

# Improving the medical records department processes by lean management

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## ABSTRACT

**Background:** Lean management is a process improvement technique to identify waste actions and processes to eliminate them. The benefits of Lean for healthcare organizations are that first, the quality of the outcomes in terms of mistakes and errors improves. The second is that the amount of time taken through the whole process significantly improves. **Aims:** The purpose of this paper is to improve the Medical Records Department (MRD) processes at Ayatollah-Kashani Hospital in Isfahan, Iran by utilizing Lean management. **Materials and Methods:** This research was applied and an interventional study. The data have been collected by brainstorming, observation, interview, and workflow review. The study population included MRD staff and other expert staff within the hospital who were stakeholders and users of the MRD. **Statistical Analysis Used:** The MRD were initially taught the concepts of Lean management and then formed into the MRD Lean team. The team then identified and reviewed the current processes subsequently; they identified wastes and values, and proposed solutions. **Results:** The findings showed that the MRD units (Archive, Coding, Statistics, and Admission) had 17 current processes, 28 wastes, and 11 values were identified. In addition, they offered 27 comments for eliminating the wastes. **Conclusion:** The MRD is the critical department for the hospital information system and, therefore, the continuous improvement of its services and processes, through scientific methods such as Lean management, are essential. **Originality/Value:** The study represents one of the few attempts trying to eliminate wastes in the MRD.

**Key words:** Information management, Lean, medical records, process improvement, team work

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## INTRODUCTION

Medical Records (MRs) is a set of documents that renders the clinical, para-clinical care, and financial information about the patient. The Medical Records Department (MRD) is responsible for collecting, and protecting patient information, and for disseminating it to the right people or an organization, in order to promote the quality of patient care.<sup>[1]</sup>

Each MRD in the hospitals includes the following four units, each of which undertakes special functions:

- Admission: Registration of inpatients and outpatients who are admitted to Hospital wards and the Accident and Emergency Department

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- Archive: Checking to ensure that a complete discharge summary and all other necessary notes and reports are present in the MRs; assembling and internally organizing the MR and filing them in an orderly and timely manner; retrieving these records for various users, for treatment and the provision of other services
- Statistics: Preparing statistics for administration, hospital wards, and external agencies such as the Ministry of Health; providing health information for physicians, nurses and students for medical research purposes
- Coding: Analyzing the MRs of all inpatient' following discharge and assigning a set of numeric codes to the diagnostic data based on the International Classification of Diseases-10 and the International Classification of Procedures in Medicine.<sup>[2]</sup>

As health care expenses continue to erode the budgets of households, governments, and healthcare providers, more suitable methods to reduce the cost of care are required. One tool that can increase efficiency and value is a change management technique called Lean thinking.<sup>[3]</sup>

In recent years, expanses of regulation approaches around these same objectives go emerged farther down various names. Faultless With, Kaizen, Kanban, and 6 Sigma are approximately solutions go off act endorse the interchangeable through want of the Lean technique.<sup>[4]</sup>

The aim of Lean management is customer satisfaction through the elimination of waste and the improvement of processes.<sup>[5]</sup> To meet customer needs, existing processes should have the necessary efficiency and effectiveness. A process will be effective when properly done. It should be done when properly selected and designed.<sup>[6]</sup>

Lean eliminates waste by taking out unnecessary processes and redirecting human effort toward value-added business operations.<sup>[7,8]</sup>

Womack and Jones claimed that better products produced by better processes should lead to happier customers?<sup>[9]</sup>

Waste, according to Taiichi Ohno, the Toyota executive responsible for the development of Lean thinking, can be described by the Japanese word "Muda." According to Ohno, "Muda" is evident in mistakes that require correction, production of goods without demand, inventories and remaining goods. Healthcare has its own specific types of waste, which include information, process, and physical environment. Healthcare is fraught with information waste. The guarantee b make amends for is to law from a single source of information. Anyway, depending on the electronic health record (EHR) becomes omnipresent, the heap of extra data, varied of which may never be used, will be a problem. Second issues connected more indicator hint offensive count up buddy proscription, reentering data, converting formats, data-errors, and data safety issues. Remodeling in turn types of spirit decrial compute rework, workarounds, approvals, and

waiting.<sup>[10]</sup> To fulfill Lean management, value stream mapping should be drawn. Value stream mapping identifies waste within a process. It helps the plan, construct an enterprise, label oppression within the process, and billet direction for transforming it. Value stream mapping begins by defining the current state, how the process is currently being performed.<sup>[10]</sup>

Studies over many years have shown "Lean to have a wide range of applications in hospital operations ranging from:

- Reducing inappropriate hospital stays
- Improving the quality and financial efficiency of trauma care
- Reducing the cost of temporary staff
- Improving operating room and emergency department efficiency
- Improving radiology processes
- Reaching better strategic decisions affecting marketing and capacity management, among other uses of Lean leading to improved hospital profitability."<sup>[11]</sup>

"One of the early adopters, Virginia Mason Medical Center in Seattle, a 350-bed hospital, reaped Lean benefits immediately after its 2002 implementation. They saved \$6 million in planned capital investment, freed 13,000 square feet of space, cut inventory costs by over \$350,000, reduced staff travel time around the hospital, and decreased infection rates, as well as greatly improved patient satisfaction. The Lean process eliminates waste by taking out unnecessary processes and redirecting human effort toward value-added business operations and in doing so, reduces production time, decreases costs and improves customer satisfaction. Doesn't this sound exactly like what healthcare needs?"<sup>[12]</sup>

The Ayatollah-Kashani Hospital affiliated, with the Isfahan University of Medical Sciences (IUMS), Iran has 10 wards, 196 active beds, the average length of stay of 2.41 days, bed occupancy of 70%. The numbers of inpatients' MRs that have been stored in the Archive unit. In 2011, there were 10,010 of inpatients' MR stored in the Archive unit. There were 16 staff members working the MRD in 2011. One research study in 2010 made the pairwise comparisons and weighting of the units of the MRD in three Isfahan hospitals: Al-Zahra, Ayatollah-Kashani, and Khorshid, with the following result: Regarding to clients and information relative function management, MRD of Al-Zahra, the Ayatollah-Kashani, and Khorshid Hospitals had a grade one, two and three respectively. According to the findings of this research that has been done by Analytic Hierarchy Process method in the MRD performance aspect of information management and customer were 0.268 and 0.311, respectively. On the other hand, performance of Admission, Archive, Statistics and Coding grade were 0.342, 0.249, 0.290 and 0.144, respectively.<sup>[12]</sup> There were many problems in the MRD at Ayatollah-Kashani Hospital. Therefore, there was a huge gap between current and perfect situation in the MRD at the Ayatollah-Kashani Hospital. Therefore, the management board asked researchers to solve current problems. They promised to support researchers.

This paper refers to the research was undertaken to improve the MRD by using Lean principles as a continuous improvement tool in the Ayatolah-Kashani Hospital, Isfahan, Iran. The aim of this study was, first, to identify processes, wastes, and values, and second, to eliminate waste and improve the processes of the MRD in the Ayatolah-Kashani Hospital by Lean management.

## MATERIALS AND METHODS

This research was applied and an interventional study. This study was carried out in the MRD of the Ayatolah-Kashani Hospital in Isfahan, Iran during the spring and summer of 2011. Data collected by brainstorming, observation, interview, and review of workflow during Lean sessions. To reach our goals; in which included improving MRD processes, find problems, and their solutions, we used brainstorming technique to motivates Lean group, generate their ideas, and to come up with creative their solutions to problems. We used interview and discussion methods to know current processes and workflow in MRD. Lean motivates people because it involves members of a team in bigger management issues, and it gets a team working together. The survey instruments were a plastic sheet (as a board), whiteboard pens, and some papers in blue and pink colors (blue for writing their problems on and pink for writing solutions on). In this method, we did not need to measure reliability of our instruments, but validity was approved by expert people in Health Information Management field. We put plastic sheet on the wall in Archive room and held our Lean sessions there.

To do the study, first of all, Lean training workshops were held by the researches. Workshops were held by 14 persons who were the MRD staff and top managers. Then, an invitation was sent to the qualified and responsible authorities (as the MRD Lean team) to attend Lean sessions which last for 12 sessions that lasted almost an hour [Figure 1]. The population included the personnel related to the MRD and some internal clients (14 persons participated) that formed the MRD Lean team. In Lean method, there is not any



**Figure 1:** A shot of Lean session in Ayatolah-Kashani Hospital, Iran

limitation for selecting a sample size. We used of MRD staff experiences to know external clients opinions of MRD.

As, Patel emphasized that the continuous improvement is one of the major goals of Lean management that can be defined as the ability for MRD services to meet customer's requirements and needs. To achieve this goal, first customers have to be identified and then their expectations and needs have to be understood.<sup>[12,13]</sup>

Toussaint and Berry believed that clinical and nonclinical staff members who are given the encouragement, training, and time to make meaningful improvements in how the work is done are unlikely to want to retreat to an earlier period when the formalized effort to improve existing processes was outside their domain of responsibility. As staff members gain confidence in their problem-solving skills and as they witness positive changes, momentum for even more improvement work is likely to build. This is Lean at its best; employees keep raising the bar, the organization becomes increasingly innovative; more staff wants to be directly involved, and attitude of continuous improvement becomes the driving force behind all work.<sup>[14]</sup>

We used of MRD staff experience to know external clients opinions of MRD. Therefore, during the Lean sessions first of all the customers and their needs, processes, wastes, and also valuable activities of the MRD in the Ayatolah-Kashani Hospital were identified by the MRD Lean team [Figure 2].

During the sessions, the MRD Lean team put forward their suggestions to remove current wastes; in addition, the practicability or non-practicability of the suggestions was discussed and finally the modifications in the processes were confirmed by the consent of the MRD Lean team.

## RESULTS

### Specify internal and external clients

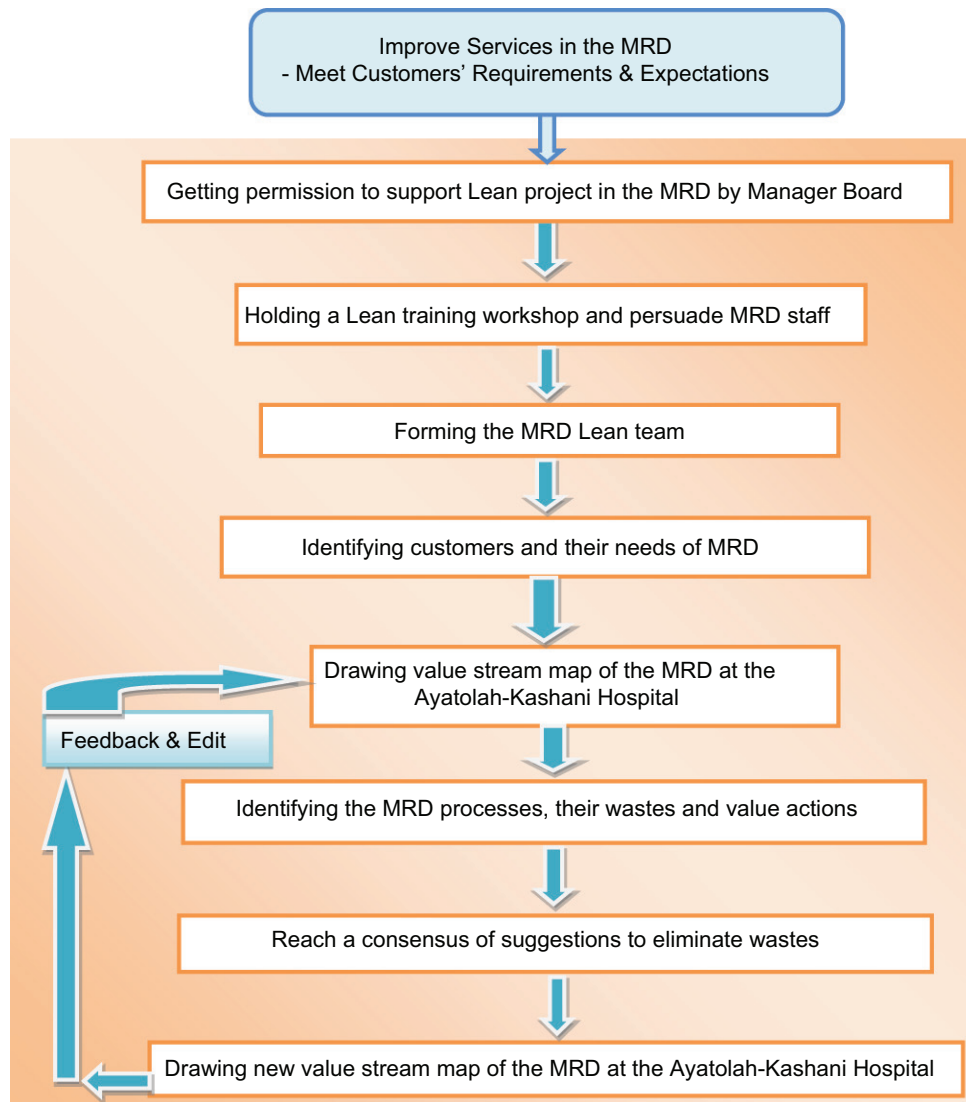
According to the findings, internal and external clients in Coding, Statistics, Admission, and Archive units were as follows:

#### *Clients of admission unit*

- Internal client: This unit has no internal client
- External clients: External clients of the Admission unit in the Ayatolah-Kashani Hospital include the patients going to be admitted in the hospital. The needs of these patients are to receive the MRs and get their gown.

#### *Clients of coding unit*

- Internal clients: Internal clients of the cutting unit in the Ayatolah-Kashani Hospital are researchers, professors, and students of medicine and geriatrics courses who study or work at the hospital or university
- External clients: External clients of the cutting unit in the Ayatolah-Kashani Hospital are researchers who are referred from out of the hospital to study the MRs.



**Figure 2: Steps of Lean Management in the Medical Records Department at the Ayatollah-Kashani Hospital, Iran**

*Clients of archive unit*

- Internal clients: Internal clients of Archive unit at the Ayatollah-Kashani Hospital includes the head and manager of the hospital, clinical personnel such as physicians, nurses and those individuals dealing with patients' treatment, accounting staff at the hospital, insurance officials placed in the hospital, researchers, and students related to the University of Medical Sciences
- External clients: External clients in this unit include the patients who need their own medical information to continue their treatment or need other demands such as rename, and also some organizations such as Military Exemptions and Public Duty Organization, Organization and Martyr Veterans Affairs, Islamic Revolution Court, Insurance Organizations, Charity Organizations, Iranian Legal Medicine Organization, The Medical Council of Iran, Department of Education, Welfare Organization, Bureau for Aliens and Foreign Immigrants and the researchers out of the Ayatollah-Kashani Hospital in Isfahan.

*Clients of statistics unit*

- Internal client: Internal clients on this unit include the head and manager of the hospital, supervisor of the hospital, hospital's financial manager and technicians of surgery rooms
- External clients of this unit include the emergency department, assistance, and Statistics unit of the IUMS, Local Registry Office, Health Center of the province and Medicine College and other departments in the hospital which need statistical information.

**Specify the processes based on the customer's point of view**

After identifying clients in different units of the MRD, the processes based on the customer's point of view in each unit were described.

In general processes of the MRD, general route of the MRs is considered and illustrated from the creation of the store by value stream mapping. The MRs are generated by

patients or those accompanying them at the reception desk in Admission unit, completed by medical staff and delivered to the MRD after discharging in the revenue department. At the MRD, it is registered in the computer database and after coding procedure, it will be stored in the Archive unit. In the case that it is not complete, it is returned back to the Coding unit to receive the proper codes and then it will be archived [Figure 3].

**Specify wastes, values, and suggestions**

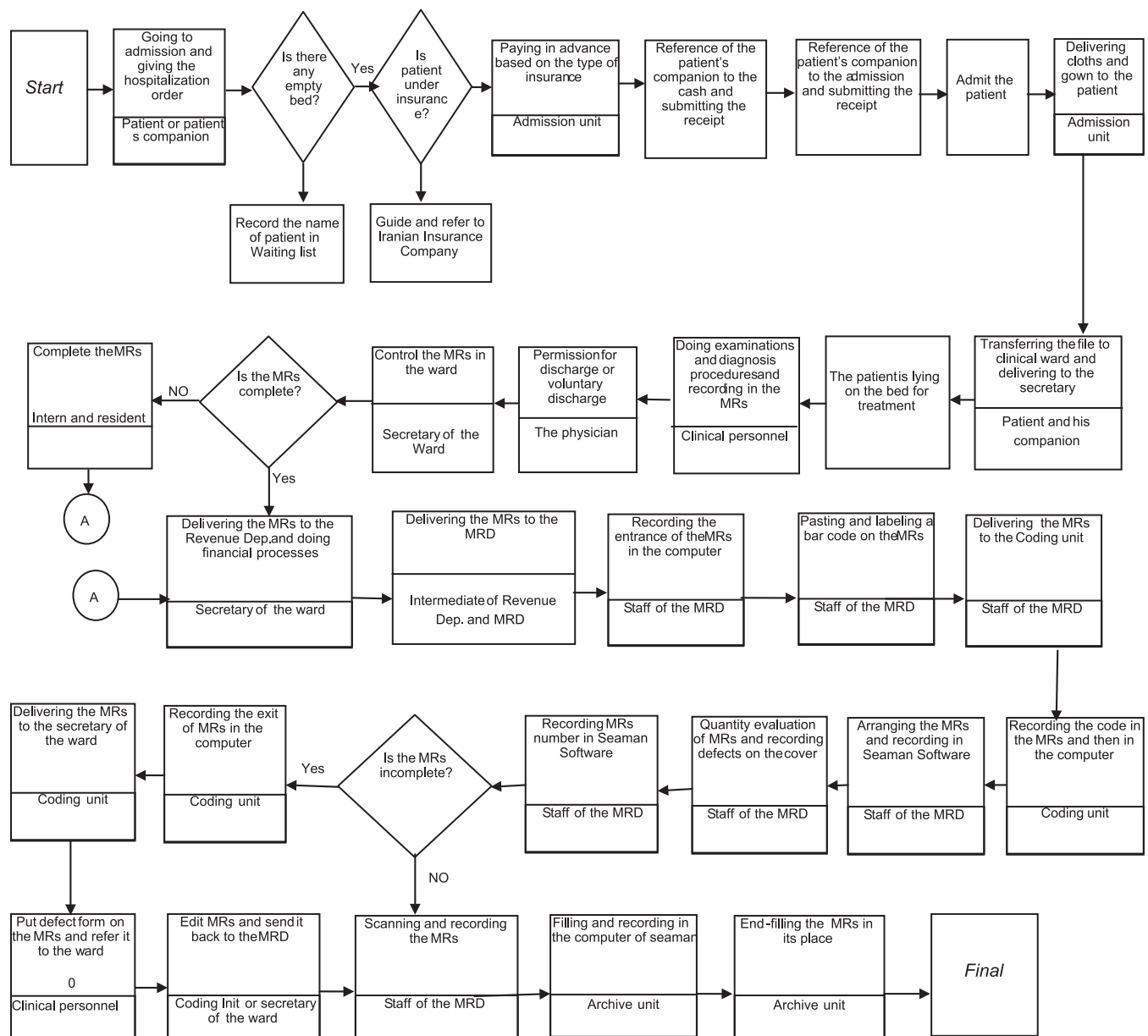
During sessions of Lean processes, wastes, and valuable activities were determined, and some suggestions were proposed to remove these wastes by the MRD Lean team. Table 1 shows the number of processes, wastes, values, and suggestions of the MRD Lean team according to the MRD units.

There were plenty of processes, wastes, values, and suggestions; the most important of them are mentioned here [Table 1].

**Waste processes at the medical records department**

Altogether, according to the workflow at the MRD, wastes and their categories were identified. The most important wastes are as follows:

- Lack of Pathology form of the MRs (information waste category)
- Delivery of the MRs of the hospital staff without any permission (physical environment waste category)
- Releasing the information of the MRs to people without a formal request letter from the director of MRD (physical environment waste category and unclear roles subcategory)
- Enrolling the patients' name wrongly by mistake at the Admission unit and facing the subsequent



**Figure 3: Value Stream Map of the Medical Records Department at the Ayatollah-Kashani Hospital**

**Table 1: Processes, wastes, values, and suggestions according to the MRD Lean team in the MRD units of the Ayatolah-Kashani Hospital**

MRD units	Number of processes	Number of wastes	Number of values	Number of suggestions
Admission	1	5	4	5
Statistics	10	6	1	8
Coding	1	4	1	9
Archive	4	11	5	7
Total	16	26	10	29

MRD=Medical Records Department

problems (information waste category and data-errors subcategory)

- Lack of unity in information on the MRs and the presence of conflict among final diagnosis in different parts of the MRs (information waste category, data safety and data-errors subcategory)
- Lack of proper and complete documentation of the MRs that caused improper coding (information waste category, data safety and data-errors subcategory)
- Lack of Progress sheet in >50% of the MRs (information waste category, data safety and data-errors subcategory)
- Reworking in the Statistics unit (process waste category, waiting and rework subcategory).

#### *Suggestions to eliminate waste processes at the medical records department*

Following the current wastes, the MRD Lean team proposed 29 suggestions which the most important of them are as follows:

- The MRD personnel should be responsible for receiving Pathology forms from the Pathology department, deliver it to the MRD and attach them to the MRs
- Receiving the MRs from different people should be banned; they should prepare a list of the names who are allowed to receive these MRs and inform it to the hospital manager for confirmation
- In general, all information about the MRs should be presented via formal request, so it is suggested that a request form be prepared by the MRD, so those who do not have a formal request refer to the hospital manager for confirmation and then refer them to the MRD for their requests
- In the statistics unit, it was proposed that much of the statistical reports have to be prepared by computers and the one who is in charge of such statistics receive them through the hospital network
- The doctors' credits are affected by their documentation on the MRs
- The MRD should report their activities as feedback to the attending physicians, the interns and the residents
- The correct and standard methods of documentation should be taught to the interns and residents, when they start their jobs in the hospitals through training workshops, by specialists in the Health Information Management
- The accuracy of the documentation of the interns and residents, as well as their effectiveness, should be reported

to their attending physicians and the vice chancellor of education of the hospital.

After identifying the wastes, the researchers identified the value activities.

#### **Identify the value stream**

##### *Value processes at the medical records department*

The value activities in the units of Coding, Admission, Statistics, and Archive contain the following:

- In the Archive unit, the MRs are given to the researchers based on the request forms to be completed by them and approved by the attending physicians and the vice-president in the educational affairs
- In the Archive unit, if the client is not the patient itself, needing a certified copy, a note is attached to the file signed by the client showing that the certified copy is submitted to him
- For the copies of the documents for the Military Exemptions and Public Duty Organization, the phrase "for the Military Exemptions and Public Duty Organization" is written, and a tag is stuck over it to prevent others from any probable misuses
- No answer is given to the MRs which has financial problems
- On the cover of the MRs which copies are provided, it is written that a certified copy was submitted
- The MRs related to the Neurology ward, due to its being single-service, a summary sheet of the MRs is provided
- SPSS training courses for staff of the Statistics unit is held
- A person who is in charge of the statistics unit prepares voluntarily different statistical reports; therefore, when the authorities require reports, they are ready and are submitted at once
- The hospitalization order form all physicians are the same
- The Admission unit conducts those patients who are not under any insurance to the Iranian insurance to prevent them from wasting their time and confusion.

When the wastes and the value activities were identified, the offered suggestions from the MRD Lean team were evaluated and finally the modified processes were identified.

## **DISCUSSION**

Based on the results 19 processes have been identified in the MRD of the Ayatolah-Kashani Hospital (including Statistics,

Admission, Archive, and Coding units). This department offers services to the internal and external clients according to rules and formal requests. The general workflow of the MRs in the MRD, from the creation of the store, was taken into consideration and was delineated.

Hepp said “One of the problems that healthcare organizations face is that there is a lot of waste as they navigate patients through the health system. That waste inherently causes problems with EHR information, patient safety and quality, and medication reconciliation,” said Michael Chamberlain, president of Simpler North America. “When you automate that and put in an EHR system, you are not necessarily changing the way those processes are done. In fact, it can be worse; you can actually be automating waste. Before automating EHR information, Chamberlain recommends that organizations make sure they have new streamlined processes in place so that they get the greatest benefits from the new solution.” Denver Health quickly recognized that if they just put in an EHR system over the top of bad processes, they wouldn’t improve their outcomes. What they needed to do was simultaneous—they needed to improve patient flow and then overlay EHR over a new, better process for it to work effectively.”<sup>[15]</sup>

Schmidt stated, “Most U.S. medical practitioners still use paper as the predominant medium for MRs. This fact makes it very hard (impossible, really) to share information for a referral, or with a team of providers treating the same patient. The technology clearly exists to move beyond handwritten prescriptions or fax and courier as the predominant means of exchanging MRs. Lean integration shows how this goal can be achieved incrementally and in a sustainable manner.”<sup>[16]</sup>

The present research has specified the processes of requesting information for the Military Exemptions and Public Duty Organization.

On the other hand, the rules for changing the patient name have specified in some cases, according to the Organization and Martyr Veterans Affairs request and permission and confirm by the Islamic Revolution Court.

To implement the Lean steps and improve the performance of the MRD, the Healthcare Performance Partners (HPP) group also delineated the current processes of that department, by the use of brainstorming, on the basis of which they discovered the problematic processes (Lean and six sigma combine to improve performance for HIM). In their research, one of the most significant stages of doing the job was a delineation of the current processes by the brainstorming of the MRD Lean team.<sup>[17]</sup>

With HPP assistance, a 17-member team applied Lean Health Care tools and principles to rectify the problem. The team used value-stream maps and process maps to examine the sources of patient records, bottleneck for the MRs’ flow, and how the records were handled at those points.

This comprehensive assessment revealed a number of issues: A lack of standardized work practices and unbalanced flow in the MRD, lead to an inefficient work process and confusion regarding individual staff members’ responsibilities; Poor communication between hospital departments, resulting in spotty data collection; Inadequate Records workspace, with lack of space, out-of-date equipment, and frequent distractions causing disorganization, lost records, inefficient processing of patient information, and a delinquency rate of 60%.<sup>[17]</sup>

Furthermore, the findings of Mettler *et al.*, are noticeable. In this research that deals with the promotion of the data quality in the health care systems, they write, “In America, about 98,000 people die because of wrong treatments when they are bedridden in the hospitals. In England and Australia, 12–16% of the inpatients face undesirable happenings; the low quality of the health care inputs is responsible for this condition.”<sup>[18]</sup>

In the present research, when the coding processes had been investigated, a lot of cases have been also encountered in which there was a lack of correct file documentation which will result in confusion while determining a precise code.

Chopra *et al.*, said “Unfortunately, registration is also one of the most complex processes performed at the Medical Group, and registration errors were found to account for half of the claims denied. As a result, staff at every physician office had to be knowledgeable on all nuances of the different and often changing insurance plans – in addition to handling their normal office functions such as scheduling appointments, taking telephone messages, and pulling MRs.”<sup>[19]</sup>

In the present research, the MRD Lean team offered some suggestions for the documentation of the MRs and a reduction in their shortages. Moreover, they carefully examined the processes and promoted the current ones and eliminated the wastes. Among the processes which were modified and suggested in this research the processes of Admission, Statistics, and Archive units were as follows:

- Answering the insurance companies and the Military Exemptions and Public Duty Organization (to eliminate the physical environment waste category)
- Answering the patient’s request for changing his/her name (to eliminate physical information waste category)
- Answering the requests of Organization and Martyr Veterans Affairs (to eliminate the physical environment waste category)
- Collecting and sending the number of the inpatients MRs (to eliminate the process waste category)
- Calculating the ready, empty, occupied surgery rooms (to eliminate the physical environment waste category)
- Calculating the statistics of patients in wards and the emergency department (to eliminate the physical environment waste category)
- Preparing and sending the reports related the cancer patients and suicide attempts (to eliminate the physical environment waste category).

Ajami and Ketabi stated about some wastes in the discharge process in Ayatollah-Kashani Hospital as, the personnel's opinion about factors affecting waiting time in the discharge process, based on their importance from most to least, which is as follows: Absence of networked Hospital Information Systems, absence of guidelines for personnel involved in the discharge process, lack of on time patients' visit by physicians and lack of patients' financial ability to pay their bills. The personnel's suggestions on how to reduce the length of the discharge process are based on importance, from most to least, as follows: Formulation of guidelines for personnel involved in the discharge process, implementing Hospital Information System networks, in-service training for personnel and timely documentation by interns of the summary sheet (Discharge Summary) of the MRs.<sup>[20]</sup>

Scanlan-Hanson said, "How might this process be more efficient? Only the people doing the work can tell you!" In general, the job problems do not appear unless their processes are not identified and investigated thoroughly and step by step. Due to the involvement of the masters of the processes and the sharp insight they acquired, this research identified and eliminated many of the wastes. There is a hope for it to be effective in the improvement of the services. Because, the aim of Lean management is not only to pursue short-term results, but rather to create a Lean team, that is, to cultivate a continuous improvement culture, to make Lean a way of thinking in staff's daily work. Then, they report their opinion on the Lean team to improve their function continuously.<sup>[21]</sup>

Chopra *et al.* pointed out, "Inaccurate registrations and loose processes in the physician offices led to significant patient complaints. Bills were sent to incorrect insurance companies who would deny payment, and then the patient was held responsible for the bill. Office staff juggling multiple tasks would sometimes unknowingly create duplicate patient accounts, creating multiple bills for a single patient or family."<sup>[19]</sup>

Dehghan-Nasiri and Worthington stated, "National Health Service trust had been causing delays and cancellation in the clinics prior to the study. To improve the situation, Lean techniques were chosen to be implemented across the core departments involved in handling MRs which consisted of MRs, Medical Secretaries and Main Outpatient Clinics. In the first step, an information flow map was developed from the moment a patient presents a health issue to the point of discharge. It was observed that usually 150 procedures were taking place in an average patient treatment with >50 hand-offs."<sup>[22]</sup>

In addition, the other defect was seen to be poor communication between departments. The consultant team focused on the elimination of wasteful procedures that add cost and increase time to respond to patients. A group of managers, secretaries, clerks and nurses were trained in Lean principles, and a 7-week implementation followed.

Shazali *et al.* in which quoted Folinas and Faruna, "successful in implementing Lean in healthcare can increase higher income and lower cost for the organization. Therefore, financial performance is one important performance measurement in healthcare."<sup>[23]</sup>

The processes of the Admission unit were also modified. Delivery of gowns and clothes which is the duty of the warehouse was the responsibility of the Admission, which caused an increase in the patients' waiting time in the Admission unit queue. Thus, the MRD Lean team suggested that this duty be assigned to the hospital warehouse to improve the speed of the services offered to the patients.

## CONCLUSION

This research revealed that achieving the patients' satisfaction as the most significant customers of the health system, is one of the major criteria in measuring the quality of the services offered to the people in the hospitals and the medical centers. It is also the most important goal of the Lean management. The implementation of the Lean management in the MRD is so helpful and desirable, because it is on the basis of a team work with the presence of the masters of the processes who are closely involved in the duties and activities of their units and are aware of the precise details of the current activities.

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