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Editorial

Example of Lean Management in the Health Sector; E-Prescription Application

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Abstract

In 2013, Ministry of Health carried out the application of 'e-prescription (e-prescription is a regulation of electronic prescription instead of using paper." within the scope of Lean Management. Measuring the knowledge level of using this application among doctors, pharmacists and citizens and determining the risks and the benefits of the system are the purposes of this study. In this context, the theoretical part of the study is comprised of literature review and the field research is done with a survey applied to 150 people comprising doctors, pharmacists and the people using e-prescription method.

Key Words: Lean Management, Lean Principle, E-Prescription.

Introduction

Due to the globalization, technological advances and rivalry ,today's businesses are flexible, free of unnecessary process and are obliged to carry out activities in the shortest time with minimum input and optimum output. Understanding of 'Lean Management' is one of the ways helping to achieve these determined goals.

Lean Management is described as a system without any unnecessary elements in structure in which some factors are reduced such as mistakes, cost, stock, labour, R&D and production processes, scrap and customer dissatisfaction. Lean thinking system provides much more output by spending less effort, equipment, time and area and provides a closer approach to the customers' expectations (Womack et al., 1990).In other words, being simple means disengaging everything (stock, bureaucracy, etc.) that is not needed in organization (Türkkan, 2010).

Lean management system was successfully implemented by Toyota Motor in 1945 and has spread to other sectors. The health sector constituting a sample of this study carries out services with a structure consisting many complex activities such as medical services and hosting. Within this aspect, applying lean management principles in this sector directly reflects to the quality of patient care and treatment results because the lost energy in bureaucratic and unnecessary processes will be transferred to treatment process which is the main activity. In aspect of hospitals 'Lean Management' is a method which allows to improve the quality of care by reducing the mistakes and patient waiting times. In some sort, lean management is a system which removes the handicaps at work and guides stakeholders to provide a patient-centered care and strengthens the institution by reducing risks and expenses in the long run (Grab,2011).

The E-prescription system is used both to prevent paper wastage and to save time in health sector and can be viewed as an example of lean management practices. E-prescription is the utilization of of electronic prescriptions instead of using paper. Therefore SGK and all other stakeholders (hospital, pharmacists, doctors, etc.) are able to achieve correct and reliable results. This research studies the benefits and risks of this system and determines the knowledge level of users (doctors, pharmacists and citizens).

Conceptual Framework

The Concept of Lean Management: Being developed by the Japanese Automotive Company Toyota during the 1940s and applied successfully in both production and service processes until today and used in a number of sectors like textile and white appliances, the philosophy of lean management is defined as; a production system that preserves no unnecessary elements in its structure and minimizes the elements like mistake, cost, stock, workmanship, research and development process, production area, outage and customer dissatisfaction (Womack et al., 1990). *Being lean means getting rid of everything unnecessary*. In addition to this**;** it means getting rid of not only the unnecessary procedures

regarding production, but also the unnecessary duties and costs in the organization (Türkkan, 2010).

Lean management is aimed at differentiating what is valuable from what is wasteful by changing the focal point of management and focusing procedures and studies that affect the products rather than fixed organizational and technological assets. This allows profit to be grasped byby cutting down onwaste. Lean Production is a form of production and management that involves basic techniques withing the chain of supplier-producer-customer and has as its target a wasteless production. The main strategy in lean production is to increase the speed, decrease the time of flow and enhance the quality-cost-delivery performance all at the same time (Özkan,2015).

Lean Management at Health Institutions: The technique of lean management could be used in enhancing the blocked and non-operating processes at health institutions. The use of this technique will not only make the health institutions operating in both a complex structure and a hierarchical order more flexible, but also minimize the expenses and mistakes and decrease the costs. In addition to this, it will provide a saving on time and a quality service and decrease the work load. The ultimate goal of lean management at health institutions is to increase the value of patients. The technique of lean management which has important acquisitions in health sector is applied in countries like the United States, England, Canada, Australia and Italy. The first archetypal application of Lean Management in Turkey was realized by Confi-Dent Oral and Dental Health Center (www.kobipostasi.net). Uludağ University Medical Faculty Hospital has started a project titled "Applying the Lean Notion in Health Services" as a public institution. The objective of this project is to remove the corporate wastes without sacrificing the quality (www.hekimpostasi.org.tr). The following table shows the list of the most frequent waste types in health institutions.

Table 1: Waste Types in the Service Sector (Hospitals)

Wastes	***Short Definition of Waste***	***Examples from the Hospital***
Mistakes	Doing the job wrongly and spending plenty of time to fix it	Determination of missing materials during the operation and giving wrong drugs to the patient
More than enough production	Stock production outside the demand or need of the customer	Applying an unnecessary diagnosis, going into detail for the simple problem of the patient
Unnecessary material action	Unnecessary actions of the pieces of a system	Having a blood laboratory outside the hospital, being away from the copier machine
Waiting	Time elapsed between the start and the finish of the latter job	Patients waiting during the examination
	Storing the over-produced	Extra out-of-date drugs,

Overstock	products, storage costs, deterioration and loss costs	deterioration of other medical equipments being used in the hospital
Unnecessary human action	Unnecessary actions of the hospital personnel frustrating others	Unnecessary interfacility actions with a bad settlement plan
More than adequate proceedings	Doing things that are not appreciated or needed by patients	Requesting of information registered in the system in other services
Human potential	Ignoring to get the opinions of the personnel, listen to them and make investments to their career	Medical personnel with a decreased commitment to an organization where they are not involved

Referans: Graban, M. (2011),"Yalın Hastane", Optimist Yayınları, İstanbul,.

Westwood et al. (2007) stated that using lean management tools provided a number of benefits, which are as follows.

- Patients' flow of values gets improved.
- The duration of diagnosis and treatment gets faster and shorter.
- The capacity is used in the best, the most efficient and effective way.
- The costs are decreased.
- Majority of wastes are removed.
- Waiting periods are shortened.
- The duration of remaining in the process is decreased.
- The efficiency is increased.
- A higher number of patients could be treated.
- More reliable and more conscious services are formed.
- Processes and instruments being used are standardized.
- Workers have increased levels of motivation and spirits.

Sample of Lean Management in Health Sector; Electronic Prescription System

Prescription: "A signed technical script addressing to pharmacists, which involves written information about the drugs that are considered necessary for patients by physicians and the ways of using these drugs, as well as the instructions of drugs to be taken or used in public treatment and the drugs that are recommended by physicians for patients and the ways of using them" (www.tdk.gov.tr).

Electronic Prescription: In Turkey, Health Institutions have been using electronic prescriptions (e-prescription) since 01.07.2012. The Social Security Institution defines the e-prescription as; "a prescription that is formed by physicians on the systems of health service providers in a way that is announced and defined by the institution and is recorded in the

MEDULA system (a health information system software) in the electronic environment and is given an electronic prescription number" (www.medeczane.sgk.gov.tr).

Following is the comparison of the procedure steps before and after using the Electronic Prescription.

Present situation before the e-prescription

1. Patient's applying to the health facility
2. Completing the procedure of examination
3. Writing and signing the prescription (paper prescription) manually and giving it to the patient
4. Recording the prescription in the Patient Treatment Pad and giving a Protocol Number
5. Pharmacists' recording the prescription in the MEDULA PHARMACY SYSTEM
6. Obtaining information from the patient like signature and address in this process
7. Delivering the prescription manually to the physician and making the necessary corrections in case of a mistake
8. Packing all the prescriptions and delivering them to the SSI by hand for repayment at the end of the month
9. SSI's manual separation of prescriptions to be examined in examples
10. Presenting the exemplified prescriptions to analyzers in the manual environment
11. Performing both electronic and manual examinations
12. Archiving the prescriptions within packages.
13. Waste of Paper and Time

Changing condition with e-prescription

1. Patient's applying to the health facility
2. Completing the procedure of examination
3. Writing the prescription in the electronic environment and giving a number to the patient
4. Pharmacists' recording the rule input and data matrix information of the drug in the system regarding the repayment -if available- without recording the prescription in the MEDULA PHARMACY SYSTEM
5. Physician's conducting the necessary procedures in the electronic environment in case of a mistake in the prescription
6. Electronically separating the prescriptions to be examined by the SSI in examples at the end of the month
7. Examining the exemplified prescriptions in the electronic environment
8. Archiving the prescriptions in the electronic environment.

Advantages of Prescription

The advantages of e-prescription, which will save up the paper being used for at least 1.5 million prescriptions in a day even if it is evaluated only in terms of paper waste, are

explained by the Monitoring and Evaluation Department of the General Directorate of General Health Insurance (2012) as follows:

From the point of health service providers/physicians;

1- False prescription; No prescription will be written outside of the information and the control of physicians. By this way, the physicians will not be held responsible for prescriptions that are not written by them. No prescription will be written using the name of the health service provider.
2- Prescription standard; The standard of forming the prescriptions will be provided.

From the point of patients;

1- Wrong drug; Electronic prescriptions will remove the administration of wrong drugs that may be caused by both the font styles of physicians and different evaluations at pharmacy being experienced in manual prescriptions.

From the point of pharmacy;

1- False prescription; Pharmacies will no more experience penal situations caused by false prescriptions. A prescription that is not written by a health service provider will not be recorded by the pharmacy.
2- Recording the prescription data; While recording the prescription, the pharmacists are required to record approximately 31 types of data in the Medula pharmacy provision system. The electronic prescription will enable us to get majority of these data ready in the system. The pharmacists will record only 6 types of data in the system.

3- Penal actions; The situations where it is hard to determine who performs the forgery and drug addition being experienced in manual prescriptions will not repeat in this prescription and pharmacies will not encounter with penal actions.
4- Wrong drug; Electronic prescriptions will remove the administration of wrong drugs that may be caused by both the font styles of physicians and different evaluations at pharmacy being experienced in manual prescriptions.
5- Manual document; Pharmacies will not deliver the electronic prescriptions and annex documents to the Institution for repayment.

From the point of the Social Security Institution;

1- False prescription; False prescriptions that are written with false stamps will not be delivered to the Institution.
2- Manual document/archive; The electronic bill that is considered to be used soon will enable us to deliver the documents from health service providers and pharmacies to the Institution no more. There will be no problem in the stages of receiving, exemplifying, examining and archiving the prescriptions following the repayment for repayment.
3- Prescription annex documents: There will be no need to deliver the prescription annex documents (such as documents showing the result of examination, approval form outside of indication, patient safety follow-up form) to the Institution.

4- Prescription forgery; The penal actions involved in the contracts of pharmacies due to forgeries and drug additions will no more be experienced as in manual prescriptions.
5- Supervision; The problems being experienced in reaching the prescription regarding the examinations and supervisions to be performed by institutions and third parties will be removed.
6- Medula hospital-Medula pharmacy association; Medula hospital system and Medula pharmacy system will be associated.

Studies on Lean Management in the Health Sector

In his study, Pearce (2004) emphasized the efficient use of beds at hospitals and defended the improvement of these processes. In their study, Steyn and Walley (2004) emphasized the problem of standing in lines at health organizations, investigated the reasons of these lines and finally associated them with the instability in demand and capacity. As well as the application of lean principles, Correa et al. (2005) suggested the use of RFID (Radio Frequency Identification- RFID), which is a new technology enabling the medical personnel to see all the changes regarding the patients, and exemplified the collocation of lean principles and RFID.

In their study, Wadhwa and Wadhwa (2005) prepared method cards, made a contribution to the standardization of things, observed the processes at the hospital and removed activities causing waste and creating no value. In their study, Synder et al. (2005) recommended recording the patient information via the automation system and by this way, they removed the waste of time caused by rerecording the information at the hospital. In his study, Zidel (2006) associated the patient deaths with complications in the processes and recommended enhancing the processes via lean methods.

In their study, Mathur et al. (2006) observed an inverse proportion between the waiting period of patients and the patient satisfaction and thus, they started studies for increasing the satisfaction by decreasing the waiting periods and used 6 Sigma techniques in their study. In his study, Efe (2011) investigated the applicability of Lean Thought in service systems and the availability of benefits being acquired in manufacturing systems via the philosophy of lean production also in service systems and thus, conducted a study in the Emergency Service of Ankara Numune Training and Research Hospital. Graban (2009) published a book titled "Lean Hospital" and in his study, he emphasized the lean health, explained both the necessity of lean hospitals and the concepts of value and waste, made suggestions for enhancing the flow and approached the vision of lean hospital.

Yüksel (2012) published a book titled "Lean Health" and in his study, he explained the concepts of lean thought, discussed the lean health applications, emphasized the data enveloping analysis and recommended applying lean management to the processes in laboratories. In his Postgraduate Thesis titled "Lean Management Systems at Hospitals",

Aytaç(2009) holistically approached the procedures contributing to the recovery of patients and targeted to develop precautions for preventing the interruption of the value flow via lean production techniques. It was asserted that techniques like value flow mapping, work standardization, 5S and kanban would decrease the average duration of patients to remain in the system and prevent medical mistakes. The application was aimed at removing the idea that the techniques being used in production could not be applied to individuals.

Research

Sample: 150 people in total consisting 50 pharmacist, 50 doctors and 50 from other occupations that are chosen randomly in two provinces (Gümüşhane and Trabzon cities in Turkey) form the sample of the study.

Scale: Survey method is preferred as a means of input collection. In order to measure the service providers' and service users 'perception level, benefits and risks of the system ,a survey comprised of 22 statements and three dimensions (knowledge level, benefits and risks of e-prescribing) is conducted .

Table 2. Table of Reliability Analysis Result

Cronbach's Alpha	Number of Question
,729	22

Table 2 shows the reliability analysis results concerning scale in this research are (Cronbach's Alpha): (0,729). According to these results, it can be identified, that all analysed have acceptable reliability values.

Table 3. Table of Validity Analysis Result

KMO and Bartlett's Test

Kaiser-Meyer-OlkinMeasure of SamplingAdequacy.		,811
Bartlett's Test of Sphericity	Approx. Chi-Square	2,582E3
	Df	231
	Sig.	,000

Table 3 shows that Validity Analysis of measurement. The Kaiser–Meyer–Olkin measurement of sampling adequacy was .811, indicating sufficient intercorrelations and validity.

Table 4. Result of Lean Management Positive way- (Benefit) Survey

The benefits of e prescribing system	Definitely/ Don't Agree %	Don't agree %	Indecisive / No idea %	Agree %	Definitely Agree %
1. e-prescribing application saves time.	6,7	2,7	---	**52,7**	38,0
2. e- prescribing application prevents paper wastage.	5,3	2,0	---	**48,0**	**44,7**
3. e- prescribing provides convenience to patients.	6,7	16,0	15,3	**28,7**	**33,3**
4. e- prescribing provides convenience to doctors.	8,0	2,7	7,3	**38,0**	**44,0**
5. e-prescribing application allows you to control drug costs.	5,3	2,0	23,3	**42,7**	26,7
6. with e-prescribing application access to drug statistics is quick and easy.	6,0	2,7	6,7	**50,0**	34,7
7. e-prescription system contributes to evaluation and development of doctors' prescribing performances.	4,7	4,0	26,0	**44,0**	21,3

Table 4 shows the answers given by pharmacist, doctors and from other occupations for the question of **"**"what is the *positive effect of e-prescribing system*?".

Findings And Results

It has been tried to determine the knowledge level and attitudes of 'doctors, pharmacists and users' about e-prescription. The information acquired as a result of the analysis is below:

- 74,7% of the respondents state that they prefer e-prescribing instead of paper prescriptions.
- 93,3% of the respondents state that they have sufficient information about e-prescription.
- 68% of the respondents state that they have a training for the use of e-prescribing.
- While 85,4% of the respondents claim that e-prescription is not complex and challenging to use, 12% of them claim the reverse.
- While 76% of the respondents find e-prescribing reliable, 35,3% state there are deficiencies in the system.

To a large extent respondent's state that they mostly agree to the questions which demonstrates e-prescription is a part of Lean Management. As it is understood, e-prescribing is a lean management method approved and appreciated by everyone. Respondents have adopted e-prescribing as a useful application.

In the study, it is questioned whether e-prescribing has negative/ risk ways. Respondents claim that;

- They are not sure about the negative ways but believe that there will be legal issues,
- The E-prescribing system will increase the illegal usage by in rate of 51.3%
- If the system gives an error, hand written prescriptions can be used (56,6%) and there will not be paper wastage on condition of being essential(60%).
- When the system is not working, service providers and recipients have difficulty (60%), , they do not need to worry about the security the system provides (63,3%) and they find the system reliable (75,3%).

E-prescribing system applied within lean management has made improvements in health sector and proved to be a valuable evaluation management tool. This wastage avoiding management philosophy separates qualified activities from unqualified ones in respect of health sector and gives opportunity to focus on offering quality service by reducing the time incured expenses, wastages and mistakes. For instance, many factors such as prescribing, drug use and doctor performance can be searched and checked simultaneously.

When prescriptions were written utilizing the old system, -it was found to be- difficult and time consuming. As many innovations reflect common practices in the technological age, these types of innovations and improvements carried out in health sector can improve work load productivity and decrease the workload of employees.

Conclusions

It is concluded that although the system is new, it has been understood and become habitual for users. While some of the respondents that we have found time to discuss with are extremely willing and responsive towards the system, the majority express their contentedness with what they experience . Therefore it can be said that adjustment behaviors will disappear in time in the future.

Thanks to e-prescribing, previous activities that resulted in waste of time, paper, in the need for excessive storage which slowed the workforce have been replaced with improvements in all of these areas. In hospitals, the employee satisfaction among pharmacists has increased and the process has gained speed due to e-prescribing.

References

Aytaç, Zeynep, (2009), "Hastanelerde Yalın Yönetim Sistemleri". İstanbul Teknik Üniversitesi / Fen Bilimleri Enstitüsü / Endüstri Mühendisliği Anabilim Dalı yüksek Lisans Tezi.

Correa, F. A., Gil, M. J. ve Redin, L. B., **(**2005). Benefits of Conneting RFID and Lean Principles in Healthcare. *Bussiness Economics Series 10,*Working Paper, pp. 5-44.

EFE, Ö. (2011). Yalın Hizmet/ Değer Akışı Haritalama: Bir Acil Serviste Uygulanabilirliği,Selçuk Üniversitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi.

Graban, Mark, (2011). **"**Yalın Hastane", (çeviren: Pınar Şengözer), Optimist Yayınları.

Mathur, D.S., Stone, D., Simpson, D. ve Barnt, W., **(**2006). Bridging Lean Six Sigma to Engineering Management Model Through Healthcare. *International Journal for Quality in Healthcare*, 14, pp. 493-502.

Özkan, Memet (2015). "Yalın Düşünceye Giriş" http://www.danismend.com/ (Erişim tarihi: 05.09.2015).

Pearce, J., 2004. Achieving Timely 'Simple' Discharge From Hospital – A Toolkit for the Multi-diciplinary Team, Department of Health Chlorine Free Paper, London, UK

Steyn, R., Walley, P., 2004. Reducing Waiting Times in the NHS: Is Lack of Capacity the Problem? *Redcliffe Medical Press,* Birmingham, UK.

Synder, K. D., Paulson, P. ve McGrath, P**.,** 2005. Improving Processes in a Small Health-Care Network. *Business Process Management Journal.,* Vol.11, 87-99

Türkan, Ö.U. (2010) Üretimde Yalın Dönüşümün Temel Performans Kriterleri, BAÜ Fen Bil. Enst. Dergisi Cilt 12(2) 28-41
Westwood, N.,James, Moore, M., Cooke, M.,(2007) "Going Lean in the NHS".http://www.birminghamcancer.nhs.uk/uploads/document_file/document/4ff2d719358e9870fe000032/going_lean_in_the_nhs.pdf.

Wadhwa, A. ve Wadhwa, G. S., **(**2005). Adirondack Oral and Maxillofacial Surgery Case, Better Solutions Consulting

Womack J.P.,Jones D.T. Ve Roos D. (1990), "Dünyayı Değiştiren Makine", Türkçesi: Otomotiv Sanayi Derneği, 1, OSD Yayını, Panel Matbaacılık, İstanbul,
Yüksel, Hilmi, (2012),**"**Yalın Sağlık", Nobel Yayım, Kasım

Zidel, T. G., **(**2006). A Lean Toolbox-Using Lean Principles and Techniques in Healthcare. *Journal of Healthcare Quality*, Web Exclusive, Vol: 28, pp. 7-15.

www.tdk.gov.tr/index.php?option=com_bts&arama=kelime&guid=TDK.GTS.53768d4c76f2f6.78345230 (Access Date: 05.04.2014).

T.C. Sosyal Güvenlik Bakanlığı Genel Sağlık Sigortası Genel Müdürlüğü İzleme ve Değerlendirme D. Bşk. (2012) (-e reçete sunumu).

www.usaksaglik.gov.tr/upload/dokuman/e_recete_sunumu.ppt (Access Date: 05.09.2015).

www.kobipostasi.net/2011/07/05/saglik-sektorunde-sifir-hata-arayisina-yalin-cozum/ (Access Date: 07.04.2015).

www.hekimpostasi.org.tr/2012/10/09/yalin-saglik-hizmeti-dert-mi-care-mi/(Access Date: 07.09.2015).

www.medeczane.sgk.gov.tr/doktor/erecetesss.pdf (Access Date: 04.09.2015