Exploiting Process Thinking in Healthcare: Evidence of Positive Impact on Operating Theatre Efficiency

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ABSTRACT

In Finland, a project designed to modernize processes and reduce the waiting list for joint replacement surgery has recently been completed. The new surgery arrangements for artificial joint patients were monitored for a period of one year. The new arrangements involved relocating the anaesthesia phase outside the operating theatre. The reorganization of the patient care process for joint replacement surgery succeeded in achieving a 50 per cent increase in operations. While conventional operations can often be pushed up a notch with state-of-the-art technology, for example, this article supports the argument that process thinking can be exploited effectively to support new ways of work and improve productivity in healthcare.

INTRODUCTION

The Care Guarantee Act, which came into force in Finland in March 2005, has made many healthcare units look at the arrangement of the services they produce in a new light. Particular attention is fixed on the legal obligation concerning the waiting times between treatment decisions and treatment measures, which is to be no more than six months. The need to increase the number of operations has become a matter of current debate particularly in orthopaedics, where the length of queues has become unlawfully long at several hospitals. Improvements in controlling the queues have previously been achieved by the more efficient handling of referrals (Harno et al., 2000), but with surgery this was felt to be ineffective (Harno et al., 2001). In special operative areas, making use of all the development potential available within the traditional treatment chains should be explored as a permanent remedy, after first-aid obtained in the form of outsourced services. In this article we illustrate a case where process thinking and process development tools where exploited to support new ways of work and improve productivity in healthcare.

PROCESS THINKING

The term 'process thinking' refers to a number of management theories that have been used by industry in its quest for better operating processes over the last few decades. Large-scale application of them in the healthcare sector should be seriously considered because it is time to take a critical look at the publicly funded system. The system is struggling with the combination of rising demand and escalating costs in specialist medical care, while at the same time, there is strong support for reduced public-sector healthcare spending but firm rejection of any cuts in service levels. If the two targets are to become reality simultaneously, the methods enabling them to be achieved should be chosen on the basis of how deep the cuts should be. Cosmetic improvements would be fairly painless: for example, Total Quality Management would result in long-term improvements in operating processes as a more efficient use of resources would bring gradual savings. Some scholars have, however, likened some quality management theories to a rain dance (Schaffer & Thomson, 1992). In their view they look good, sound good and allow those involved to feel good, while at the same time they may have no influence on the rain itself.

There are also other management theories in the field of process thinking. According to the time-based management approach, all development should focus on process lead-time (Stalk & Hout, 1990). In such an approach all other positive aspects, improved quality, cost savings and customer satisfaction will follow automatically. However, development measures do not need to mean squeezing more out of the stages intended to boost the value of the treatment process. In fact, industrial companies have been able to find larger savings in the way they use the time that brings no added value, which, after all, accounts for more than 95% of the total. Cutting consultation times in health care would be sheer folly as the measure would probably only result in additional repeat visits. At the same time, all solutions speeding up the flow of information and improving the service capability of the support processes would be a real 'shot in the arm' to the system: replacing piles of paper with a byte-based system would, for example, give surgeons real-time access to x-ray images, which would allow quicker decision-making and, consequently, help to shorten treatment times.

In contrast to Total Quality Management, which emphasizes continuous development, Business Process Reengineering proposes a radical revision of the business process. The aim is to start from scratch without the burden of old operating approaches (Oliver, 1993; Hammer & Champy, 1993). The reengineering starts with a definition of the desired end result. This will form the basis for the planning of the new process functions and sequences. The aim is to maximize value-adding functions and to get rid of all operations not adding to the value. Extensive use of the information technology is often used as the means for achieving the desired results.

Effecting the operational changes required by Business Process Reengineering has been somewhat problematic. Resistance to change, which is inherent in human nature, and the fact that reengineering is often a zero-sum game, make the implementation of the change process more difficult (Buchanan, 1997). Besides, reengineering thinking emerged just as the recession of the early 90s began to bite, and was often used as a justification for drastic job cuts. In fact, for a while BPR was almost likened to the Black Death in the industrial sector. Since then it has lost some of its reputation and has evolved from a much-feared consulting tool into a set of practical measures. The theory, though somewhat worn-out, is still useful, as it underlines the importance of the information technology in performance improvement. Great potential for applying the theory and information technology can be found in sectors that for ages have relied on well-entrenched operating models, such as health care (Evans, Hwang & Nagarajan, 1997).

This article presents a case from hospital environment where process thinking was utilized. Seinäjoki Central Hospital implemented a project to revise processes in order to reduce queues in surgery, particularly artificial-joint surgery. The project was part of the ProViisikko project of the Hospital District of South Ostrobothnia and Tekes. This article describes the results of the experiment for the benefit of, for example, other operation units that are taking a close look at their operations and of developers and management in health care as support for decision-making. Parts of the study have been published in Finnish language (Jokipii et al., 2006).

STARTING POINTS FOR CHANGE AND EXPERIMENT

Seinäjoki Central Hospital wanted to reorganize the operations for artificial-joint patients so that three operations could be performed in the same operating room in the course of a normal day's work instead of two. The experimental period lasted from November 1, 2004 to November 30, 2005.

The revision of the treatment process utilized process thinking and process development tools. Of these, the theory of constraints was thought the best applicable for examining the process for treating artificial-joint patients. The point in this approach is to identify those stages in the process that dictate the maximum current throughput (Goldratt, 1990). By allocating additional resources and development action to these bottlenecks, the throughput can be improved without needing to interfere in the other stages of the process. The main change for increasing the usage of the operating room capacity was transferring the anaesthetic stage from the operating room to separate induction facilities. Experiments on this had been reported earlier in medical journals (Hanss et al., 2005; Sandberg et al., 2005, Torkki et al., 2005).

In the new arrangement, the anaesthetic stage was transferred outside the operating room. At the same time, one anaesthesia nurse was added to the operating team, working both in the operating room and in anaesthetic. Another anaesthetic nurse took the next patient in good time to the recovery room or to the operating room's induction facilities to be anaesthetized. As soon as the operating room was cleaned after the previous operation, the next patient could be prepared for surgery. The next patient was brought to the operating room already anaesthetized and in the correct position for the operation.

The duties of the orthopaedist that were not part of the operations or preparation for them were scheduled outside the operation days. Thus, the surgeon whose turn it was to operate was able to focus exclusively on the work in the operating room. At the beginning of the experimental period, the same orthopaedist operated for one week at a time, but this practice had to be changed so that the operation days were rotated among different practitioners. At the beginning of 2005, there were five orthopaedists working at Seinäjoki Central Hospital.

MATERIAL, METHODS AND RESULTS

In Finland in 2003, about 6,800 artificial joint operations were carried out on the hip and some 7,200 on the knee, and there were more than 1,700 instances of further surgery. These operations are performed in almost 70 hospitals, but the minimum number of 200 operations recommended by the Ministry of Social Affairs and Health is only exceeded in 25 units. Every year the Hospital District of South Ostrobothnia performs between 550 and 600 artificial-joint operations.

In the study, quantitative material was collected from the operating days in the experimental period on which three artificial-joint operations were carried out (n=49); because of the small number of orthopaedists, there were 2-3 of these days in a week. Comparative material consisted of the days on which two artificial-joint operations were carried out between January 1 and June 30, 2004 (n=27).

The time when patients were in the operating room and changeover times were recorded in the operation database. The time-monitoring material consisted of the times when the operating room was in use. The median time that patients were in the operating room and the median changeover time, when there is no patient in the operating room, were used for comparison purposes.

Qualitative material was collected through interviews during the experimental period and by means of a work-satisfaction questionnaire carried out among doctors and nurses a year after the experiment started.

The new operating model made it possible to carry out three operations during a normal working day. The orthopaedists examined the patients during a pre-operative visit or on the day preceding the operation. The first patient of the morning was in the operating room in time, and the operation started on time at 8.30 a.m. The anaesthetization stages for the second and third patients, which were carried out staggered with the operation, took slightly longer than if carried out in the operating room.

As it was possible to separate some of the steps previously carried out in the operating room and have them done outside, the hospital succeeded in increasing the throughput of the process by 50%, even though the usage capacity of the operating room remained almost the same.

Adding four nurses to the operating team (2 for anaesthetization and 2 for the operation) made it possible to shorten the changeover times considerably: the average time was reduced from 54 minutes to 13 minutes. This was because the team was able to take coffee and meal breaks in turn. One of the operation nurses was able to help the orthopaedist as necessary.

In the three-operation model, anaesthetizing the second or third patient of the day in separate facilities reduced the time the patient was in the operating room by 20 minutes (149 minutes vs. 129 minutes).

According to the questionnaire, fifty per cent or more of the doctors who took part in the experiment felt that the meaningfulness of their work and work motivation had increased and thought that the three-operation experiment should become a permanent fixture. The nursing staff felt that minimizing the idle waiting improves the atmosphere and increases work motivation to some extent. The doctors felt the new operating model improves the meaningfulness of the work and work motivation more than the nursing staff did.

DISCUSSION

The usage capacity of the operating room is generally considered to be the bottleneck in the operation process. This generalization leads easily to a practice where outsourced services or increasing the number of a hospital's own operating rooms are seen as the only options for increasing output. From our experiences the throughput of the process for artificial-joint operations can be increased while the usage capacity of the operating room remains the same or even decreases. Focusing the operations on one operating room proved to be effective.

An increase in the throughput of the operation process was sought without increasing the workload of the staff. The hospital succeeded in doing this by firstly dealing with idle waiting. Targeting greater efficiency here and a simultaneous improvement in the throughput required development in several areas, e.g. adding one nurse to the operating team, a bigger work contribution from the hospital attendant in preparing patients, preparing the anaesthetic in a new way and changing the orthopaedist's work schedule. The justification for adding one nurse was that in the revised staggered operation stage, there was also one patient more.

It was not possible to anticipate all the effects of the change. In order to ensure that things went smoothly, specialist experienced doctors acted as anaesthetists and orthopaedists during the experimental period, but at the same time the arrangement narrowed the opportunities for training specializing doctors. Furthermore, not enough preparation was made for the increase in the number of operations at all stages of the treatment process. At times, the growth in the throughput caused congestion on the ward and especially in further treatment at health centres.

In financial terms, the transfer to the practice of three operations was worthwhile. The resources for arranging three operations were obtained principally by utilizing the fixed costs of the hospital more efficiently. In alternative cost accounting comparing the additional cost caused by a hospital's own activities with the cost of an artificial-joint operation acquired from the private sector or another provider (minus the costs of the prosthesis, materials and cost of the treatment days) shows a difference of some USD 4,000 between the hospital's own work and outsourcing with regard to the added third primary operation per day. Because of the limited number of orthopaedists, however, it was not possible in the experimental period to run 'flat out' five days a week.

15 complete operations a week would be enough to meet the need for artificial-joint surgery in the entire hospital district, and the revised treatment process would generate annual savings of between USD 700,000 and USD 800,000 for the Hospital District of South Ostrobothnia, even taking into account the additional recruitment required.

CONCLUSIONS

The project by Seinäjoki Central Hospital offers an encouraging example of a way to exploit process thinking and process development tools in health care. Seinäjoki Central Hospital succeeded in obtaining a 50% increase in flow-through in the process for treating artificial-joint patients with the transfer of the anaesthesia stage outside the operating room in the reorganization. For every two joint replacement operations previously conducted, there were now three operations performed in the same theatre and in a normal working day. In the longer term, the arrangement would mean that in Finland the entire country's need for artificial-joint surgery, about 15,600 operations per annum, could be dealt with in 30 operating rooms.

The introduction of the new patient care process demonstrated that the operating theatre capacity was not causing a bottleneck, but that it was the orthopaedic

surgeons brought in at the various intervals who formed the key resource. The reorganized care process for patients requiring joint replacement surgery should produce annual cost savings of USD 700,000 to USD 800,000 for the Hospital District of South Ostrobothnia. Following the experience gained in the project, the Seinäjoki Central Hospital has decided to adopt the project model on a permanent basis. A similar reorganization is also possible in other hospital districts.

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