of free time of the residents in this clinic. Therefore, the secretary at gynecology clinic would refer the patients to the clinic for prenatal care and prevention and treatment of cancer as soon as the number of waiting patients or waiting time reached the maximum threshold. As a result, patient waiting time is controlled and predicted by FIFO lines. However, effective management of FIFO lines requires careful planning and willingness of the employees to help each other to maintain a continuous movement in the visit process. In other words, the residents would be drifted from one activity to another one, which necessitates a strong relationship between the personnel and attitude change toward effective cooperation in the process.

According to the above-mentioned materials, the FVSM follows a push system that allows continuous flow of the patient. Seven lean wastes were identified in the FVSM and effective strategies were proposed to eliminate or reduce these wastes. A review and comparison between the current and future maps revealed that complexity of the process has significantly decreased. The FVSM contains only two work cells and FIFO lines. Eight activities and seven waiting times in the CVSM were reduced to two activities and one waiting time in the future value stream map. The number of VA steps has increased from 20% to 33% while the number of NVA steps has decreased from 73.3% to 33%.

DISCUSSION

The findings showed that the time of VA activities has increased from 10.6 to 17.9 depending on type of the patients. The s spent from 79% to 85.2% of their time on waiting at the gynecology clinic. These findings are consistent with findings of those studies representing huge waste of time and high share of NVA activities in the field of health. The findings of a study in primary care in the UK showed that 67 processes are available in main services for healthcare in which 65% are in vain and can be eliminated in the FVSM [18]. Abu-Hamdet al. showed that 78% Drug round process refers to NVA activities on average in Ireland [19]. Analysis of value stream map for purchasing endovascular stents showed that only two processes from total 13 processes were VA activities and only 1.92% of the time was spent on purchasing stents as a VA activity and only 15.4% of human resources performed VA activities [20]. A study in the Netherlands showed that only 13.3% of esophageal cancer treatment activities are value adding [21]. The present study and the above-mentioned studies showed inefficiency of patient flow in many health care facilities and highlighted the necessity to identify wastes and take measure to improve this process. In other words, many efforts of staff and other rare and valuable resources are dedicated to NVA activities. In this system, the patients are involved with long processes, waiting times and huge wastes. Therefore, the patient as the main customer is not satisfied despite efforts of employees and resource allocation. Thus, the necessity for process improvement methods such as lean is highlighted more than ever.

Long waiting times at the clinics in public hospitals are main obstacles to service delivery in the OPD department, which was addressed in previous studies. AeenParast showed that waiting time to be visited by a physician was 87.4 minutes at orthopedic clinics [22]. Another study at clinics in Shariati Hospital in Tehran showed that average patient waiting time was 121 minutes [23]. All these findings are consistent with findings of this study and show that examination room is the bottleneck of services delivery to outpatients. Long waiting time is the most important factor for dissatisfaction of patients in the OPD. Previous studies suggested that reduced waiting time is effective in overall satisfaction with outpatient services [24]. According to the above issues, attention of senior managers, periodic monitoring, determining root causes of waiting times and bottlenecks are necessary to improve the process of providing outpatient services.

The findings showed that such factors as inefficiency of appointment system, presence of large numbers of walk-ins in early hours of the shifts and lack of timely presence of physicians at the clinic lead to long waiting time. Hong believed that root causes of many problems in the OPD are inefficient appointment system and schedule of service delivery. These findings are consistent with findings of the present study [24].

Various studies have been conducted in the field of reduced waiting time where scholars have used two methods.

- 1- Changes in distribution of the patients in the system through appointment system [, 25].
- 2- Changes in clinic schedules and hours of human resource activities [26].

Since this study was conducted in a teaching hospital and residents were involved in education and healthcare activities at the beginning of the day, it was not possible to change working hours of the residents in an effective manner to improve visit process. In such circumstances, it is essential to schedule arrival of the patients at the clinic in order to not only reduce patient waiting time, but also increase human resource and equipment productivity. An efficient appointment is one of the most important priorities in improving service delivery [27]. It seems that using an efficient appointment system and regulation of services delivery can reduce waiting times and increase satisfaction of the patients and the personnel.

The results showed that the delays caused by Transportation and Motion (e.g. the physician goes to another room to get examination instruments, the physician or the personnel go from one room to another one to search for necessary papers and equipment) can be eliminated using 5s. Searching for necessary equipment and forms were causes of waste in a urology clinic in a University Hospital in Canada, which were resolved using the 5s [28]. Mahabadi also used this method in a study to reduce patient presence in the system [29]. Khatibi also stated that one of the five most important causes of interruptions in operations was unavailability of equipment [30]. The results of this study are consistent with findings of the present study, which showed that 5s is an effective strategy for improvement in clinic workspace, decrease in time of implementation of tasks, faster access to necessary equipment and tools.

The present study had several limitations. First, identification of all wastes in the visit process is a time-consuming and challenging task, which requires a culture based on lean thinking at all levels of the organization to identify a thorough list of these factors. Second, only improvement opportunities were identified in the visit process. It is expected to achieve significant results in case that an effective intervention was applied to the case study.

CONCLUSION

The findings of this study showed that most of the proposed strategies could be implemented solely by modifying the existing processes without using either new human resources or expensive technologies. Hopefully, these strategies would reduce waiting time of the patients visiting the clinic and consequently might reduce average time of patient visit process. Education and institutionalization of lean management [particularly VSM] can be an effective step to facilitate implementation of healthcare reform plan, particularly the service package designed to improve the quality of visit process in outpatient clinics.

CONFLICT OF INTEREST

There is no conflict of interest.

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FINANCIAL DISCLOSURE

None.

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