

LEAN HEALTHCARE: AN OPPORTUNITY FOR CZECH HEALTHCARE FACILITIES

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Abstract: *There is growing interest in applying Lean in healthcare processes. Healthcare services around the world have adopted industrial engineering methods and process improvement methodologies from the manufacturing sector, known as Lean production. The purpose of this paper is to find out ways how to apply Lean into the Czech healthcare facilities and its limitation. This paper discuss the results of a questionnaire survey, which was conducted among to several hospitals in the Czech Republic and based on this questionnaire survey identifies key trends and potentials for next improvement and innovation projects in Czech healthcare. This paper was create as a first step of research, which should lead to real implementation of Business Process Management (BPM) and Industrial Engineering (IE) methods to the health care facility. It is possible, based on this questionnaire survey, to implement Lean at Czech healthcare facilities effectively and to improve processes.*

Keywords: *Process improvement, Lean healthcare, Lean thinking, Efficiency, Industrial Engineering, Business Process Management*

JEL Classification: I100

1 INTRODUCTION

The idea of lean healthcare or lean services is not new. Since the 1970s various attempts have been made to contain healthcare spending and improve service performance. Many of today's studies talk about costs and wait time reduction, increasing quality, reducing errors and increasing employee motivation and customer satisfaction. Public services around the world are pressured to increase their efficiency and save money. (Radnor, 2011) A study from November 1999 estimated that around 98,000 patients die each year following medical errors in U.S. hospitals (Liberatore, 2013). Many

people would like to have quality, cheap and quick healthcare. They would like to know that hospitals save costs but preserve the quality care for patients and provide a pleasant working environment for their employees.

Experience from abroad shows that the interpretation of lean concept and industrial engineering methods outside of the industry is a challenge, and its success rests on understanding first that lean is a system, not a toolbox (Ballè, 2007). Staff in hospitals should know lean and its utilization. They should learn how to think in a different way and learn not just lean methods but lean ideology which includes identifying problems in processes and solving them. Industrial engineers should develop a lean mentality (Ballè, 2007). They need a simple language for themselves and healthcare staff. These two groups should talk together to achieve common goals: reduce costs, increase efficiency, educate staff and patients.

2 LEAN HEALTHCARE IN THE CZECH REPUBLIC

Currently, the situation of the healthcare in the Czech republic is on the limit of economic sustainability. In Czech hospitals we can not talk about development and process improvement. Hospitals, on the one hand, investing in modern equipment and developing their staff for their technical nature but unfortunately is not enough to improve their economic situation. Frequently, hospital equipment prevents increasing numbers of patients and thus increasing the number of processes that take place in their organization. They do not focus on resource consumption and performance of their processes. Hospital facilities are tied by very ossified system of legislation and health insurance companies are very conservative and do not have enough economically oriented employees who would be interested in reducing costs and improving the efficiency of individual processes. Often, hospitals focus more on external conditions such as the right legislation or situation of payers – insurance companies. They can not accept the idea of reducing internal costs and support their own equipment and staff.

Another important factor is that staff in hospitals are rewarded according to rigid salary scale. They have a very narrow range of motivation. Motivation, known from the current working environment, in hospitals practically does not exist. Most of the staff are motivated by their own work, which is for them very fulfilling in socially and emotionally way. Classical motivation to work and to do the job effectively, quickly and without unnecessary steps is

missing. Significant is only the execution of a process but not its time or quality.

Abroad, the situation is often very different from external reasons that hospitals predetermine the competitive environment and the need for management performance in the same manner as in the well-functioning of the company. Hospitals must meet more criteria than in our conditions and a large number of these criteria is targeted to the client – the patient. Hospitals should know how to satisfied patients. Just as a satisfied customer of industrial company. Hospitals are also often targeted by advertising, low cost processes, high salary of its employees, incentive programs, and this can help all methods of industrial engineering and lean philosophy.

2.1 Lean philosophy

Lean thinking was developed by the Toyota Motor Corporation between 1948 and 1975. Lean could also be called the Toyota Production System (TPS). It is based on five principles (Radnor, 2011):

1. "Specify the value desired by the customer.
2. Identify the value stream for each product/service, providing that value and, challenge all of the wasted steps.
3. Make the product flow continuously. Standardise processes around best practices, allowing them to run more smoothly, freeing up time for creativity and innovation.
4. Introduce "pull" between all steps where continuous flow is impossible. Focus upon the demand from the customer and trigger events backwards through the value chain.
5. Manage towards perfection so that non-value adding activity will be removed from the value chain so that the number of steps, amount of time and information needed to serve the customer continually falls." (Radnor, 2011, p. 365)

According to Campbell (2009, p. 40), "Lean thinking is the efficient use of staff, resources, and technology to provide the highest level of service possible to the ultimate healthcare customer: the patient." The main purpose of this study is to determine whether these five lean principles are useful for healthcare and health facilities in the Czech Republic. The questionnaire survey was used to confirm or refute this research question. Questionnaires were sent to interested groups, especially nurses, medical staff and physicians. The research was conducted with the help of the internet portal Survio.com.

In the final phase, the return of questionnaires was 94.21%. 93 complete questionnaires were returned back. The questionnaire survey was answered by 79 women (84.95%) and 14 men (15.05%). The questionnaire was further differentiated by age, job position and length of experience in healthcare. Based on these data, it was possible to sort out relevant facts. Almost a half of survey participants were middle-aged people between 30 and 49 years (46.24%), the next most common category were nurses (62.37%) and in terms of practice, the most common were people with more than 10 years experience (54.84%). Following table 1 illustrate distribution of respondents in the questionnaire survey.

Tab. 1: Job positions of respondents

Job position	Frequency
Health professionals (nurses)	56%
Doctors	23%
Auxiliary health staff (orderlies)	7%
General nurses	7%
Special staff	5%
Social staff	2%

Source: Own processing

The fact that the most common staff in the survey were nurses is useful, because according to Ballè (2007), head nurses and nursing managers could act on improvements and lean methodology because of their contact with patients. According to Andalo (2006, p. 16), "nurses at all levels of the profession from the youngest junior to the most experience director, have the potential to bring new ways of working to the care to improve it, but they are the last to recognize their ability to change practice." Industrial engineer should be able to quell fears of nurses and help them realize their ideas. "The strategic aim of any organisation therefore should be to empower senior nurses, and ensure that they have the appropriate knowledge and expertise." (Aherne, 2007, p. 13)

People at the level of ordinary workers are not familiar with the concept of lean healthcare. The survey showed that 93.48% of respondents never heard of "Lean Healthcare" or Process improvement. In the verbal prompt, in which respondents had to state what they understand by the term lean

healthcare, this was confirmed. They usually understand lean healthcare as a downsizing or they do not have any idea at all.

Although the majority of respondents in their work intuitively encounters with some of the methods of industrial engineering and lean healthcare, their education is not such as to be able to name the basic methods. The survey showed that the only terms that are close to workers are standardization and ergonomics, and they are also familiar with concept of visual management. Further follow-up questions that directed respondents to the methods in another way and with unprofessional names, showed that respondents often meet these methods.

Mainly due to professional names is very important communication in the lean healthcare. There are two field, industrial engineering and healthcare, which need to find a common language and a common speech. "Lean seems to be one of those "easy to say, hard to do" things. As we learn what to look for, and to see work in a different way, we start to see the possibilities, and to see where improvements would yield huge benefits." (Bliss, 2009, p. 39)

2.2 Wasting in healthcare processes

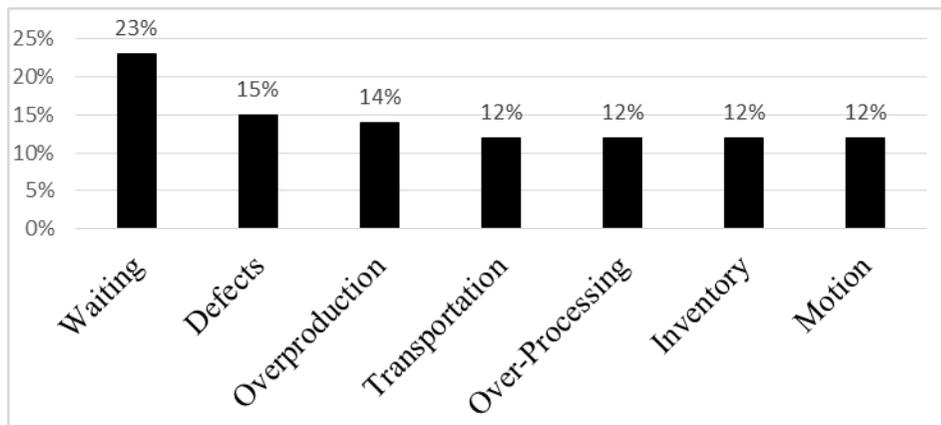
We need to start working and destroy the myth that the commercial methods that work in the industry can not work and be effective for hospitals. Methods and philosophy are transferable, especially because we are dealing with individual processes rather than medical interventions. Hospitals are also closely linked with industry, which is nowadays already on a certain level of standardization and process improvement. Another potentials can therefore also be improvements in the supply chain. The following list shows seven kinds of waste in hospital processes:

1. "Transportation – staff walking to the other end of a ward to pick up notes; central equipment stores for commonly used items instead of locating items where they are used
2. Inventory – excess stock in storerooms that is not being used, patients waiting to be discharged; waiting lists
3. Motion – unnecessary staff movement looking for paperwork; not having basic equipment in every examination room
4. Waiting – patients, staff results, prescriptions and medicine; doctors to discharge patients
5. Overproduction – requesting unnecessary tests from pathology; keeping investigation slots "just in case"

6. Over-Processing – duplication of information; asking for patients' details several time
7. Defects – readmission because of failed discharge; repeating tests because correct information was not provided" (Radnor, 2011, p. 365)

Respondents were asked to identify waste in their workplace. Only 8% of respondents said that they do not know about any waste. The most commonly identified waste by the respondents was waiting, whether patients or staff, as well as overproduction, particularly the respondents focused on excessive paperwork, as well as transport and redundant processes. Respondents demonstrated that they meet different types of waste in processes and that there is great opportunity for process optimization and implementation of industrial engineering methods to the Czech healthcare. How respondents see wasting in their hospitals shows picture 1. Picture shows the percentage of respondents and which kind of waste they identify on their workplace.

Pic. 1: Identified waste in czech hospitals



Source: Own processing

92% of respondent in the questionnaire survey identified some sort of waste. This fact is a sign that the hospital can find waste and focus on process improvement. Processes are obviously much more limited by legislation and regulations than in industrial enterprises and the need to waste look slightly different way. Even so, the question is, how is it possible that the money allocated by the government does not cover costs of hospitals. How is it possible that we do not pay relieve the hard work of nurses, who are often overwhelmed with tasks that should not and may not be detrimental to that will give patients? How can we allow that hospitals in the Czech republic are

„companies“, which are undergoing public finance, and nobody does not address this issue comprehensively?

Understanding waste is the most important part of Lean thinking. People should realize which processes are wasteful and which add value to the customer – to the patient. "Rather than focusing on cutting personnel and assets, "lean healthcare" looks to improve patient satisfaction through improved actions and processes". (Weinstock, 2008, p. 339) Only 5% of activities are Value Adding and 95% of activities are Wasteful. Peter Drucker says: "There is nothing so useless as doing efficiently that which should not be done at all." (Wood, 2004, p. 8)

Abroad are identified almost the same types of waste, errors and problems: missing or incorrect information, missing or malfunctioning equipment, waiting for a resource, missing or incorrect supplies, simultaneous demands, incorrect actions, errors made by others and unnecessary execution of tasks (Storey, 2008). Same situation as in healthcare these days was in all service sector around 1998. Service sector focused on low cost, dependability, quality and flexibility (Bowen, 1998). Now we want do the same for healthcare. Survey showed that it is possible.

2.3 Benefits of lean healthcare

Another important factor, which is conducive to the fact that the introduction of methods of industrial engineering would be beneficial within the Czech healthcare, is the fact that 64% of respondents said they felt the competition between healthcare facilities. This competition which was one of the main factors in the development of lean healthcare in the U.S., is very important for the management of the hospital. Managers should realize that the competition can be defeated only on the basis of patient satisfaction. Patients will be satisfied in a well-functioning hospital where they feel that the care is at top level and everything is concentrated only towards them. In this environment we can find help us, well set up and managed processes which perform concentrated and satisfied employees. With proper optimization of processes, we can also save costs – both in terms of time, materials, administration, etc. In this step, we should realize that we can constantly improve and that is beneficial to use a different point of view.

"Today's healthcare organizations are complex dynamic systems. Healthcare professionals must demonstrate attributes consistent with organizational culture. Six attributes for a quality healthcare system are identified as follows:

1. Safe – Security for patients but also for the staff. Each hospital facility should be a safe environment. Hospitals currently monitor certain parameters of safety, and this parameter is essential for them already in present. Safety is the first priority and hospitals need to constantly work on it, both in terms of medical procedures and also hospital environment.
2. Effective – Efficient use of resources and enhance the performance of subsequent processes. In particular, we focus on supporting processes in which it is the highest potential. In particular, in areas of administration, supply-chain and layouts of workplaces. Also, a questionnaire survey showed that these areas are feeling as areas with the greatest potential.
3. Patient-centred – Hospital facilities should focus as well as industrial companies to its customer – the patient. It is all happening around the patient. Although the hospital staff does not admit that this situation should be different, it is still very specific theme. The patient is not a typical customer. Patient does not pay for hospital services, but he is only the consumer. Even in this situation, hospitals should see its patients as a full-fledged customers and do whatever it takes to give timely care in appropriate quality and at the lowest cost.
4. Timely – Any performance and any action must be properly timed. Just in time, now widely promoted in the industry, could be going in the sphere of healthcare. It is very important to customers (patients) wait the least possible time and were treated effectively and quickly. In healthcare are processes that can be standardized and improved based on this standardization.
5. Efficient – Efficient processes are those processes where could be maximized the difference between the proceeds from this process and the costs of this process. If the process is efficient then it is profitable and it is done correctly, at the right time, it takes the right time and it has the quality output.
6. Equitable – In healthcare, more than in any other sector, politeness and certain ethics are important parts of everyday work. Industrial Engineers can never be insensitive during improving processes

because it may touch on sensitive issues such as health, illness, accidents, etc. It is very important to collaborate and cooperate with hospital staff. Only these people have power to change processes.

Monitoring these attributes is a crucial element of organization's philosophy and should be part of the quality improvement initiative." (Taner, 2007, p. 330)

Czech healthcare facilities are aware of their situation. The survey showed that almost 67% of respondents believe that their organization pursue to an effective cost reduction and 57% of respondents believe that over the last five years in their organization increased productivity of work. However at the same time 60% of respondents believe that there is still space to achieve operational savings, or in other words, reduce costs in processes. For these reasons, it is important that organizations begin a dialogue on increasing their productivity, optimize processes and reduce costs. The situation is the same abroad. The Institute of Medicine stated in 2010 that the pressing and well-established concerns common to all sectors of healthcare that impact quality are rising cost and limited resources, system inefficiencies, increasing complexity, and an ever-expanding evidence gap (Weberg, 2012). Lean implementation continues to be popular in English hospitals, hospital trust managers, they are implementing lean in different ways ranging from other sectors and implement lean to the strategy and vision (Burgess, 2013). Hospitals need some solutions. As shows the table 2 below, 93% of respondents are interested in methods that could improve their work. It is time for industrial engineers, which can show improvement methods.

Tab. 2: Are you interested in methods that could improve your work?

Answer	Frequency
Yes	93%
No	7%

Source: Own processing

A workshop on lean healthcare was organized at the Tomas Bata University where several interviews with representatives of both medical and non-medical positions in hospitals (especially KNTB Zlin and Podhorska hospital Bruntal) and hospice (Hospice at Holy Hill in Olomouc) were held. Current trends in process improvements in health care would be to become particular:

- Communication
- Mapping value streams
- Better support processes
- Teamwork
- Focus on quality indicators
- Ergonomic audits

The workshops and discussions with representatives of specific organizations suggest the need to unite in how we talk about this issue. It is very important that all stakeholders understand and think about how to use the information for the greatest satisfaction of the end customer, which would in all circumstances be patient. It often happens that the leaders of healthcare facilities argue that the processes can not to be optimized, because their income is not sufficient for fulfilment of their capacities to finance more medical operation. There is a misunderstanding when the leaders do not realize that what brings idea of lean healthcare is in particular saving their internal costs. On the other hand also monitoring and measurement of processes, assignment of process owners and standardization of all processes and operations, which can be standardized. For many healthcare organization it is problem to see process-based organization, health care delivery has traditionally been organized around specialties and professional groups that address patient's problems one at the time. This is picture of function-based organization. (Mazzocato, 2012) In this organizational structure is difficult to change people minds and keep them work in team. We have to convince them to change their thinking and then to implement lean.

On the other hand, lean healthcare conceals many ways to help workers themselves. It solves the ergonomic aspect of their work, accidents at work, patient handling, distance, etc. "When participants were asked to 'the customer' a range of actors were identifies. The most common, especially for clinical staff, was the patient as the immediate recipient of care", but for some of them is customer local or central political organisations, international hospital departments or health insurance group. (Radnor, 2011, p. 368)

Workers themselves are interested to learn more and are willing to continue to educate themselves and work together to solve problems that are bothering them. 90% of respondents said that they would be interested in using a system that would allow them to make suggestions on improving work, working

environment or processes. 23% of these workers reported that they have proposals for improving their workplace right now. 89% of the respondents wrote to the questionnaire that they would be interested in learning more about methods that enable more efficient work. Whether this would be to eliminate waste, alleviate the physical and time burden, workplace organization, or anything else, people want to learn how to make their work more pleasant, less demanding, easier and less time consuming. All of these for them directed to save time and energy which they can dedicate to the patient. "Staff were beginning to recognise where problems and issues were, and what changes were need, they were not always given the opportunity to implement change." (Radnor, 2011, p. 368)

Respondents indicated to the questionnaire survey that the most problematic areas are the amount of administration that does not add anything to them, is useless, has no customers and only consumes their working time. The equivalent to this problem was answer "to increase staff". Ordinary healthcare workers are loading excessive amounts of paperwork and thus do not have time for essential tasks and activities that they must also perform during their work shift. 34% of respondents said they are working over-time overloading. This congestion can be attributed to the fact that they perform many administrative or unnecessary activities that are not required, are useless, they are not required and these workers have feelings that these activities should be done by someone else, or should not be performed at all. 48% of respondents believe that they perform work that should or could have done by someone else and the same proportion of respondents thought that performs some activities that are useless or unnecessary. From these data we can deduce that workers are particularly unnecessary overload of work, especially in the area of administrative activities.

The survey also revealed problems of transport and transport activities that are in healthcare facilities sometimes necessary. In certain cases should staff make changes in the layout of workplace that would help them to better satisfaction with the workplace organization. 72% of respondents said they are not satisfied with the arrangement of their workplace. Some layouts are very limited by the condition and the location of the buildings. Even so healthcare facilities should learn how to build a spaces and buildings and how to use industrial engineering consultants in these cases. Industrial engineering consultants know working methods, ergonomics and work environment and they are able to design spaces for staff and management satisfaction and waste on the jobsite. Some of the changes, which do not

concern the construction of buildings, are immediately applicable with a minimum amount of investment. A worker who is dissatisfied with some part of his work is certainly working much harder than a worker who has a workplace optimized for his needs, physical attributes and accurately for the operation.

From the introduction of industrial engineering methods into production, we could learn many times, there is a need to involve staff into process change. Industrial Engineers and Healthcare staff need to work together to eliminate maximum quantity of waste. Especially when industrial engineers want to change processes which are performed daily, or they want to change layout of their workplace they need to talk with staff and use different methods and workshops to create the future state with them. It is possible that this future state will not be absolutely perfect and will not be liking of the industrial engineer, who only acts as a consultant, but in that state workers will be connected and will be able to perform their daily work. They will feel good and they will adopt changes very quickly.

It is important that projects in lean healthcare, perhaps even more than in the manufacturing sector, have a very individual approach to each customer – to each medical facility and have a very personal approach to every employee. These people are very empathetic, easygoing, and are used to work in hard and demanding environment. They are used to perform all activities which they should according to prescriptions and standards. However they feel that these activities are unnecessary. Industrial engineers will work very well with people who themselves want to simplify their work, will be helpful to new information, opinions and working methods. Industrial engineers can give opportunity for healthcare processes optimization. Table 3 below shows that 64% of respondents maybe will use new methods for improving workplace and work environment and 30% of respondents will use these methods. This fact means, that 94% of respondents are interesting in new ways how to increase effectivity of their work.

Tab. 3: Would you have used a system that would offer opportunities for improving workplace processes and work environment?

Answer	Frequency
Maybe, I would use	64%
I would use	30%
I would not use – Everything works without problems	3%
I would not use – I am not interested in process improvement	3%

Source: Own processing

Currently, there is also research focused on the management of hospitals. This research aims to show the current status of management, process management and using of modern trends of lean healthcare and information technology in hospitals in the Czech Republic. Healthcare in the Czech Republic is a very conservative environment and processes in hospitals are often run by people which have no preconditions for control functions. Especially in middle management, which consists of senior doctors and highly trained doctors is often a problem with grasping of effective management, lean healthcare, motivation and improvement.

Management of hospitals have a broader look at the whole issue and they can interpret it in the context of the Czech economic situation and legislation. Even so, they see great opportunity in lean healthcare, process management and cost saving in processes. 99% of the hospital directors, which respond the survey said they perceived competition between medical institutions especially from the perspective of employees. 40% of CEOs said that they perceive competition between patients (most often in non-acute sectors, such as maternity hospital).

From the above it follows that management of hospitals is aware of the need of effective management and cost savings. All respondents said they are trying to actively search operational savings. Most hospitals also develops strategies for a long period, or at least a vision, which they want to fill. There is no problem decay of plans into operational objectives and convert them into daily activities leading to the fulfilment of plans. Many hospitals in the Czech Republic are certified, whether medical certification or ISO 9001. In most hospitals management are also trying to improve processes in cooperation with their staff.

Management of hospitals aware the situation as a whole. Many threats and obstacles were shown during the research. Management of hospitals see these threats and obstacles often as insurmountable. Even so, they are looking for ways how to move hospitals towards modern trends and improved patient care.

2.4 Threats and obstacles for the implementation of lean healthcare

Threats and obstacles for the implementation of lean healthcare can be divided into two categories. The first of these are threats arising from the very introduction of lean healthcare and are widely described in the literature and case studies. The other categories are threats and obstacles arising from conditions in Czech Republic, especially economic and legislative.

General threats are those that arise from the very methods of process management and lean healthcare. We rank among them especially the threat of areas of cooperation, communication, support from management and process owners and last but not least, we must also think of the threats that arise from the environment in which we are introducing methods.

In any organization where lean healthcare is implemented we should have the support of the leadership of the organization. Management should familiarize all personnel and middle management with everything which will happen in organization. This support is essential, it does not make sense start with any changes without it. Also communication is very important. And both internal and external with external consultants. Hospital environment is specific and it is important to find common speech and break down communication barriers. Managers should support cooperation of all stakeholders.

We should know about threats that arise from the environment in which we are introducing lean healthcare because of quality, effectivity and speed of care. We speak about human life and it is crucial to think about safety. The hospital environment is also very specific because of treatment process. This process is individual. Doctors have to be sensitive and they have to have a certain degree of creativity. We need to avoid strict standardization, which would mean the conversion of process to too technical and avoid it from personal and individual approach.

The research, which was conducted with the senior management of hospitals using structured interviews, showed that the biggest threats of the efficient management of processes in hospitals are legislative and unhealthy economic environment. These threats could be called for a second category, as a threats arising from external environment. Laws and regulations governing certain extent both costs and revenues of organizations. In certain types of organizations are clearly define tables for the evaluation of employees. Hospitals also have clearly defined payment for services and they are often limited in number of beds and procedures by the insurance company. Smaller organizations also often do not reach on government subsidies.

Another problem is the lack of staff and methods of their training, which leads to a lack of both doctors and nurses. These problems are directly linked with process improvement, lean healthcare and process management. Hospitals cannot set effective processes often because of laws or because of the intervention of the insurance company. They are limited to the extent that they can, for example, use electronic documentation and computerized processes.

Another negative aspect is that management cannot have function and effective staff evaluation in some organization. Hospitals are unable to create a functioning motivation system. The last threat that prevents the implementation of lean healthcare can also be founders. Founders as owners, controlling shareholders or majority owners, in some cases, own several organizations (for example at the regional level). They are trying to fund all their organizations and try to keep them in economic health. Often, however, this principle is applied against hospitals, which try to be effective. Founder is often investing this extra money to the hospitals that is doing worse economically. The problem therefore is often impossible separate financing of organization and separate project management.

Despite of the above threats there are hospitals which are trying to manage processes effectively and using principles of lean healthcare and process management. There are hospitals which are trying to achieve the maximum possible computerization and simplify and accelerate processes. They are also trying to balance the positive effects to employees and patients during this work. Some of these organizations are also supported by their founder. They have opportunity to reinvest money to their processes, employees and patients. However, they constantly face to the complications posed by the legislative and insurance companies.

3 CONCLUSION

Concept of lean healthcare is not really known under the conditions of the Czech healthcare system. However a survey and comparison with other countries have clearly demonstrated that it is possible to Czech conditions apply lean healthcare. Important in this respect is to work with the staff of health facilities and at the same time also with management. All these people need to understand Lean like a philosophy and must learn to see waste in the organization and how to solve these "waste" problems.

The survey showed that it is possible in the Czech hospitals effectively implement industrial engineering methods to increase the productivity of individual processes. In case that the organization and the consultant will have common goals and are willing to understand one another and come to meet, we can achieve a similar success as in the U.S.. The hospital which saves its costs and have sufficient funds in a budget may pay more care to customers (patients) and of course can devote financial resources to improve the environment not only for patients but also for staff. Medical devices and equipment are so costly that it is necessary for hospitals to seek all possible ways. One of those ways will be sure to optimizing processes and use of industrial engineering methods to make them more effective. We could use more than lean methods. There are other methods like total quality management, systems thinking, systems dynamics, theory of constraints, reengineering or discrete event simulation. (Brandao, 2009)

Whole system of process improvement is standing on business process management. Healthcare facilities often use standardization, which is based on quality standards and/or on World Health Organization standards. All of these standards require description of processes, their standardization and continuous improvement. Lean and industrial engineering methods are a way how to achieve effective standard and improvement in each process.

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