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Centralized placement process solution for patient flow management

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Abstract

The article presents a case study of implementing a new solution for patient placement in the South Karelia District of Social and Health Services (Eksote). Eksote is a forerunner in the development of health and social care services in Finland, as it combines primary and secondary health care, elderly care and social care in a totally new way, covering eight municipalities that worked independently earlier.

The paper describes a new operating model and a supporting information system for the patient placement process. The focus is on the short term patient placement process which covers the placement of patients from specialized health care wards to rehabilitation wards. The article describes empirical experiences gained about the actual usage of the solution in daily operations. At annual level, thousands of patients are placed by using the developed solution, which has proved to improve both the efficiency and the effectiveness of the patient flow management process significantly.

Keywords: follow-up care, patient flow management, patient placement

Introduction

The South Karelia Social and Health Care District (Eksote), which was established in 2010, combines primary and secondary health care, elderly care and social care. Health and social services are closely integrated together in the South Karelia region. Eksote works by delivering patient-oriented care to the approximately 130 000 citizens of South Karelia in South-Eastern Finland. Eksote employs approximately 4 100 people and has a budget of 370 million euros.

Eksote's goal is to ensure equal access to social and health care services to all citizens in the region, across the boundaries of municipalities. Eksote makes it possible to develop integrated care processes, as the same electronic patient record system is used in the health care centers and hospitals of all communities belonging to the organization. The common electronic patient record allows also for example developing mobile social and health care services and utilizing a centralized placement model.

Before Eksote, in 1996, Lappeenranta central hospital produced 93 500 patient days. The average length of stay was 4.93 days of treatment. The hospital was significantly overloaded and patients' access to follow-up care was poorly coordinated. The central hospital called the patient's home municipality ward and agreed about the place for the follow-up care. There were serious delays in getting the follow-up treatment place because the needed arrangements were often delayed to the afternoon or the patient information was not available (disappeared for some reason).

In 1997, patient follow-up care arrangements were centralized to the AQP (Assess-Qualify-Place) operations unit. The aim was to speed up the short term AQP process of placing patients from the central hospital to follow-up treatment. Calls to the hospital inpatient wards were concentrated to a single telephone number. The average length of hospital treatment in the same year was 4.85 days of treatment, and in 1998 it was 4.5 days.

In 2010, the municipalities issued Eksote to arrange the social and health care services, and the AQP operations were expanded to cover all municipalities in the province. However, many challenges were related to the expansion of the AQP operations. The number of the actors involved in the AQP process increased and thus set a lot of requirements for the fluency of the communication flows. One challenge was organizing an up-to-date view of the bed resource availability in the whole Eksote area. Furthermore, the possibilities to increase the number of full-time persons involved in the management of the AQP process were limited.

In order to improve the efficiency of the short-term AQP –process and to overcome the challenges, Eksote decided to develop a new computer-based solution for the process. The objective of this paper is to present the new IT solution for the AQP process and to present the results achieved from both a quantitative and qualitative perspective. The quantitative measurements are based on the key performance indicators built into the AQP solution during the development process. These indicators form the basis for the on-going evaluation of the effectiveness of the process and solution. The qualitative measurements are based on a focus-group interview of the main users of the solution.

Literature review on patient flow management

Hospitals have become increasingly interested in maximizing patient throughput and bed utilization to improve their efficiency. Understanding the patient flow and resource utilization have become very important tasks to hospital managers [1]. Delivering high-quality, patient-centered health care requires contributions from several parts of the care continuum, including effective coordination of transitions between providers and care settings.

Only little research has been conducted to obtain an overview on the use, combination and effects of approaches to improve patient logistics in hospitals [2]. Patient logistics seems to be a rather new subject. Approaches such as benchmarking, operations research,

lean management and Six Sigma could be adopted to improve patient logistics in healthcare [2].

The timing of patient discharge is a key factor in hospital capacity. The patient discharge process has been a continuous problem for hospitals of all sizes. Research has offered a lot of insights for improving the quality of the discharge process (e.g., [3, 4]). The research has also focused on achieving better post-discharge outcomes, such as lower re-admission rates [5] or higher perceived patient and caregiver satisfaction [6]. The research has also focused on special populations with higher levels of discharge needs, such as elderly [3, 7] or cognitively impaired patients [6].

Consistent transfer criteria ensure that all care providers share a common understanding of a resident's condition. Assessment of a patient's needs based on standard criteria contributes to an effective transition plan. This step reduces the likelihood of quick rehospitalisation and it clearly specifies what information about the patient's condition the nursing facility will need when a patient is transitioning from hospital care to the nursing facility setting [8].

Despite the goal of care continuity between care levels and settings, in reality transitions from one care setting to the next are plagued with discontinuity and lack of coordination [9]. Often the necessary medical information, generally in the form of a patient discharge summary, is inadequate or incomplete [10], or unavailable when needed [11]. Furthermore, the acute health care system is increasingly designed to discharge patients quickly, which may lead to poor transition planning, care co-ordination and post-discharge intervention [12].

Some patients stay in acute care for longer than is appropriate. Slow transitions are influenced by several factors, such as inadequate exchange of information and poor communication amongst health care providers, patients, caregivers and administrators [13].

The outcome of patient flow bottlenecks and delays is usually the same: strained relationships and inefficient use of resources throughout the organization [14]. When hospitals exceed their pain threshold in patient flow, a search for solutions generally begins. Adding new capacity is usually the most expensive option. Another approach to improving patient flow is purchasing new IT technology. Technology solutions are popular because they offer the prospect of improved communication and flow associated with a defined cost and time frame for installation [14, 15]. Organizations often only achieve a fraction of the benefits from the new technology they install. Reasons for failure are e.g. [14]:

- the new technology does not link with the organization's existing technology
- the new technology may add to the workload of individuals
- the personnel have not been adequately trained or encouraged to use the new technology
- the personnel may revert to using the old approaches that the new technology was supposed to replace.

Challenges in patient placement at Eksote

Eksote was established in 2010 to arrange the social and health care services for the eight municipalities in South Karelia. The Assess-Qualify-Place (AQP) operations were expanded to cover all municipalities in the province.

There are a number of regional health centres with bed wards across the Eksote region and one central hospital. The AQP office is responsible for both short-term and long-term placements. The focus of the short term placement process is to relocate patients from the central hospital to bed wards at the primary care. The office consists of several specialized discharge and placement nurses and social workers who focus solely on patient placement. These AQP nurses assess the patients' needs and make the placement decisions instead of doctors and nurses in the wards.

Earlier, the AQP office relied on using telephone for communication, and an Excel spreadsheet was used for keeping track of patient placements and bed availability. However, the Excel-based solution lacked up-to-

date availability information of beds in the primary care, the overall control and auditability of the process were at an unsatisfactory level, there were no clear ownerships and roles in the process, process metrics were missing, and the data content was not properly structured.

A major problem in the old telephone-based AQP procedure was its great workload. The number of patients transferred for further treatment increased each year. Management practices became fast-paced, and the need to transfer patients to other facilities for further rehabilitation and follow-up care increased. The centralized phone line was very busy, and a lot of the working time of the central hospital nurses went to getting the patients in a follow-up treatment queue.

The limited amount of available beds, especially in the specialized health care wards, caused a growing need to pay attention to discharging patients home or sending them for further treatment in primary care bed wards as early as possible. The problem was that the doctors and nurses lacked an understanding of bed resource availability in the area. This resulted in a great amount of inefficient point-to-point communication for finding a suitable further treatment ward for the patients, and too much time spent on non-care -related activities.

The original short-term AQP process was laborious and unstructured. There were no clear rules for deciding who could be submitted to assessment. This caused a lack of process control and discipline. Information exchange happened through phone calls and e-mails and proved to be time-consuming and stressful for each party.

Material and methods

The quantitative key performance indicators used in the paper are included in the IT solution for the AQP process. The solution was implemented in 2010 and the execution of the development project as well as the features of the solution has been described in detail in Korpela et al. [16]. During the development project, the key stakeholders in the AQP process were interviewed in order to define the process steps and the key performance indicators that will be used for measuring the quality and efficiency of the process.

In addition, seven Eksote's AQP nurses participated in the three hour group interview session. In the group interview session the group used the electronic meeting software, group support system (GSS) in a meeting room. The GSS software was used because in has many features which promote group work. A GSS supports and develops the group work process and improves the productivity of meetings. A GSS is superior to a conventional meeting in the following possibilities it offers for supporting a group in promoting cooperation and effectiveness: enables parallel communication between the participants; offers equal and anonymous opportunity to contribute opinions; prevents domination of the meeting by domineering people; identifies common and divergent viewpoints quickly; helps to manage the schedule of the meeting; provides effective automatic documentation capabilities [17].

The group interview session was divided into three phases. At the first phase the problems and challenges of the old AQP process was discussed. In the second phase the benefits of new AQP procedure and tool was discussed. In the last phase the group was asked if there were any development areas or tips for the new system/process. At the beginning of each phase, the participants first wrote their opinions about the topic under discussion into the GSS system (and every participant of the meeting also saw these opinions). After the silent working the group discussed about all noted opinions together. At the end of each phase all opinions were evaluated by electronic voting. For example, the opinions about problems of earlier AQP procedure were prioritized by using voting scale 1 to 10 (1 = minor problem, ..., 10 = very significant problem). By using this GSS supported meeting style all participants got their opinions heard and also the meeting time was used effectively. In addition, the most important matters were identified.

Development of a new AQP process and supporting information system

In order to improve the efficiency of the short-term AQP process, Eksote decided to develop a new computer-based solution for the process. Based on earlier experiments, Serena Business Manager (SBM) was selected as the platform for the new solution. Eksote utilized an external partner, ROCE Partners (www.roce.com), to support the process and solution development. An overall comparison between the original way of working and the targeted way of working is presented in Figure 1.

An essential actor in the development project was the core project team that consisted of about ten representatives of the specialized health care wards, the AQP office and the primary care bed wards. One external consultant worked intensively with the core project group.

The most important phase of the project was the process definition. The objective of process definition was to analyze the current short-term AQP process, to define the needed improvement areas and to agree on the new, improved process design (Figure 2). The new process design formed the basis for the new computer-based solution. The process definition phase lasted about two weeks and consisted of interviews of multiple stakeholders, in addition to core project team workshops.

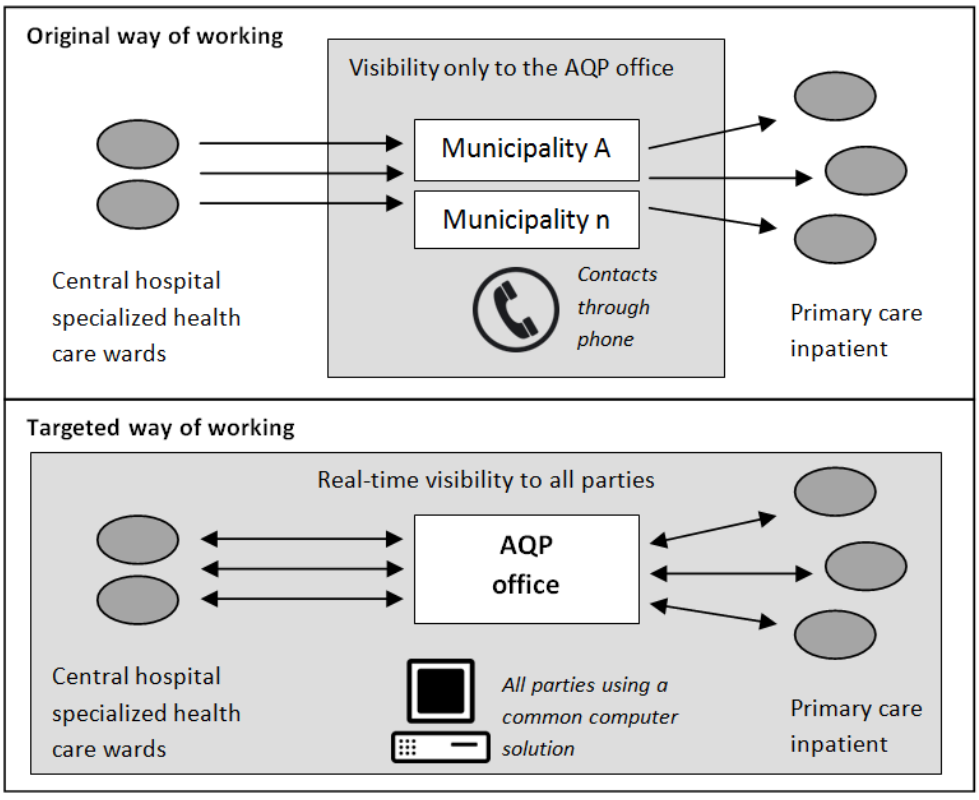

Figure 1. Comparison between the original and targeted way of working.

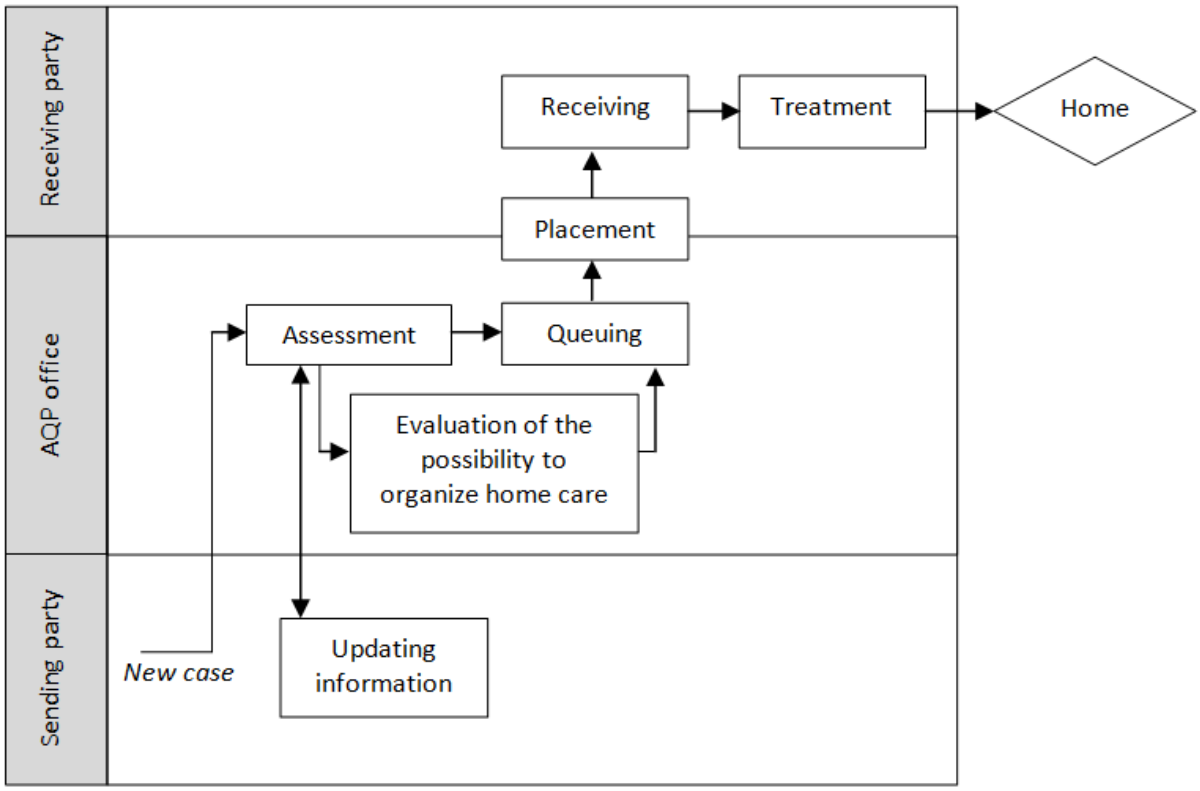

Figure 2. Process diagram of the short-term AQP process.

Once the new process design had been agreed on, the external consultant created the initial version of the computer-based solution with the SBM software within a couple of days. The initial version was used as the basis for the iterative development process with the core project team. The core project team had frequent meetings where they went through the existing version of the solution and defined the needed changes, adjustments and additions. Based on the core team feedback, the external consultant created a new version of the solution for the core project team to review. This iterative approach to solution development proved to be very efficient, as the core project team was able to see a live system, to give their comments and to see the impact of their feedback in the solution almost instantly. The iterative solution development lasted about three weeks.

When the core project team was satisfied with the features of the developed solution for the short-term AQP process, the solution was put into user acceptance testing. The developed solution proved to be quite well-working, and no major errors or lacking features were identified.

The user base of the short-term AQP process consists of about 500 persons, and thus user training could have been an extensive effort. However, the solution created with SBM proved to be so easy to use that a brief two-hour introduction was basically enough for the others but a few nominated key users. The user trainings took about two weeks in calendar time, and thus after eight weeks from the start of the project, the new solution for the short-term AQP process was successfully implemented in the organization.

Impacts of the AQP solution

The introduced AQP process and the supporting information system resulted in a number of benefits. The various professionals involved in the process have now clear responsibilities, and therefore the use of the professionals' time is more productive and unnecessary

communication is reduced. Prior to the implementation of the new AQP solution, there was no measurement of the number of needed telephone calls. However, an assumption can be made that for each patient placement at least ten phone calls took place: one between the sending ward and the AQP office, multiple calls between the AQP office and the various primary care wards in order to check bed availability and a call between the AQP office and the chosen primary care ward to finalize the placement. Furthermore, for each connected call there were multiple calls which did not go through due to busy lines. Thus, based on the 250 placements per month on average, at least 2500 connected calls were made. With the assumption that a call lasts 3 minutes on average, the total working time spent on the phone for the AQP office was abt. 17 days per month, i.e. one of the three full-time AQP office employees was spending her time only on telephone. Naturally, the same amount of working time all in all was spent on the phone in the sending wards and primary care wards as well. With the implementation of the new AQP solution, almost all of the communication was handled though the solution and thus the need for phone calls almost disappeared.

The queues were shortened, and the specific needs and requirements of each patient can be taken into account in the placement decision.

The AQP solution is available in 11 of the sending units and in 66 of the receiving units. There are 1430 beds or supported housing places in the receiving units. The receiving units are divided into the following places:

- service home (125 places)
- nursing home (638 places)
- retirement home (284 places)
- health care ward (294 beds)
- hospital ward (89 beds).

650 nurses can participate in the process (= potential users of the program). About 350 of the users are in the sending wards. The assessment and placement process has 125 users, and about 40 of these users are in the centralized placement unit. This stage of the process includes the centralized placement unit and two other wards where assessment and placement are made. In addition, there are about 170 users in the rehabilitation wards.

The process begins in the sending ward (Figure 3). First, the patient's data in entered into the information system. The sending unit's nurse enters the patient's basic data, for example name, personal identification number and the diagnosis or the reason of treatment. In addition, the sending ward evaluates the duration needed for rehabilitation, as well as the physical and psychological functioning. Also the need for special attention such

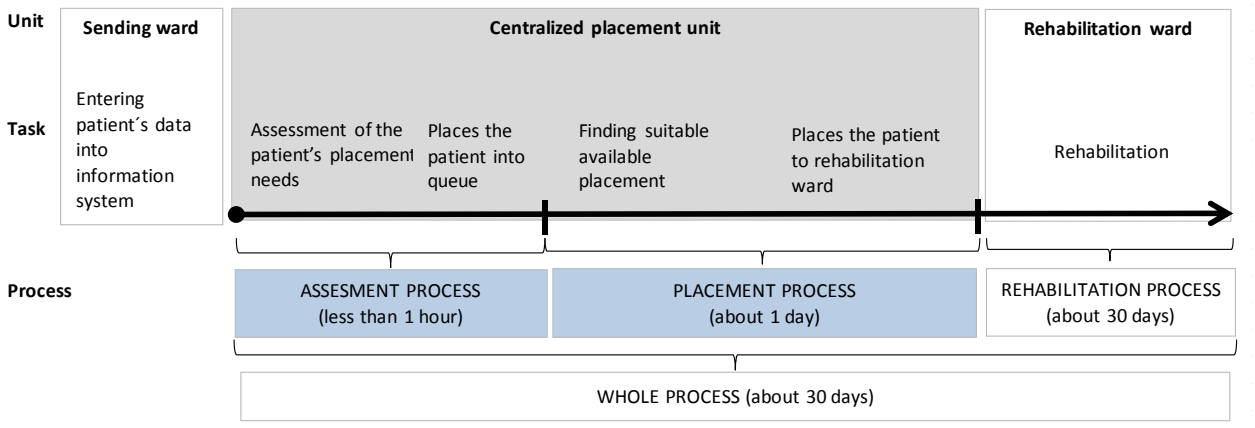

Figure 3. Different phases of the placement processes.

as oxygen therapy, palliative care, wound care, pain management etc. is recognized.

Next, the centralized placement unit assesses the patient's placement needs and looks for a suitable place in the assessment process. When the patient is assessed to be in need of placement, the centralized placement unit places the patient into the queue.

The duration of the assessment process has been reduced on average from ten hours to less than one hour, although the number of patients in the assessment process has increased by 25 % in three years (Figure 4).

The information needed for the placement decision has been defined in the program. The assessment process has shortened because the information system forces all necessary information of the patients to be recorded.

The AQP solution has facilitated the work of the centralized placement unit's staff significantly. Without this solution, it would have been necessary to hire at least one more person to the assessment and placement process. There are currently three employees in the centralized placement unit.

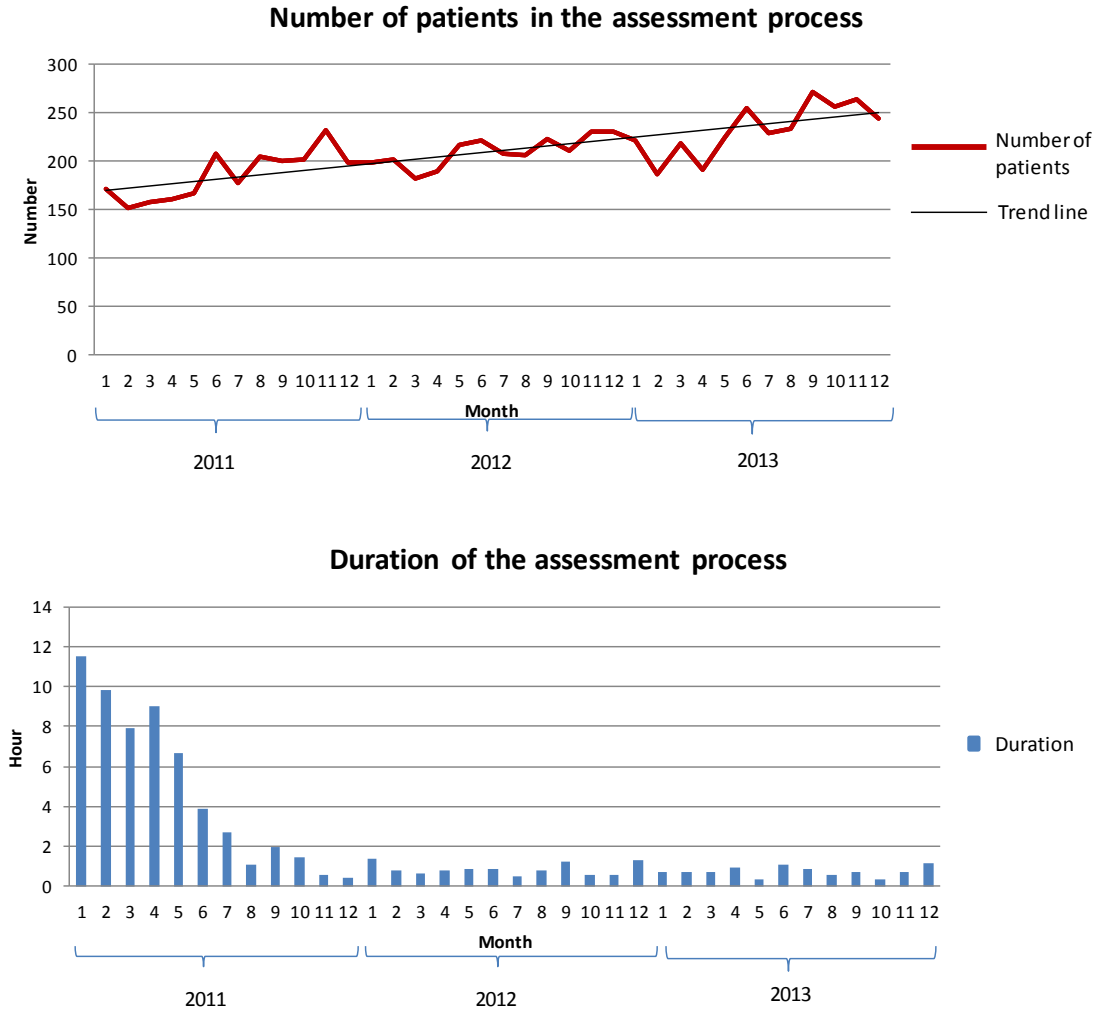

Figure 4. The number of patients in the assessment process and the duration of the assessment process.

The system allows all the available beds within the municipalities in Eksote's operating area to be tracked in real-time, which also has a positive effect on reducing the duration of the whole process. Additionally, the duration of locating a suitable placement has been reduced from the approx. 1.8 days to approx. 0.9 days, thus reducing the duration of the whole placement process (Figure 5 and 6). One day in specialized health care costs about 600-1000 euros per day per patient. In 2012, the acceleration of the assessment and placement process lead to savings of about 350 specialized health care days, which meant savings of 250 000 euros.

In the beginning of 2012, the duration of the placement process increased momentarily due to a 4 % (44 beds) reduction in the number of rehabilitation beds (Figure 5). Reducing the rehabilitation beds stems from Eksote's strategy, which steers the focus to be shifted from care in wards to home care.

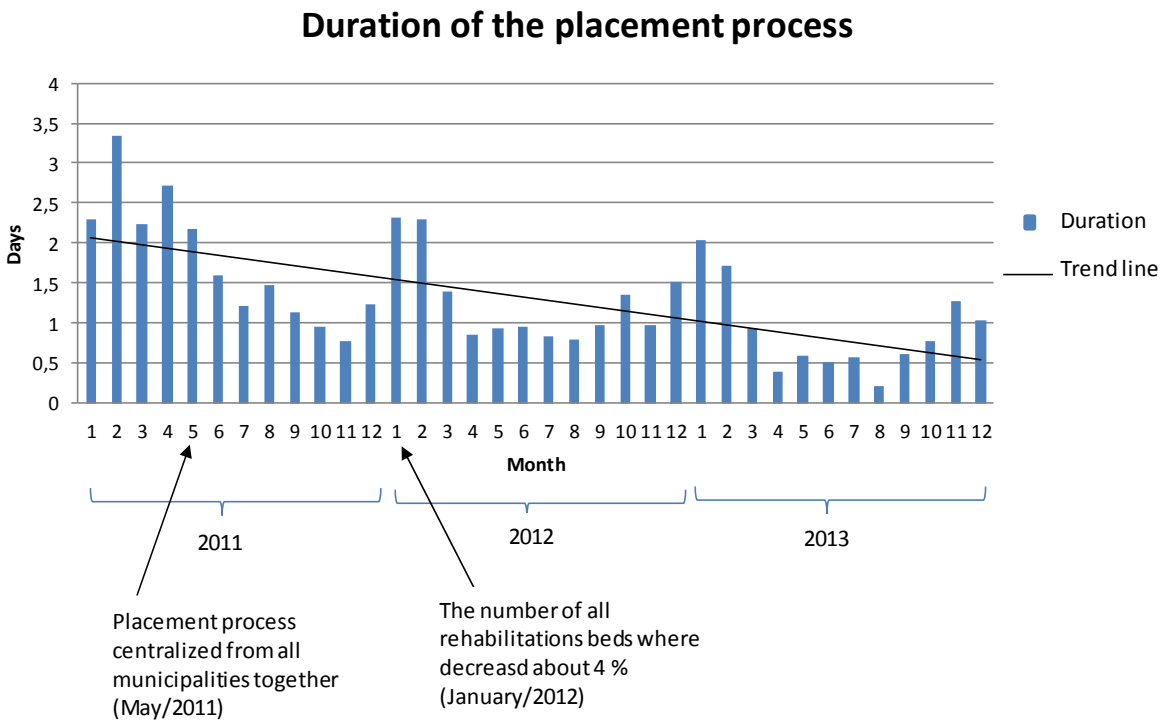

Figure 5. Duration of the placement process.

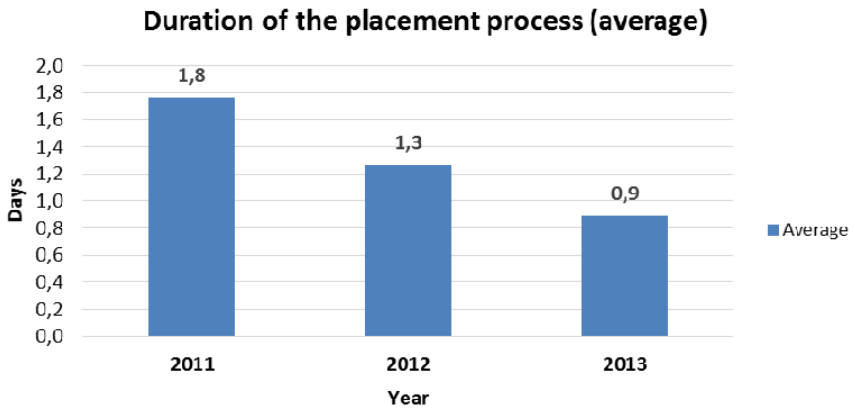

Figure 6. Average days of duration of the placement process.

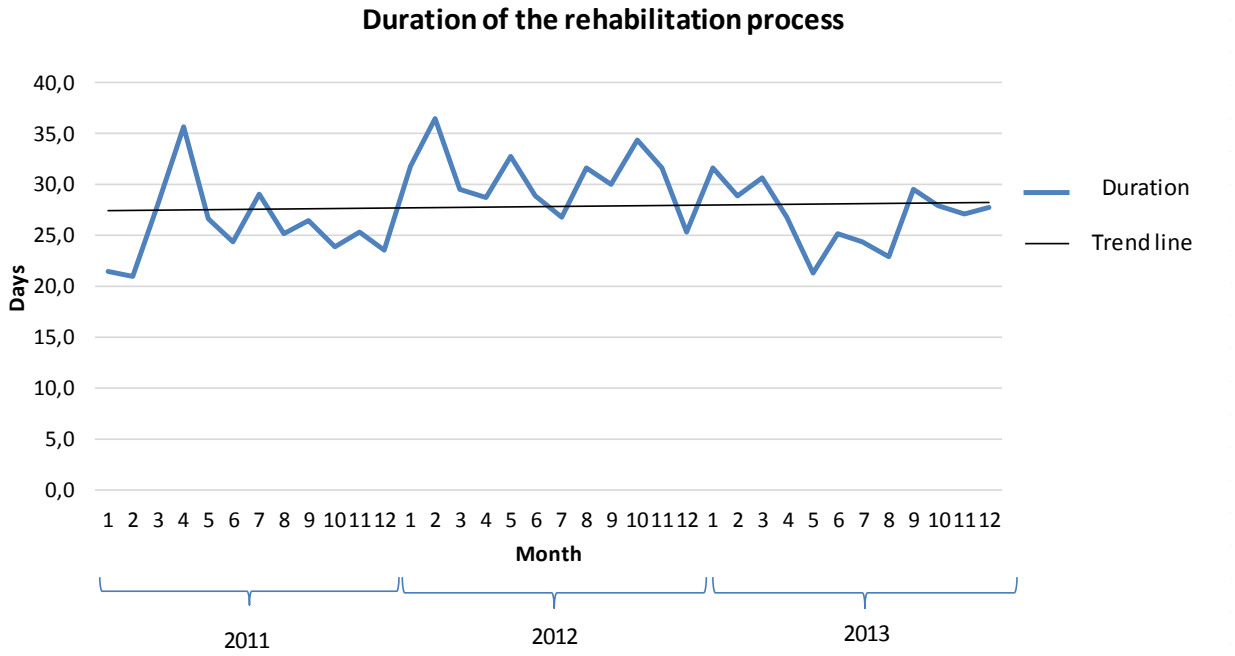

Figure 7. Duration of the rehabilitation process.

There were approx. 600 patients (25 %) more in the rehabilitation process in 2013 than in 2011. In part this was due to the fact that the number of units using the new system was increased. At the same time the number of patients returning home from rehabilitation independently or aided with home care increased by approx. 4 %.

The placement information system does not have an effect on the duration of the rehabilitation process, but it has shortened the time of the assessment process (Figure 7).

If the patient appears in the queue three times in months, the program automatically alerts the personnel of the centralized placement unit. In this case, thorough assessment of the reasons behind the patient's frequent visits must be done.

User feedback about the new AQP system

The research team arranged a group interview meeting to get user feedback about the new AQP solution. The challenges of the AQP process before implementing the new solution were discussed in the meeting. Also, the researchers asked how the new system changed the old working routines and what the users thought about the new process and the software tool. Seven Eksote employees representing all parts of the AQP process participated in the three-hour group interview session. These nurses had worked in the same AQP duties before and after the implementation of the new process.

All participants agreed that the most significant problem of the earlier AQP process was related to the continuous and ineffective phone-based working procedure. The main part of the working shift was spent on calling other units and trying to find places available for patients who needed placement.

According to the interviewed persons, the most important benefits of the implemented new process and solution were:

- Faster and better flow of information, ensuring that updated information is available
  - the right patient information available, fewer errors than before

- nurses have real-time information available on the queue situation at all times
- nurses have the opportunity to follow the progress of the process
- works also at weekends
- secure and smooth functioning of the AQP software.

• The new procedure ensures a timely and fluent daily work flow, resulting in time savings at daily work

- it has accelerated the AQP process and things are done on time
- telephone traffic has been reduced dramatically
- it saves time for all, as the number of enquiry and confirmation calls has decreased
- additional questions and clarifications can also be sought through the AQP software.

• Consistent practices across the Eksote region

- objective treatment of patients
- common understanding of the follow-up treatment between the AQP personnel and the discharging nurse
- patient follow-up treatment assessment has become more concise.

Discussion

The developed IT solution for the AQP process has proved to be unique in Finland. Based on our experience on other organizations in public health care, the AQP process is mainly executed in the traditional way relying on telephone and email as the main means of communication. Since the implementation of the AQP solution at Eksote, corresponding solutions with the same technology have been developed for about 10 other organizations. These solutions have not only covered the short term AQP process but also the long term AQP process, and the results of the usage of the solutions in other organizations have been similar to the ones achieved at Eksote. Thus, it can be concluded that the presented approach, technology and solution have a good match with the requirements of the public health care organizations with tangible benefits..

Conclusions

The utilization of the new solution started very smoothly in Eksote. Despite the big number of users, there were only minor technical or user-related issues to be resolved. Change management was handled efficiently, and basically all users started using the solution from day one. Thus, the benefits of the system were seen almost instantly.

The number of phone calls between the AQP office and the other actors in the short-term AQP process has decreased dramatically. Information about the patients and available beds in the primary care wards is visible to all parties in real-time through the new solution, and thus phone calls are needed only in exceptional situations. The decreased number of phone calls has released a lot of working time for more effective use for all parties in the process.

The effectiveness and lead time of the short-term AQP process has improved drastically, and the queues in the process have practically disappeared. If there are queues, they are caused by the fact that there are no available beds for placement and not by the fact that the AQP office does not have time to process all patients in a timely manner.

The new solution has given transparency to the process and enabled the measurability of the process. All actions in the process are recorded with a time stamp, and thus the duration of each process step and the overall process lead time can be measured. After a couple of months, there was already enough data to help identify the bottlenecks in the process and to take corrective action.

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