

Primary healthcare delivery: an exploratory case study of a “See and treat” unit

Abstract

Primary health care centres (PHCC) and hospital emergency departments (EDs) are the first line of healthcare and the institutions responsible of taking care of the population’s primary health care (PHC) needs. PHC treats both acute patients with minor complaints and patients with chronic conditions. Despite the very different needs of these patients, research on how care processes should be designed to meet the different needs in PHC is limited. In this thesis we draw upon the concepts of volume and variety from operations management literature and use an exploratory case study to understand how a concept, previously studied in EDs, referred to as “See-and-Treat”, can be used to treat acute patients with minor complaints in PHC. We find that care process reconfiguration by taking laboratory tests and payment before the consultation makes all information needed for clinical decisions available before the consultation, instead of having to wait after the consultation for test results as often seen in a traditional setting. Furthermore, we find that a “See-and-treat” approach seems to provide high quality care to patients with minor complaints. We identify that a sheet of paper called “symptom form” is a central aspect of the care process. It guides all activities of the studied care process and it can contribute to care quality by decreasing input and output variety and manage the inherent variety in the care process. The symptom form could build in quality and safety in the process itself, however, as inclusion criteria for the studied intervention are not adhered to, the seen quality could be due to personnel competence rather than care process design.

Keywords: Primary health care, See-and-Treat, service variety, cellular process

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List of abbreviations

LOS: Length of stay

WT: Waiting time

PHC: Primary health care

PHCC: Primary health

S&T: See-and-treat

ED: Emergency department

1 Background

1.1 Introduction

Primary health care centres (PHCC) and hospital emergency departments (EDs) are the first line of healthcare and the institutions responsible of taking care of the population's primary health care (PHC) needs. As a result of frequent ED overcrowding and rising costs of specialised care, research efforts have focused on operations management applications in hospitals and specialised care, particularly regarding how to improve the efficiency of service delivery. While process improvement has become a commonplace term for hospital staff, the application of operations management theory in PHC is less widespread.

EDs are intended to treat patients with life-threatening conditions that require hospital resources and competence. The intended role of PHC in Sweden is to investigate, treat and monitor diseases that do not need hospital resources in terms of competence or equipment, to help patients get in contact with other healthcare institutions if needed, and to coordinate care efforts by communication with other caregivers, such as hospital clinics (SOU2008:37). More specifically, the responsibility for PHC is twofold: to provide care for patients with minor acute conditions that do not need hospital resources and to coordinate care for patients with chronic, often multiple diseases that in addition visit different specialists. While adequate care for patients with minor, urgent complaints usually can be provided within a single visit, patients with chronic, multiple diseases require continuous monitoring and long-term contact. Despite the patient groups' very different needs, in practice the difference in the care process is often only the length and number of physician consultations. This suggests that operations management applications could improve disease management process design and thus, the efficiency of care delivery.

However, empirical research on care processes for PHC patients is to our knowledge limited. This despite recent PHC reforms regarding reimbursement systems and patient choice (*Vårdval*), the latter aimed at strengthening the role of PHC and improving performance, specifically in terms of access and responsiveness. Furthermore, implications of the strategic document of Stockholm future health care plan are unknown but the role of PHC is likely to be expanded. Changes are occurring throughout Sweden and challenges of healthcare make operations management studies important in a local and national context.

1.2 Problem formulation

Even though PHC is intended to be the first line of healthcare for citizens, ED overcrowding of patients treatable in PHC is a recognised problem in Sweden and many other western countries. Many patients seek help at EDs with minor complaints that are intended to be taken care of by PHCCs. Long waiting (WT) and throughput times (LOS) is a result of EDs not being dimensioned for taking care of patients with minor complaints. One reason for people seeking help at EDs is a preference for immediate care and accessibility to PHCC is by many seen as low. Different organisational interventions in EDs have been tried with the aim to decrease WT and LOS. One such concept called *“See and Treat”* is based on a physician meeting non-complex patients, where they can diagnose, decide upon treatment and discharge the patients directly (Rogers et al. 2004).

Swedish PHC appears to have a shortage of doctors (Sveriges Läkarförbund 2013), but to just increase the number of PHC physicians will also mean an acceleration of the growing costs of healthcare. There is thus a challenge facing PHC to see more patients, both more acute patients with minor complaints and more patients with chronic conditions. These challenges cannot be approached by just increasing the number of doctors. One approach to solve the problem, however, is for each doctor to see more patients.

1.3 Purpose of study and expected contribution

Limited research has been done in process design in PHC, more specifically there are few empirical examples of how to separate processes for acute and chronic patients in PHC. The way of taking care of acute patients is often just to book shorter appointments, however, the actual care processes are not differentiated. This can be seen as a contrast to the way ED overcrowding has been dealt with by hospitals, where different ways of sorting patients to different care processes have been tried to reduce WT and LOS (Rogers et al. 2004; King et al. 2006b; Ieraci et al. 2008; Cooke et al. 2002).

See-and-treat (S&T) refers to the principle that “one clinician is able to see, treat and discharge the patient after an initial assessment, thereby reducing the length of time these patients stay in the [emergency] department” (Rogers et al. 2004). As the concept of S&T has successfully been tried out in EDs, this study aims to understand if an S&T approach also can be used to manage acute patients in PHC. The research question can thus be formulated:

How can a “See and Treat” approach be used to manage acute patients in a primary care setting?

The study aims to contribute to knowledge on how to design processes for acute patients in PHC.

1.4 Study delimitation

The study is limited to care processes of acute patients in one PHCC. Since the focus of the study was to study the care process from an operations management perspective no patients were interviewed. Furthermore, the care process for chronic patients was not studied.

2 Previous research

Since there has been limited empirical research on process design in PHC, we take a broader perspective and include studies in hospital EDs. Care in EDs share many characteristics with PHC: high input variety to the care processes (patient present with many different conditions), patients seek help on a drop-in basis, and both ED and PHC form the first line of healthcare. In addition, up to 27% of ED patients are estimated to have conditions that do not need hospital resources suggesting that their needs could be addressed by PHC (Weinick et al. 2010).

Frequent overcrowding of EDs has resulted in studies on process improvement approaches to decrease WT and LOS. These include *streaming* (Kelly et al. 2007; King et al. 2006a; Cooke et al. 2002), *team assignment system* (Patel & Vinson 2005), *S&T* (Rogers et al. 2004) and *fast track* (Rodi et al. 2006; Ieraci et al. 2008). These all aim to shorten WT and reduce LOS for all ED patients by introducing separate care processes for patients with minor, yet urgent, conditions. Sorting is based on different mechanisms and care is coordinated in a predefined process separated from other patients. Outcomes in these studies focus on quantitative flow efficiency measures such as WT, LOS, and patient satisfaction. While these measures are relevant to EDs, they are not in PHC where availability currently is of more importance than LOS or WT. Different ways of sorting patients include likelihood of hospital admission or discharge (Kelly et al. 2007; King et al. 2006a), a specific set of symptoms or diagnoses (Ardagh et al. 2002), triage level and likelihood of admission or discharge (O'Brien et al. 2006), and "complexity of the functional processes" (Ieraci et al. 2008).

In a traditional ED setting, ambulatory patients are usually first registered at a reception and then undergo a priority sorting, "triage", where important determinants of condition severity (e.g. blood pressure, respiratory rate, body temperature, heart rate, and blood oxygenation) are checked (Exhibit 1). Patients with minor conditions receive a low priority rating and thus have to wait for care until patients with higher priority ratings have been treated.

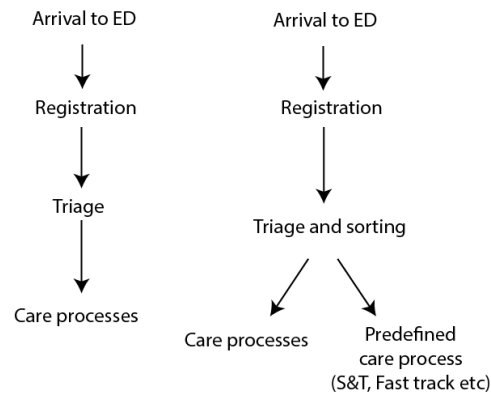


Exhibit 1. Overview of the initial care activities in EDs

The fast track, streaming and S&T approaches then divert patients with minor conditions to a separate care process with dedicated personnel. Patients with minor conditions do not have to wait for more urgent patients. This usually leads to shorter LOS while the remaining ED personnel can focus on patients with more severe conditions.

Studies often describe overall principles of the interventions (e.g. staff competence level and sorting mechanisms), but they often lack detailed descriptions of the activities in the care processes. This makes it difficult to determine causality between interventions and the reported results. Contextual differences between countries and over time limits the external validity of the studies. Underlying mechanisms such as inclusion criteria and resources utilized are also important details often omitted. These have relevance for which patients enter the process and which design is optimal. Furthermore, as detailed process maps are not described it is hard to determine how well the design meets patient demand as determined by the inclusion criteria.

Process design aspects may be absent because the studies are often medically oriented and have adapted evidence-based medicine (EBM) approaches based on quantitative outcomes and randomised controlled trials. EBM refers to the concept that all medical decisions and treatment should be guided by the current best knowledge about the disease. Therefore, studies on process design in medical literature often focus on outcomes while underlying mechanisms (why, how) are often neglected and care processes are seldom described in detail. Management literature has another tradition and often uses a qualitative approach and theoretically generalises from single-cases (Yin, 2003). In operations management literature it is crucial to include details of process design in order to assess feasibility (Slack et al. 2012). It is to this body of literature we now turn.

3 Theoretical framework

3.1 Volume versus variety

In manufacturing and services operations management, the relationship between volume and variety is an important determinant in process design (Slack et al. 2012). The Volume-Variety framework (Wheelwright 1984) describes the relationship between the two. Volume refers to the amount of a unit that is produced. Variety refers to the number of different products and services that are processed. A high variety demands a flexible and costly production. High variety processes are intended to better respond to customers individual desires and needs while low-variety processes instead try to minimize costs and variability in outcome through standardization (Slack et al. 2012).

The Volume-Variety framework suggests that there is a balance between the two where an optimum relationship can be found in terms of achieving cost-efficiency (Slack et al. 2012). Cost-efficiency has been the traditional performance objective. This implies that low-volume operations can be expected to have a high variety of products and services; and high-volume operations a low variety of products and services.

Traditionally, manufacturing has tried to reduce variety in order to improve efficiency. This has led to an emphasis on standardization (i.e. less variety) rather than customization (i.e. more variety). However, it is not always clear-cut whether a process should be standardized or customized. The advent of new technologies has heralded the arrival of alternative strategies such as mass customization. Mass customisation is now a widely spread concept aiming to bring customised products and services to mass markets (Fogliatto et al. 2012). This allows manufacturers to develop customised products while still maintaining a high production (Fogliatto et al. 2012). One example of such a strategy is to provide the means but then let the customer do the customization, e.g. Lego (Tapscott & Williams 2006).

Service design presents new challenges to understanding this relationship in the context of processes. Despite a process' placement in the volume variety framework, there could be specific activities and process characteristics that might be desirable to standardize and customize respectively (Hall & Johnson 2009). This can be thought of in terms of scientific and artistic processes (Exhibit 2). Hall & Johnson (2009) define the idea of increased quality and decreased costs as scientific and the idea of allowing activity deviations as artistic.

Hypothetically, a balance could be found where the process is essentially scientific but also allows for an artistic approach where the value-added gives a return on investment. For example, a high-end restaurant might have some standardized guidelines on how the staff

should treat the guests to ensure a certain degree of quality, but might simultaneously open for employees to improvise in order to further be able to serve the individual needs of a guest. Thus, it is possible to separate activities and process characteristics which allow the coexistence of standardization with artistic allowance (Hall & Johnson 2009).

		Process environment	
		Low variability	High variability
Value of output variation to customers	Positive	Mass customisation	Artistic processes
	Negative	Mass processes	Nascent or broken processes

Exhibit 2. Value of output variation to customer and process environment matrix. Adapted from Hall & Johnson, 2009.

Scientific and artistic process impact process output. A source of variation in output is the input to the process. In services, several sources of input variability have been identified (Frei 2006). To understand the difference between variability and variety, think of variety as the number of ice cream flavors and variability as the possible difference between two servings of the same flavor or the number of different diseases treated (variety) and the response to the same treatment for the same disease (variability). Frei (2006) argues that with customer involvement comes customer variability in input timing, request variability, customer capabilities, effort by the customer and customer preferences. Customer involvement opens up for understanding output in terms of service experience and the relationship with the cost for the service.

There are two strategies for avoiding the tradeoff between “quality of service experience” and “cost to serve”: low-cost accommodation and uncompromised reduction (Exhibit 3) (Frei 2006).

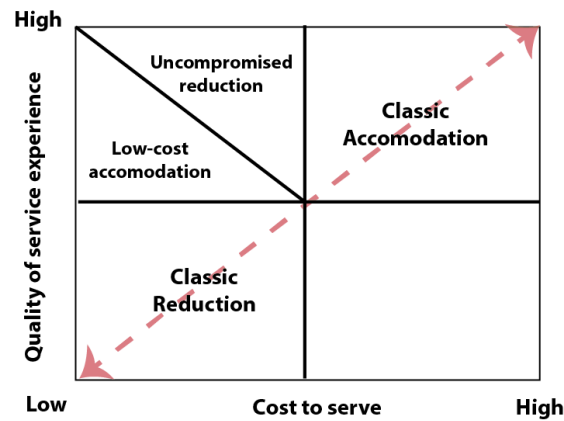


Exhibit 3. Breaking the trade-off between efficiency and service. Adapted from Frei, 2006.

A low-cost accommodation strategy strives to maintain the “quality of service experience” and lowering “cost to serve”. This could be done by involving the customer in the service production to customize to their needs. An uncompromised reduction approach is to increase the quality of the service experience while not increasing the cost to serve. An example of this strategy is to target through a specific category of variability such as only accepting high performing individuals to a university program or limiting surgical treatment to only those patients who do not smoke (since smoking increase the risk of surgical complications).

The volume-variety relationship has implications for process design in terms of process performance objectives, tasks, flow, layout, technology and job design (Slack et al. 2012). Service processes can be differentiated into professional services, service shops and mass services (Silvestro et al. 1992; Silvestro 1999). The different process types can be plotted into a matrix which illustrates different strategies to address the volume-variety (mix) relationship (Exhibit 4).

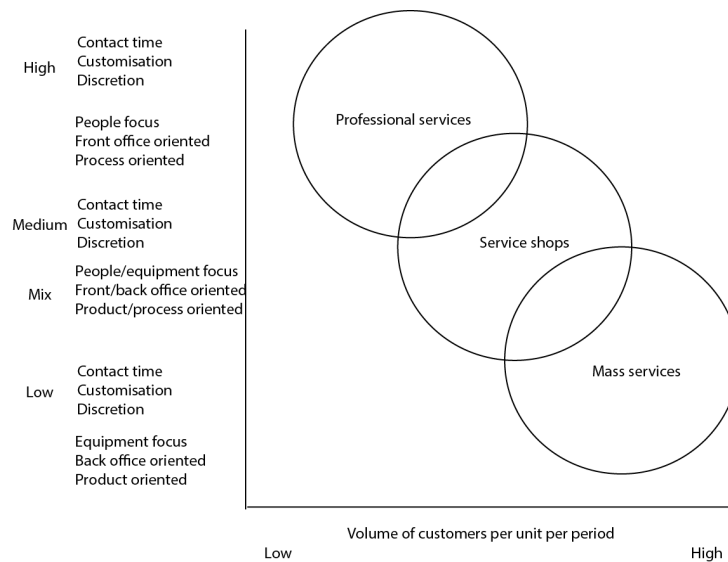


Exhibit 4. Service process types. Adapted from Silvestro et al 1992.

3.2 Implications for healthcare

In contrast to the manufacturing sector's development from a mass production focus to one of increasing customization, healthcare which began as "the art of medicine" has tried to maintain the focus on high levels of customization despite the increasing demands created by increasing volumes (McLaughlin 1996).

Some researchers have considered healthcare services to be too customised and emphasise the need for more standardised practice (Walley 2003) while others argue for the need to accept the nature of services with its inherent variation in input, process and uncertainty and that mass customisation is necessary (McLaughlin 1996). To do so, McLaughlin (1996) argues that "mastery of inherent variability is a necessary condition of the effective delivery of mass customisation". Technological developments, e.g. in genomics, open opportunities to deal with this inherent variability (Garman et al. 2007; Christensen 2008). However, new technology is not the only approach that is needed. Process design and management offer potential solutions as well.

Process design in healthcare is considered to have lagged behind the development of knowledge in diagnosis and treatment. It is not standardisation of treatments *per se* that have hampered the development of more efficient care delivery, but rather the configuration of resources in healthcare service processes (Walley 2003). Doctors approach their patients' conditions more unique than they actually are (Walley 2003). This results in too much flexibility in processes, which makes the processes poorly adapted to the demand created by treating high volumes of,

in essence, similar patients. Process standardization could increase cost-efficiency by using an appropriate degree of flexibility, relevant to the patient group treated (Walley 2003). Walley (2003) uses volume-variety logic to argue that process standardization could increase cost-efficiency by making the process reach an appropriate degree of flexibility, based on the patient group treated.

3.2.1 Understanding volume-variety in healthcare services

Lillrank (Lillrank 2002; Lillrank & Liukko 2004) uses a “broom” as a metaphor to describe variability in the outcome of a process and characterises processes as standard, routine and non-routine. The suitable process type is dependent on the uncertainty of the process which is dependent on the variation and variety in inputs and the certainty of interventions producing expected outcomes (Lillrank & Liukko 2004). In a medical context, Lillrank suggests that the degree of certainty of symptoms, diagnosis and outcomes of treatment should determine the process design. In a high degree of certainty the process should be standardised (Lillrank & Liukko 2004). Moreover, Lillrank suggests that quality in standardized processes should be built into the system rather than being dependent on the individual competences of the employees working in the process. This could be done by using guidelines for decision-making. At the other extreme is the non-routine process that has a high degree of uncertainty in symptoms, diagnosis and outcome of treatment. Here, quality is dependent on the employees in the process rather than the system and a “quality culture” rather than “quality system” should ensure process quality (Lillrank & Liukko 2004).

Bohmer (2005) distinguishes between *iterative* and *sequential* care. *Iterative* care is characterised by uncertainty of diagnosis and treatment outcome. Doctors use implicit (tacit) knowledge in diagnosing and treating diseases and diagnostic tests and treatments are tried in feedback loops. In *sequential* care there is a high degree of certainty in diagnosis and treatment outcome and a sequence of steps can be defined. Explicit knowledge is used in *sequential* care. Bohmer argues that these different types of care require different process designs and performance measures. Iterative care requires a more customised process while sequential care can be more standardised and predefined. The practical difference between an iterative and a sequential care process in terms of medical quality is that an iterative process is limited by the practitioners’ competence while a sequential process is limited by the systematic use of guidelines for diagnosis and treatment.

3.2.2 Modularization

Modularization uses standardized subcomponents that can be put together in many ways, creating different products and services (Slack et al. 2012). Hospital processes are often

modularized at the level of hospital departments (e.g. radiology department, lung department etc.). The doctor responsible for the patient during the hospital stay decides which modules (hospital departments) are needed to produce a cured/medically-improved patient. The doctor acts as an architect in these processes, composing activities in accordance with the individual patient's needs (Bohmer 2005). A common critique of this strategy in a hospital setting is that the different departments tend to be resource-efficient, but the care process as a whole often has a low flow efficiency. This has been referred to as “efficient islands” (Modig & Åhlström 2012).

3.2.3 Cellular processes

Cellular process design is another approach to understand the high volume-high variety problem. Instead of trying to increase flexibility without incurring costs, which can occur in modularization, a cellular process strategy separates groups of products/services with different volume-variety characteristics. By doing so, several process designs can be developed to optimize the production of different products/services. A cellular process design moves the production from a costly place to the right of the volume-variety line of optimization into two, or more, different places on the line (Slack et al. 2012). S&T and other approaches can be seen as cellular processes.

Bohmer (2005) discusses a concept similar to cellular process design in a medical context: “Separate and Select” and “Separate and Accommodate” (Exhibit 5).

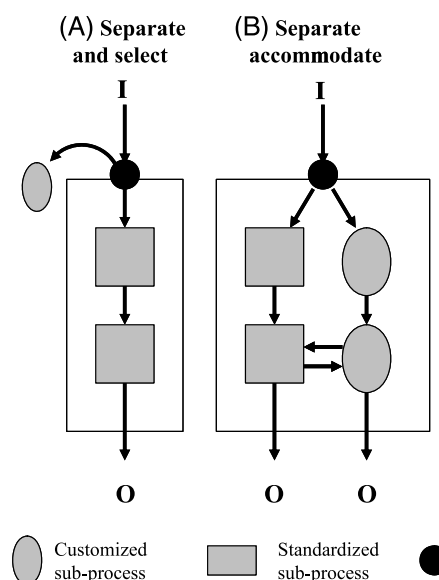


Exhibit 5. Process configurations. Adapted from Bohmer, 2005.

3.2.3.1 *Separate and Select*

This approach is designed to identify a homogeneous patient group, which can be treated in a standardized process. Suitable patients are directed to specialized clinics outside the directing organisation. By “outsourcing”, a cost-efficient process with low process variability can be achieved. Retail clinics such as the “Minute Clinic” is an example of this approach which has gained popularity in the USA (Kaissi & Charland 2013). These clinics are often co-located with pharmacies in dense populated areas, have opening hours during evenings and weekends and are staffed by nurse practitioners or physician assistant with a physician supervising and being available on call (Kaissi & Charland 2013). Retail clinics strictly select patients based on symptoms and/or diagnoses and often have “menus” with diagnoses, treatments and price. The most frequent reasons for seeking help at retail clinics include upper respiratory infections, sinusitis, urinary tract infections and immunizations (Mehrotra et al. 2008).

3.2.3.2 *Separate and Accommodate*

Bohmer (2005) describes another approach to separating processes, but retaining them within the same organisation. In this strategy, no patient is turned away. If the needs of patients in the sequential process change over time, they can easily be re-directed to an iterative process. This can be seen as a patient safety mechanism that makes use of standardization as a method for anomaly detection, which is then addressed, in an iterative fashion. “Streaming”, “S&T” and “Fast Track” are all “Separate and Accommodate” strategies.

3.2.4 *Performance objectives in healthcare*

Operations performance objectives includes quality, speed, speed, dependability, flexibility and costs (Slack et al. 2012). A similar definition exists in healthcare. Healthcare should be Safe, Timely, Effective, Equitable, Efficient and Patient-centered (STEEEP) (Committee on Quality of Health Care in America, Institute of Medicine 2001). *Safety* refers to decreasing patient injuries from care that is intended to help them, such as receiving a medication that might harm them. *Timeliness* refers to that healthcare should be given in a reasonable timeframe and that harmful delays should be avoided. *Effectiveness* refers to that services should be provided based on the latest scientific knowledge, embodied through practice of Evidence-based medicine (EBM). *Equity* refers to that care should be provided that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location or socioeconomic status. *Patient-centred* refers to that is respectful of and responsive to the individual patients’ preferences, needs and values. These aspects should be considered in clinical decisions about a patient’s care.

The STEEEP dimensions of quality are often used as a conceptual framework for quality in healthcare. Quantitative indicators have been developed for each dimension in Sweden

(Socialstyrelsen 2009). In this report, we have chosen performance measures inspired by this framework.

3.3 Theoretical problem

“Separate and Select” has been relatively well explored through rich descriptions of the evolution and use of “Retail clinics” while the other cellular process layout design proposed by Bohmer, “Separate and Accommodate”, is less explored. S&T, Streaming and Fast Track could be considered empirical examples of “Separate and Accommodate”, but as these articles in general do not provide detailed descriptions on the patient separation mechanism and the processes, they fail to allow for the evaluation of a “Separate and Accommodate” design. Moreover, we have not found that these applications have been evaluated in a PHC setting.

4 Method

4.1 Study design

A single exploratory case study approach was chosen as study design. A case study is suitable when one seeks a deeper understanding of a phenomenon in its natural environment, particularly to answer “how?” and “why?” research questions (Yin 2003). An exploratory design was chosen because the type of intervention has not been studied in a PHC context before. This limited hypothesis generation and the application of more deductive designs. With an exploratory design we attempted to study the phenomenon in-depth to allow for the generation of hypotheses and propositions for further research (Yin 2003).

4.2 Choice of study object

Lättakuten at Åkermymntan PHCC was chosen as it is, to the best of our knowledge, the first of its kind in Swedish PHC. We got in contact with the founder of the intervention through our professional network.

4.3 Data collection

Data was collected using three sources: interviews, process observations and secondary data in form of documents and administrative data.

4.3.1 Interviews

Ten semi-structured interviews were conducted using an interview guide structured around the three essential ingredients of strategic change (content, process, content) (Pettigrew & Whipp 1991) with the purpose to understand what *Lättakuten* is, the context in which it has been developed, and which outcomes were intended and realised (interview guide in Appendix 1). A broad approach allowed for the identification of important aspects (an inductive approach). All interviews were digitally recorded with the consent of the interviewees, transcribed verbatim, and reviewed by the interviewees to ensure that the descriptions were accurately captured.

Verbatim transcriptions are a good choice of recording to avoid inaccurate transcripts, which risk having a deleterious effect on the data analysis (King & Horrocks 2010).

The interviews were conducted at the studied PHCC with an approximate duration of one hour each. Interviewees were informed about the purpose of the interviews and their voluntary participation. The first interviewee was selected through purposive sampling (Patton 1990) as we had identified one potential information-rich interviewee candidate. We believed that this candidate had a good insight in the content of the intervention, as he was the creator of the concept. We also thought it would be interesting to gain an insight into the intended and realised outcomes of Lättakuten. He also provided the start for a snowballing approach to choose the rest of the candidates as he had a good overview of Lättakuten as a whole. The rest subsequent interviewees were then asked to name other potential participants. These suggestions were matched to our inclusion criteria: had worked at the studied primary healthcare center and been involved in the studied phenomenon. Five interviewees were men; five were women. They included the CEO of the parent company Legevisitten, the manager for the health care center, four doctors, two LPNs, one medical secretary and one lab assistant (Appendix 2). The interviews were conducted at the interviewees' workplace.

4.3.2 Observations

To develop our understanding of the content, process observations were conducted.

Observations were conducted using an observation protocol based on information from the interviews about the patient's path through the care process. Observations were conducted using a non-participatory approach to avoid the subjectiveness that might be associated with participatory observations as well as to capture all details of the care process (Yin, 2003). We observed both particular segments of the process (14 patients) and the entire process (86 patients) on four separate days.

4.3.3 Documents and administrative data

Documents in the form of patients' checklists (called symptom forms), administrative data about patient characteristics and patients' evaluations were obtained from the administrative systems of the PHCC.

4.3.4 Data analysis

A grounded theory approach was used when analysing data, as there was not much previous research on process design in PHC. The theoretical framework of this thesis was thus not used to generate hypotheses, but rather to understand the studied phenomena from a scientific perspective. The interviews were analysed using a thematic approach (King & Horrocks 2010). Thematic analysis has been described to be the "methodological package" of grounded theory

(Tuckett 2005) while others even describe that grounded theory is thematic analysis (Kellehear 1993). Themes were then identified based on the questions in the interview guide where more than one interviewee had expressed an opinion. Having found themes we grouped the data within each theme based on similarities in order to structure the data as clearly as possible.

The observations were analysed using an observation protocol. The observations covered the content of the intervention, i.e. the patient care process. The observations were used to develop a process map and a value stream map to understand and illuminate the findings.

The administrative documents were used to understand which outcomes the primary healthcare center had measured, more specifically patients' satisfaction and number of patients. The distribution of patients' reasons for seeking help at Lättakuten also contributed to the understanding of the context and the homogeneity of the patients' symptoms.

Data triangulation was used to increase validity (Yin, 2003), e.g the care process investigated through a combination of interviews and observations.

4.4 Methodological considerations

The study design was chosen after evaluation of different methods through construct validity, internal validity, external validity and reliability (Yin, 2003).

4.4.1.1 Construct validity

Yin (2003) explains that a case study risks suffering from low validity if the investigator "fails to develop a sufficiently operational set of measures." We had several strategies to cope with this threat. First, we decided to evaluate Lättakuten through the STEEEP (Committee on Quality of Health Care in America Institute of Medicine 2001) dimensions of care quality. Additionally we used three different sources of evidence: interviews, non-participatory observations and administrative data. Based on this we could use data triangulation to increase the validity of our findings. We also tried to establish a chain of evidence by clearly describing in which context data had been collected. To further maintain the chain of evidence we tried to cite, as detailed as possible, what data our analysis, discussion and conclusions were based on. Transcribing the interviews verbatim was also a way to ensure that we didn't miss any aspects brought up in the interviews, also strengthening the chain of evidence.

The major weakness concerning the validity of this study is that we couldn't provide a database with all empirical data (Yin, 2003) due to ethical considerations as we had promised the interviewees that we wouldn't give anyone access to the whole interviews. This was promised to

make sure that the interviewees spoke freely and unaffected by the fact that their opinions might be read by colleagues.

4.4.1.2 Internal Validity

Several studies (Campbell & Stanley 1966; Cook & Campbell 1979) have pointed out the threats of low internal validity in a case study setting. In order to avoid this we designed the interviews to cover contextual factors that might offer a rival explanation to the results (Yin, 2003).

Internal validity could have been improved if we had used pattern matching, by formulating a hypothesis. However this couldn't be done beforehand which is why a grounded theory approach was used instead.

4.4.1.3 External Validity

As Yin (2003) suggests, instead of trying to reach statistical generalizations we focus on analytical generalizations to theory. We tried to isolate generic factors that could be generalized to a broader theory. Due to the limited time frame of the project, a single case study was chosen. However if we had used a multi-case approach we might have been able to replicate our results increasing external validity further (Yin, 2003).

4.4.1.4 Reliability

Several actions have been taken to increase reliability of the results. First we used distinct guides or protocols during our entire data gathering. We present our interview guide and observation protocol in the Appendix 1 and 8 respectively. We also specifically describe the roles of the interviewees, their gender and in which context they were interviewed. We also had specific inclusion criteria when choosing interviewees.

4.4.2 Ethical considerations

All interviewees gave their oral consent to recording the interviews and were informed that they would be anonymous in the data analysis. However, due to the limited number of persons and roles of the people working in Lättakuten, anonymity in relation to other persons in Lättakuten could not be guaranteed. No personal data on patients observed during the observations were recorded.

5 Case description

Based on the empirical data and the thematic analysis of the interviews, we present a case description of a S&T unit, from here on referred to as *Lättakuten*.

5.1 Development of *Lättakuten* at Åkermymntan PHCC

The private care provider, Legevisitten AB, founded Åkermymntan PHCC in September 2010.

Åkermymntan PHCC is located in a suburb within the Stockholm County. In less than three years, 10,000 patients were attracted and listed the PHCC and several challenges emerged as patient volume increased. The increased number of patients listed at Åkermymntan PHCC had a negative impact on access to care, patient and staff satisfaction, productivity and thus profit. With increased patient volume, physicians' capacity to deal with unscheduled patients had become insufficient and patients had to be referred to other caregivers, which incurred costs and patients dissatisfaction. Within the existing facilities, employing more physicians was not a viable alternative when there was no space for new examination rooms. Instead, the management team wanted to increase productivity with the existing staff. *Lättakuten* was started in October 2013 as an answer to the issues derived from the increasing number of listed patients and the inability to increase capacity.

5.2 Principles of *Lättakuten*

Five basic principles of *Lättakuten* emerged from the interviews:

- All patients that seek help are welcome
- Every patient should meet a physician the same day he/she needs help
- A standardized form specific to a patient's symptoms is used to collect patient and diagnostic information and forms the basis for documentation
- Specific staff and facilities are dedicated to the diagnosis and treatment of this patient category
- Patients with complex needs (such as chronic conditions, multi-morbidities) are referred to the other part of the PHCC after their visit

5.3 The care process

5.3.1 The care process of acute patients before the start of *Lättakuten*

Prior to the start of *Lättakuten* the care process of acute patients included same-day booked consultations. Patients usually called during morning hours and booked consultations for the same day. In order to accommodate the unplanned visits, time slots for acute visits that could only be booked during morning hours the same day were reserved in the physicians' schedules. Time slots were fixed at 15 minutes and sometimes, if needed, several patients were booked at the same time slots. If the time-slots for a day were full, patients were referred to another care

provider for emergency services. Patients that successfully got appointments visited the PHCC during the day.

After a registration and payment in the reception the patients met a doctor that decided if laboratory tests were needed (Exhibit 6). If laboratory tests were needed, the tests were taken at the PHCC's main laboratory by a laboratory assistant that in the same lab served patients that also visited the laboratory for regular tests (such as patients with prophylactic anticoagulant therapy). The laboratory often got overcrowded as people had to wait for tests. As one doctor put it

“In the old system I often worked faster than the lab, resulting in that I could have three patients waiting to take lab tests” (I:006)

After the laboratory testing, the physician reviewed the tests and met the patient again for treatment decisions and discharge. The care process included meeting two to four professionals: the receptionist, the physician, the laboratory assistant and the district nurse.

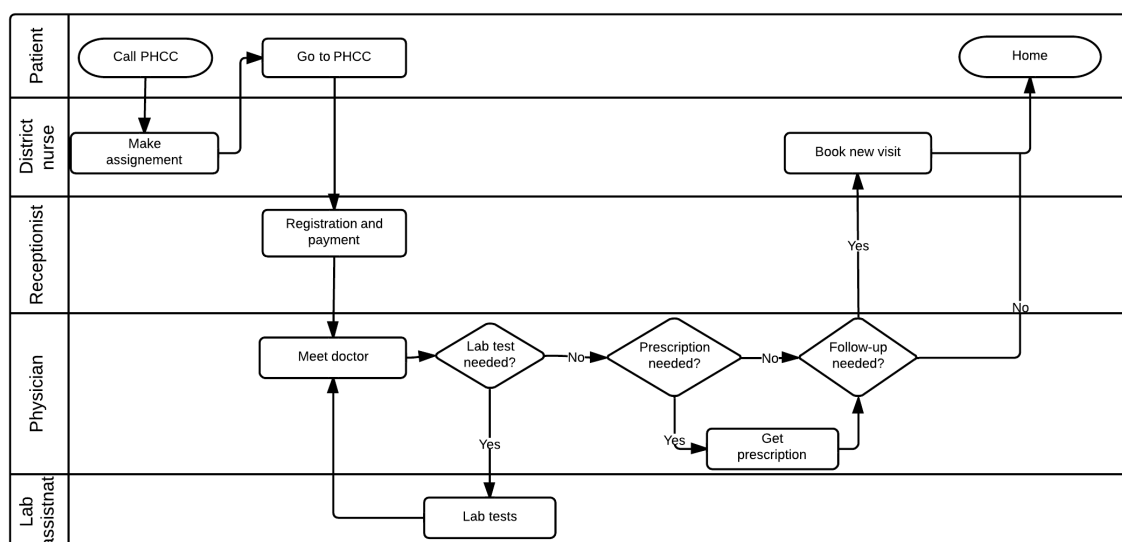


Exhibit 6. The intended care process of acute patients prior to the start of Lättakuten.

5.3.2 The care process at Lättakuten

The care process for people seeking help with acute complaints starts when they arrive at a drop-in basis to the PHCC (Exhibit 7). If patients call the PHCC during morning hours (as they did before the start of Lättakuten) an answering machine informs them of that they may visit Lättakuten in a drop-in basis for minor acute conditions.

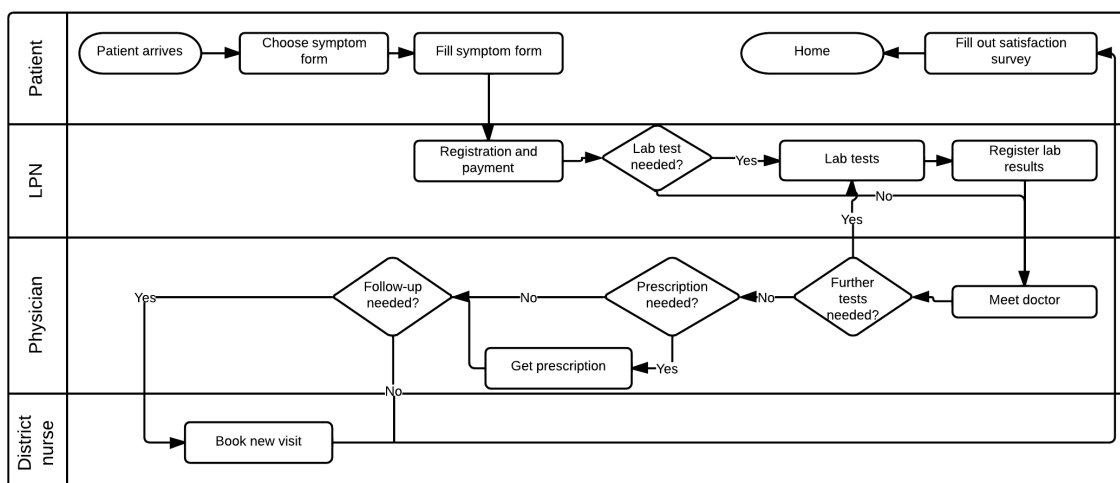


Exhibit 7. The intended care process at Lättakuten.

Having crossed the entrance of Lättakuten, the patient is informed by signs or by the licenced practical nurse (if signs are not understood) to take a queue number and a symptom form from a shelf next to the entrance (see PHCC layout, Appendix 3). The patient takes a queue number, chooses a suitable symptom form, and goes to the waiting room to fill out the form while waiting to be called. The licensed practical nurse (LPN, *undersköterska*) calls the patient who follows from the waiting room into the laboratory for registration lab tests. The LPN asks about the symptoms the patient is experiencing and is guided by the symptom form to select the appropriate laboratory tests. The LPN can consult the doctor at any time if there is any uncertainty regarding tests needed. After registration in the electronic medical record (EMR) system, laboratory tests and payment, the LPN places the symptom form in a stack, and the patient waits in the corridor for the physician (Appendix 3). Laboratory test results are noted on the symptom form. When the physician is ready for the next consultation, the physician takes the next symptom form from the stack and calls the patient from the corridor into the physician's office for the consultation. The physician verifies the symptoms with the patient and performs a clinical examination. Clinical examinations are semi-standardised and the results of the exam are recorded in fields on the same symptom form. The clinical examinations are performed face-to-face and all instruments needed are in arm's reach of the physician's chair. After the consultation, the patient may meet the district nurse for booking a follow-up visit. Before patients leave they are encouraged to fill out an evaluation form. The care process includes meeting two or three professionals: the LPN, the physician and the district nurse.

5.3.3 Details of the care process

The collected data showed a coherent picture of the general process of Lättakuten, more specifically it is clear that the process contains the above stated activities. However, looking at the specific activities within the process there were inconsistencies in the ideas of how the specific activities were to be performed. The differences were basically associated with the degree of standardization and the degree of personnel involvement in the activities.

5.3.4 Choose and fill out symptom form

The first activity the patient goes through in the Lättakuten process can be separated into three steps: take a queue number, choose a symptom form and fill out the symptom form. There was written information on the wall at the entrance explaining that the patient should take a queue number, choose a symptom form and fill it out. Patients were sometimes confused after entering the Lättakuten and observations showed that the LPN instructed 38 % of the patients to choose and fill a symptom form.

5.3.5 Doctor consultation

The activity included three steps: looking at the symptom form asking complementary questions if needed, perform a clinical examination and decide on further action. Potential further actions included expectancy (patient does not need any treatment), medical prescription for treatment, send patient back to laboratory if additional tests are needed (3.5% of patients) and send patient to district nurse if follow-up or additional investigation was needed. If additional tests were taken, the patient returned to the doctor afterwards and one of the aforementioned actions was taken. The activity had an average length of 6:12 minutes.

However, concerning the degree of standardization in the clinical examination, opinions diverged. One doctor told us that the whole doctor group at the PHCC had discussed and decided on which clinical examinations should be performed depending on which symptom form was chosen. However, two other doctors denied that they used any, by the whole doctor group decided, and standardized clinical examination. Instead, they both said that they had their individual standardized routines around clinical examination based on their own experience. Observations showed that none of the doctors did less clinical examinations than the general guidelines stated. Au contrary they tended to include more clinical examinations.

One doctor told us that there are guidelines on clinical examination:

“Yes (the clinical examination), it is standardized. I have discussed with the doctors group at the PHCC how they examine different conditions(...) then I have made a proposition that has been internally validated by my colleagues” (I:001)

However another doctor expressed:

“It is from doctor to doctor how much clinical examination to do [in Lättakuten], I have my own kit I use” (I:009)

Another ambiguity from the interviews was which patients to treat in Lättakuten. One doctor admitted that the scope had widened continuously from only treating conditions defined by the symptom forms to also treat other conditions if they could be fixed quickly, such as writing sick-leave certificates. Another doctor was worried about this development. He told us that it wouldn't be good if Lättakuten turned into “a small PHCC within the PHCC”. The reported reason for this widening of scope was that the doctors felt that it was more comfortable for the patient to get as much done as possible as long as it did not take too much time, slowing down the flow. Our observations also supported that the doctor in Lättakuten handled most of the cases himself as there were only a few observed cases where the patient was directed to the district nurse.

5.3.6 IT/information medium

Administrative and patient data flow through two mediums during a patient's visit at the *Lättakuten*: the symptom forms and the EMR system.

5.3.7 Symptom form

Each symptom form (Appendix 4-6), of which there are 10 in total, is designed for a specific set of symptoms, and is comprised of three sections. These symptoms were chosen because physicians noted that many patients sought help with these problems, there are easily taken laboratory tests for diagnosis and they often do not require follow-up visits. The first section of the forms is based on a set of questions providers usually ask during consultations for patients who present with specific symptom sets, e.g. the localisation and duration of pain or the presence of cough, sore throat or cold-symptoms (Appendix 4-6). In the second section, LPN records lab results in predefined boxes for any of the six lab tests available at the *Lättakuten* (Appendix 5). During the consultation, the physician verifies the information filled in by the patient and adds additional history notes into the third section of the symptom form. The physician's section of the form includes fields for examination, diagnosis, and prescribed treatment. Common diagnoses and treatments for the symptom set are listed with checkboxes. The physician can add clarifying notes anywhere on the physician's part of the symptom form. During the opening hours of *Lättakuten*, the physician keeps the symptom forms from all the visits in their consultation room. Each day the secretary scans the symptom form into the (EMR) system. The clinical examination is pre-defined based on the symptom forms. For example, if the patient takes a “sore throat” form the doctor is supposed to examine lymph nodes, mouth, listen to heart and lungs. Other symptom forms have other pre-defined clinical examination procedures (Appendix 5-6).

5.3.8 Recording in the Electronic Medical Record System (EMR)

After the opening hours, the physician delivers all symptom forms to a medical secretary who scans the forms into the EMR system. While physicians seldom enter information or log into the EMR, they are able to enter patient diagnoses, prescribe drugs, write sick leave documents, and order additional tests not taken in the *Lättakuten* laboratory. The EMR is also used for the administrative registration of the visit, booking physician appointments, and ordering tests. The most relevant and up-to-date patient information is communicated through the symptom form.

5.4 Capacity planning

The number of patients seeking help at Lättakuten has increased continuously since the start and at the time of observations 30-40 patients were seen in Lättakuten every day. Opening hours has been expanded from two morning blocks (08.00-11.30) per week to five morning and five afternoon blocks (13.00-14.30) per week. The Lättakuten personnel capacity was intended to accommodate one physician and one LPN, which is the basic staffing of Lättakuten. However, occasionally an additional physician is assigned to Lättakuten during “rush hours” between 08.30 and 10.00 (Exhibit 8). When patient flow is high, the lab becomes overloaded, and some of the patients (5%) are sent to the main lab of the PHCC for lab tests, which interferes with workflows. Thus, the actual capacity includes an additional laboratory and physician when needed.

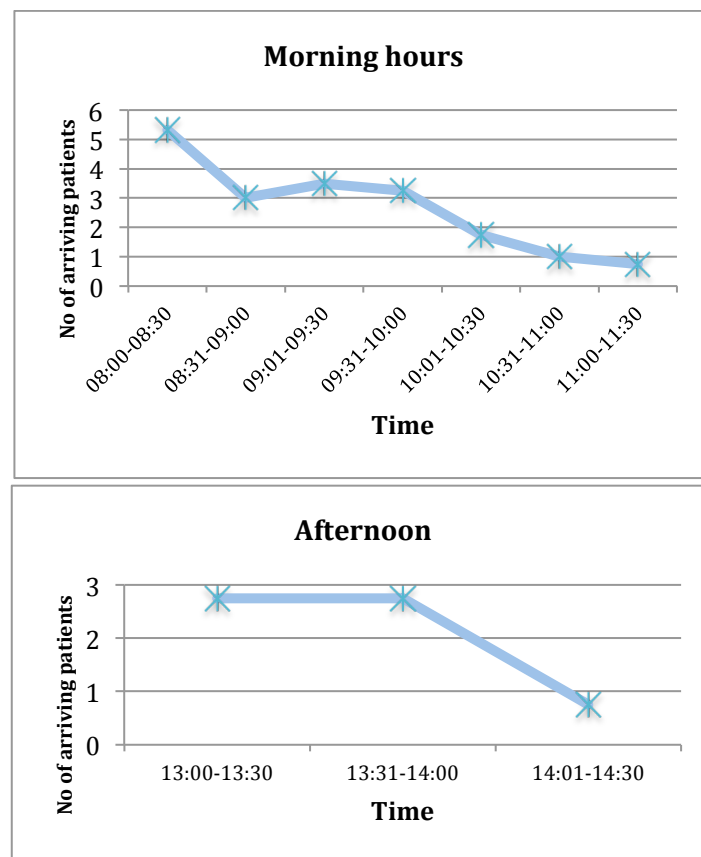


Exhibit 8. Arrival rate of patients.

5.5 Facilities

Lättakuten shares facilities with the PHCC (Appendix 3). *Lättakuten* uses one waiting room, 1-2 consultation rooms, a laboratory and one corridor. Patients enter *Lättakuten* either through the *Lättakuten* entrance or through the main entrance of the PHCC (Appendix 3). The waiting room is used only by *Lättakuten* patients where they fill out symptom forms. The laboratory is used for taking tests and administrative work (payment, registration in the EMR system, etc.). The consultation rooms are used for physician consultations. The corridor is used for waiting (on a bench and chairs) and for displaying symptom forms. If needed and directed by the physician to do so, patients book follow-up consultations by walking to the district nurse's office to schedule the appointment.

5.6 Patient characteristics

Patients visiting *Lättakuten* are encouraged to choose a symptom form even if they cannot find a suitable form for their symptom. No patients are rejected and the patients that visit *Lättakuten* are often parents with children or adults that seeking help for upper airway infections or sore throat (Exhibit 9).

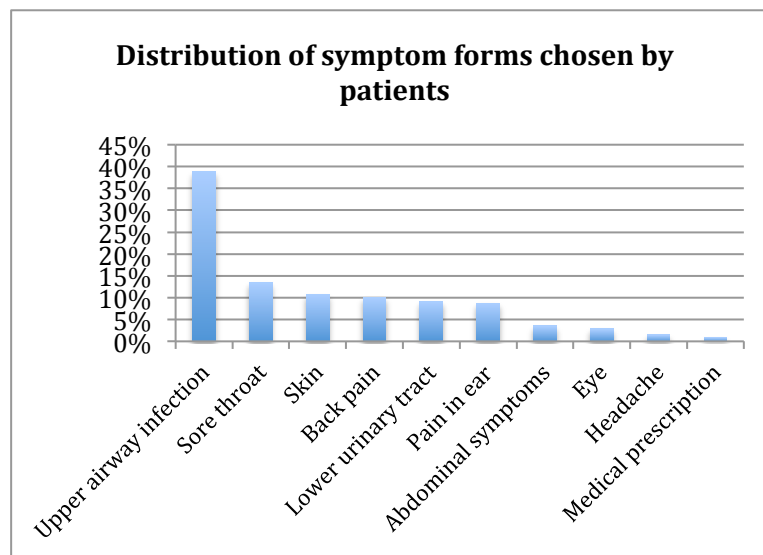


Exhibit 9. Symptom forms chosen by patients. Symptom forms do not correspond to diagnoses.

5.7 Employee characteristics

Two doctors emphasized the rush of helping many patients as the main motivational driver in their job. The LPNs mentioned that the satisfaction of making people happy as a positive aspect of working in *Lättakuten*. All doctors and LPN:s working in *Lättakuten* also described themselves as loving a high pace and working efficiently. One doctor put it:

“I hate working in inefficient systems” (I:001)

Moreover all interviewed doctors had several years of experience in first-line healthcare.

5.8 Outcomes and effects of Lättakuten

5.8.1 Patient satisfaction

Patients were satisfied with the care received at Lättakuten (Exhibit 10). They felt very well treated by the personnel and they also felt that the healthcare provided was safe. The only dimension where some of the respondents rated low was the clarity of the information given at the arrival to Lättakuten.

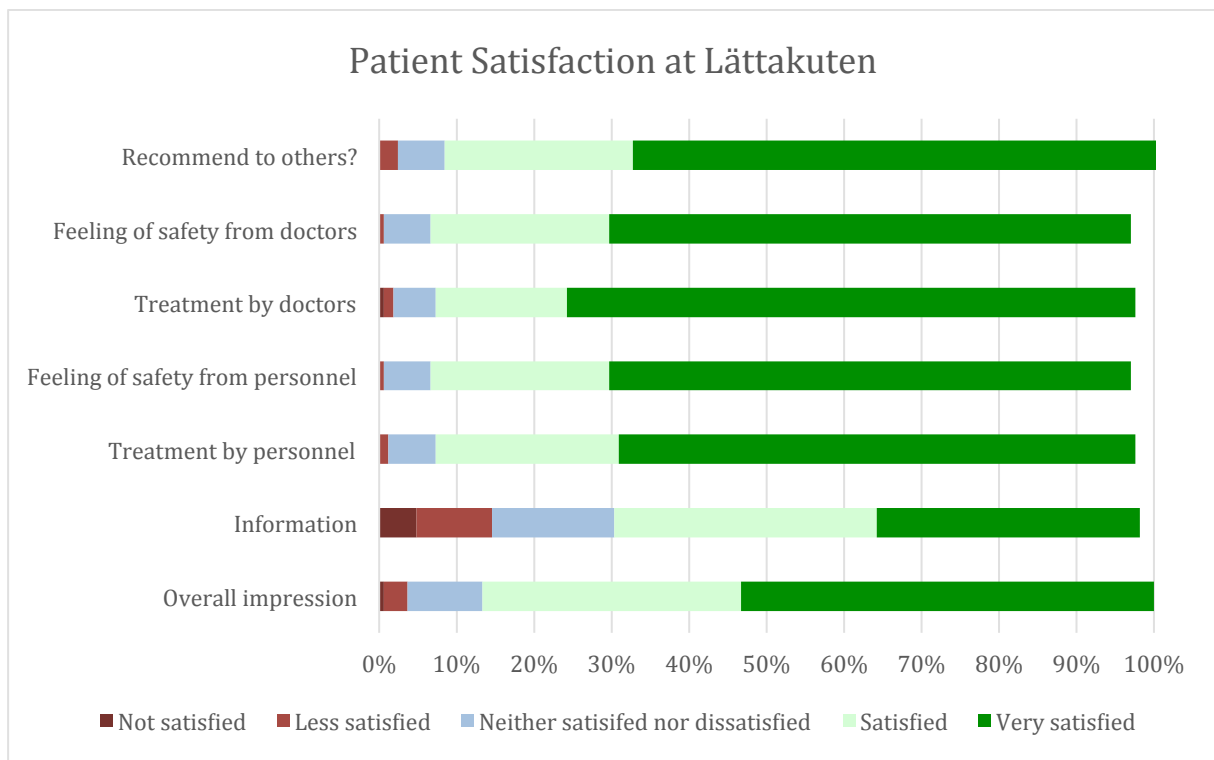


Exhibit 10. Results from patient satisfaction survey.

Bars do not add up to 100% since all respondents did not complete all questions (n =139). The questionnaire included seven questions that patients rate on a five-point Likert-scale ranging from 1 ("Not satisfied") to 5 ("Very satisfied").

5.8.2 Number of patients treated in Lättakuten

Since Lättakuten started, the number of treated patients per day has grown from 15-20 patients per day to 30-40 patients per day with a peak at 62 patients in one day (Exhibit 11). According to interviewees the Lättakuten care process treated twice as many patients per doctor compared to the previously used (and still to some extent used) acute-time booking concept.

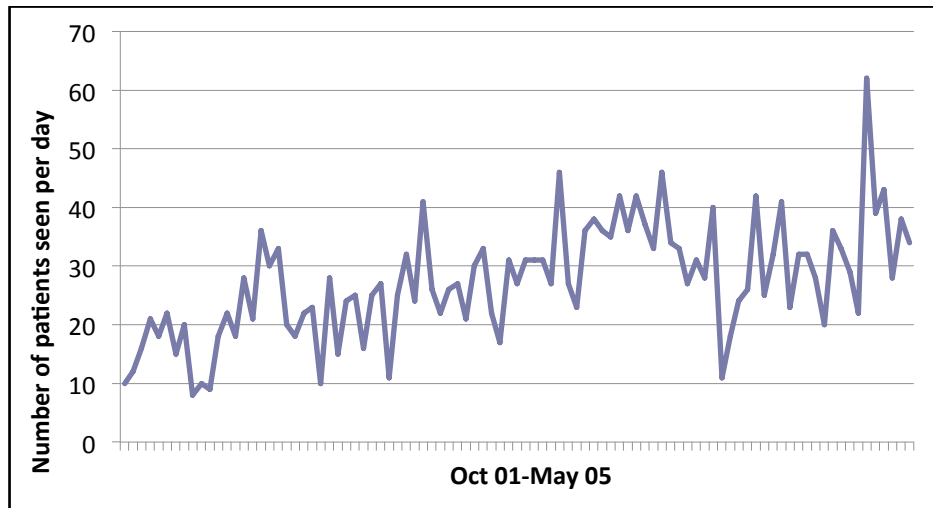


Exhibit 11. Number of patients seeking help at Lättakuten. Data points from each weekday open.

5.8.3 Quality of care

Concerning the quality of the given healthcare at Lättakuten many of the interviewees had opinions. The general trend was positive where especially the doctors felt that they could focus more on diagnosing and treating when a lot of the information they otherwise needed to gather themselves was already collected through the symptom form. The standardization of the process of information gathering by symptom forms were reported to be the one main source of increased quality in the produced healthcare at Lättakuten.

5.8.3.1 Quality from Process standardization

One doctor thought that quality in treating acute patients had increased since the start of Lättakuten as the process was more standardized. The doctor meant that as all patients with the same symptoms filled out the same symptom form, basically had the same tests taken and were examined in the same way, the patients were more likely to be treated equally.

5.8.3.2 Quality from Symptom forms

Quality aspects were often brought up when discussing the symptom forms. One doctor described that perhaps the initial idea of the symptom form was to decrease the administrative burden of the doctors and to create a fast process. However as time passed several quality aspects were revealed. Below four commonly described quality aspects of the symptom form are presented: information accuracy, guarantee that information is collected, patient focus and patient compliance to the doctor's instructions. Furthermore a reported indirect effect of Lättakuten was the possibility to find other pathological conditions requiring further investigation.

First, as patients chose a form they had to specify for themselves why they are seeking Lättakuten. As they answered the questions on the form they started thinking about their acute problem. When they later met the doctor they could provide more accurate information about their condition, which increased the likelihood of the doctor diagnosing properly and giving proper treatment.

Second, two of the doctors told us that as a lot of important information was collected on the symptom form, the symptom form worked as a guarantee that this information was gathered. According to one of the doctors this increased the likelihood of treating equal conditions in an equal way as the doctor otherwise might have missed to ask for something important from a diagnostic point of view.

Third, all the involved doctors reported that the symptom form also improved the quality of the actual consultation. As most of the basic information was gathered on the symptom form, the doctor could quickly verify the written information with the patient and then devote all attention to listening to the patients. According to two of the doctors this increased attention made the patients feel that the doctor gave them a lot of time even though the actual visit was very short. Another doctor explained that this increased attention also improved quality of the given care as the doctor could focus on asking more detailed questions that helped diagnosing and deciding on treatment.

"what is simple and normal is processed so incredibly fast so we can focus on the details and nuances in the more special cases"(I:001)

Fourth, the CEO also thought that the patient involvement could increase patients' compliance. His motivation for this was that as the patients are more involved in the process of diagnosing themselves they have a better understanding of their diagnoses and what treatments they are supposed to undergo.

The above-mentioned indirect effect of Lättakuten, "finding other pathological conditions", was motivated by two doctors as follows: As diagnosing and deciding on treatment for the sought condition could be done faster in Lättakuten, more time could be spent on scouting for symptoms of more severe diseases. For example if a middle-aged overweight man came in with upper respiratory infection symptoms the doctor had time to also take a blood pressure and by that maybe "catch" a previously untreated hypertonic patient and make the district nurse book him for a regular consultation. The same goes for acute patients who should have been at the hospital, according to the same doctor. For example he had had a patient originally seeking for

cold symptoms. This was carried out fast but when talking to the patient the patient complaint about pain in one of his calves. The doctor examined this too and sent the patient fast too nearest emergency with the suspicion of deep vein thrombosis, which is a very severe condition.

5.8.4 Process performance

The average throughput time for patients (from entering to leaving Lättakuten) was 29 min. The fraction of time patients spent together with care personnel was 52% (Appendix 7).

Lättakuten has been reported to easily be able to handle a flow of 7-8 patients per hour without accumulating patients or increase the stress and perceived workload of the personnel. However, when flow exceeded 10 patients per hour interviewees reported that the maximum capacity of Lättakuten was almost reached and patients were accumulated on the waiting room.

When asking question around the perceived flow efficiency the general view of the interviewees was that the flow efficiency was very high. Again the symptom form was brought up several times as the key driver of flow efficiency.

The doctors described the flow benefits of the symptom form. They explained that as most of the needed information was collected before meeting the doctor, the actual doctor consultation was performed faster. As the symptom form also functioned as the medical record, the administrative time of recording the visit was also decreased, further increasing the flow. One doctor described the symptom form as the critical factor to be able to manage a high patient flow. Another doctor explained that lab testing was very time-consuming before Lättakuten and that it saved a lot of time that tests are taken already before the doctor consultation in Lättakuten.

“I would never have been able to treat 38 patients in a day without the symptom forms, feeling safe in my medical judgement.” (I:003)

According to the interviewees one of the reasons why Lättakuten could manage an increasing number of patient this was that the process became more efficient over time. Three main reasons for this increased efficiency were revealed in the interviews:

First, all of the interviewed LPN:s and doctors believed that reconfiguration by merging the payment activity with the lab activity and taking all necessary tests before the consultation saved time for the patient.

Second, as time passed, patients learned the process. Having visited Lättakuten before, the patients knew what to do and how. By this they could go through the process independently. For example, they didn't need help to choose and fill out the symptom form.

Third, the LPNs got better at knowing which tests were required. According to both interviewed doctors and LPNs, this resulted in fewer re-tests with reduced average LOS as a consequence.

5.8.4.1 Increased production

All interviewees from CEO to LPN:s agreed on that Lättakuten had increased the number of treated patients per employee. As reimbursement in Stockholm is partly based on number of visits an increased number of treated patients (using the same resources) had a monetary value for the PHCC. In specific the PHCC as a whole produced 25 % doctor consultations in March 2014 compared to March 2013, using a decreased number of doctors (4.7 compared to 5.3 in 2013).

5.8.4.2 More time for chronic patients

Both the lab assistant in the main lab as well as doctors and the manager explained that when removing the acute patients from the ordinary flow the rest of the PHCC could work better with patients' requiring more investigation and attention. The doctors expressed that they could devote all their attention to the chronic patients when they were not working in Lättakuten. As previously mentioned the lab assistant also found it more efficient to only focus on the tests of the chronic patients, which in general were more complicated than the tests required for the acute patients.

5.8.4.3 Patients not suitable for Lättakuten

Even though the Lättakuten process should be able to manage and redirect patients not suitable for Lättakuten this is, according to the interviewees, both time-consuming and energy draining. One LPN thought that one problem was that there were a lot of patients in the grey zone between acute and chronic patients. Another doctor had experienced that some patients had started to exploit Lättakuten. These patients came to Lättakuten even though they knew that their conditions were not acute hoping that the doctor would examine them anyway.

5.8.4.4 Patient safety

From a managerial perspective the CEO, the manager and the medically responsible doctor were concerned about the recording of the symptom forms. They all thought that even though it was legal to scan the symptom forms into the EMR-system it was not patient safe as these medical records were quite hard to find if needed in the future. The medically responsible doctor also expressed that the handwriting on the symptom forms sometimes was hard to read and that the form as a whole sometimes was not completely filled out.

6 Data analysis

6.1 Understanding Lättakuten

Lättakuten addresses the problem of handling high input variety in terms of patients' different medical conditions in PHC. It is a cell layout process that isolates patients with minor complaints that do not need extensive resources (investigations, follow-up, laboratory tests) for management, thereby managing a patient group with similar needs. These patients are treated in a separate area of the PHCC with mostly separate resources. From this perspective, Lättakuten is partly similar to *S&T* units in EDs. However, in Lättakuten, the separation is taken one step further in an effort to manage the input variety within Lättakuten, using the symptom forms as determinant for laboratory tests and clinical examination. In essence this is a mass-customization strategy within a cellular process. The customization derives from that as each symptom form has a customized process when it comes to laboratory tests and clinical examinations. By guiding the activities in the care process, each symptom form reduces the inherent variability of the care process.

6.2 Activity reconfiguration makes the care processes sequential

The reconfiguration of the care process activities, i.e. taking laboratory tests before the doctor consultations made all information necessary for clinical decisions available at the time of consultation seem to be beneficial in terms of patient flow. Patient waiting time is reduced as patients do not have to wait for laboratory tests after a first meeting the doctor, and doctors have all needed information for clinical decisions available at the start of the consultation. Furthermore, payment is done prior to the consultation, which reduces the number of separate activities in the care process.

6.3 The symptom form is a crucial part of the care process that serves many purposes

The symptom forms serves as a gatekeeping function that selects the patients intended for Lättakuten. Furthermore they separate patients within Lättakuten to different customized processes. However we identified that the symptom form has other positive effect on process performance as well. More specific, the symptom form is a container of information that becomes the medical documentation and involves patients in the care process by visualizing the basis for clinical decisions for all process participants and enhances the quality of care given.

6.3.1 Quality and safety

The content of the symptom forms emerged from the accumulated knowledge of clinicians and inspiration from evidence-based guidelines. The symptom forms therefore have the potential to make sure that important information about the patients' symptoms is collected, that appropriate laboratory tests are taken and that sufficient clinical examination is performed. This shifts the responsibility of medical quality and safety from the individual clinicians to the care

process, thus moving towards a quality system (Lillrank 2004). As Bohmer (2005) proposes, high-quality healthcare can be produced using evidence-based guidelines when the uncertainty of the treatment's outcome is low (which is mostly the case in Lättakuten). Based on this we argue that it is important to a concept like Lättakuten that evidence-based guidelines and standardized procedures are developed and followed to produce high quality of care. The importance of clinician competence decreases as quality and safety are integrated in the care process.

Interestingly, doctors reported that the accuracy of the information given by the patient increased as a result of symptom forms, since the patients had to think about important questions already before the doctor consultation. This increased reflection made it possible to discuss and penetrate information ambiguities during the actual doctor consultation. A higher accuracy in the presented information provides a more solid base for diagnosing correctly, reducing uncertainty and increasing medical quality.

6.3.2 The symptom forms indirectly increases accessibility and care timeliness

The symptom form as an information gatherer seems to improve throughput time as both the patients' symptoms and laboratory test results are available when the consultation starts. This induce that the doctor just has to verify the symptoms and make a clinical examination before clinical decision is taken. This was reported to speed up the consultations.

A topic much debated is the amount of time that physicians spend on patient consultations and documentation respectively and many argue that doctors spend too much time on documentation in relation on time spent seeing patients (Myndigheten för Vårdanalys 2013). In a traditional setting the doctor in free text form records (by dictation or writing) a summary of the patients symptoms, the result of the clinical examination, results on laboratory tests and treatment after the consultation. With the symptom form all this information is compiled during the care process and can be directly stored after the consultation. The patient provides the information on symptoms, the LPN provides laboratory test results and the physician completes the documentation on clinical examination and treatment mostly using checkboxes with and complementary notes. As a result, almost no documentation is needed after the consultation. The documentation is thus distributed to several process participants and the structured form means that the documentation is faster than a traditional way of documentation. This is an example of a low-cost accommodation strategy (Frei 2006) where the physicians can spend less time on documentation and more time on seeing patients.

The process configuration of Lättakuten and the symptom forms provide improvements on relevant operations objectives such as quality, safety, accessibility and timeliness. However, some tensions in the care process might compromise the results.

6.4 Tensions in the S&T unit

6.4.1 Clash of concepts – inclusion criteria are not adhered to

Lättakuten has a built-in clash of concepts that results in a higher input variety than intended as all patients are welcome to Lättakuten (no one is rejected until having seen a doctor) and personnel at the same time emphasise that all patients should be able to define their symptoms on the existing symptom forms. The implication from a traditional operations management perspective is that the process is required to produce at higher variety than intended. Assuming that Lättakuten's resources were matched for the intended process, a higher variety would imply reduced process performance in terms of performance objectives. However, the empirical data rather support that process performance has maintained high. That implies that there is a mismatch between resources and the intended process variety. If a patient seek help with a problem that is not defined by any symptom form, the process steps before the doctor consultation are not changed significantly and the doctor meets a patient that has other symptoms than intended. This means that doctors need to have competence to handle non-suitable patients given the resources available in Lättakuten. Doctors admitted that they did things they knew were out of their role as Lättakuten doctors if they believed that it would not affect the patient flow, such as writing absence from work-certificates and managing medical conditions outside the Lättakuten scope, otherwise they referred to the other part of the PHCC. This implies that the variety in terms of patients not intended for Lättakuten is handled by the "excessive" competence of doctors compared to the intended needed competence.

The absence of a strict gatekeeping function means that the care process of Lättakuten must have a built-in excess flexibility for managing process input variety (i.e. treating patient with various conditions in addition to the specified conditions on symptom forms). This built-in increased variety makes the outcomes dependent on the competence of the doctors rather than the process. If Lättakuten accepts a higher variety in input, it risks transforming into a small PHCC within the PHCC that treats the same patients instead of a separate unit treating a specific group of patients. From this perspective it is very interesting that the high competence of the working doctors can compensate for an otherwise, due to increased variety in input, too rigid (non-flexible) process and still maintain high process performance. This can be seen as a classic accommodation strategy of handling input variability (Frei 2006).

We also identified another potential consequence of an increased input variety, not directly tied to the medical quality. In Lättakuten, the decision of which non-suitable patients to manage is often based on the individual doctor's perception of the time-consumption managing the particular patient. There might be a gap between the doctor's time-consumption estimation of different procedures and the actual time-consumption, which could be a patient flow inhibitor. However observations didn't support that the doctor consultation became a bottleneck due to increased patient inclusion.

6.4.2 Symptom forms are not process determinants

Even though the symptom forms are intended to separate patients within Lättakuten by determining laboratory tests and clinical examination this is not happening as the LPNs and doctors decide on tests and clinical examination based on experience rather than the symptom forms. This increases the input variety within Lättakuten eliminating the potential benefits of a mass-customization strategy within the cellular process of Lättakuten.

6.4.3 Activity-deviations - good or bad?

Apart from the non-suitable patients that required process flexibility our collected data shows that the doctors working in Lättakuten tend to deviate from the standardized doctor consultations even when treating intended patients. This could impose more flexibility than needed and harm cost-efficiency (Walley 2003) or decrease medical quality (Bohmer 2005; Lillrank & Liukko 2004).

One illustrative example of these deviations was the clinical examination. In the Lättakuten concept, there are guidelines on which clinical examinations that are supposed to be performed based on the chosen symptom form. However, when talking to the involved doctors only some of them said that they followed these guidelines. One doctor did not even know that such guidelines existed. Instead some of them based their clinical examinations on their own experience. However our observations showed that even though the doctors' clinical examinations differed slightly all the doctors did everything stated by the guidelines (and predefined in the symptom forms). They tended to include more clinical examinations than suggested by the guidelines. Elaborating on this, our data showed that this extended clinical examination rather had a positive patient-safety feature as other pathological conditions were identified, why the patient could be re-directed to the regular care for further investigation. Lillrank (2004) states the major risk of decreased medical quality in standardized processes is process deviations. These results therefore contradict Lillrank's (2002, 2004) work, from this point of view, however this might be due to that Lillrank base his reasoning on the assumption that the aim is to optimize one single process.

Walley (2003) would describe Lättakuten as a part of cellular process design, and Bohmer (2005) would specify Lättakuten as a “Separate and Accommodate” solution. According to this classification, one predicted benefit with Lättakuten should be the easiness to re-direct patients between the care process flows if needed, which is exactly what the extended clinical examination contributes to.

Even though deviations in the doctor consultation activity probably may not affect the quality of the produced care, they most likely impact LOS. Patient throughput time might therefore be dependent on specific staff members. This suspicion is further strengthened by the fact that all the interviewed doctors who worked in Lättakuten described that they enjoyed working with high patient flows and that they all had several years of experience within first-line healthcare. Based on this, it is not too far fetched to believe that they also managed acute patients faster than the average doctor. One doctor explained that he adapted his work pace to match patient flow. This is a potential problem as in theory, standardized activity should be stable and irrespective of patient flow. If doctors work faster when patient flow is high, quality of care can be compromised as well as risking the development of work sustainability issues.

Volume-variety states that imposed process flexibility and potentially longer throughput time means excess costs resulting in a less cost-efficient process. However as it seems, safety is an important performance objective in this setting and this, sometimes extended, clinical examination contributes to safety strengthening the benefits of re-direction that is possible when using cellular processes within an organization (Bohmer, 2005). In essence, the problem is really if performance is measured within the single cell (process) or overall covering all processes. Volume-variety focuses on the performance of a single process why potential benefits in process performance in other processes are rarely considered. However from an overall operations perspective, a “Separate and Accommodate” approach states that a decreased process performance in one cell can be compromised by an increase in process performance in another cell within the same organization. In this setting, this means that the small, potential decrease in throughput time derived from deviations in clinical examination might be compromised by the ability to re-direct non-suitable patients to the appropriate cell. Moreover, it is probably value-adding for the patient when the doctor deviates from the process to write sick-leave certificate or do additional clinical examinations to better diagnose and perhaps re-direct the patient. According to this thinking, the doctor consultation in Lättakuten is an “artist activity” rather than a “scientific activity” where the doctors perform a basic set of clinical examinations to ensure a basic quality of care and safety while the doctor, if needed, is free to

improvise to further reach the individual patient's needs, for example in diagnosing, treating or writing prescriptions.

6.5 Quality seems to be good – how about cost-efficiency?

The general aim of using the volume-variety framework is to design the most cost-efficient process reaching stated performance objectives. The idea of using symptom forms to first separate the minor-complaint patients into a cell and then use a mass-customization strategy to treat them individually seems to have great potential to reach relevant performance objectives like quality of care, safety and accessibility. Despite these effects were probably somewhat compromised due to inclusion problems we can still see that the PHCC as a whole treats 25% more patients now than before the introduction of Lättakuten with a decreased number of doctors.

Lättakuten is dependent on doctors able to manage the increased variety due to increased patient inclusion. These are often experienced and expensive doctors and it is possible that a more strict inclusion of patients in Lättakuten would make it possible to have a less experienced, and cheaper doctor to work there.

The conclusion is therefore that having an *S&T* concept provide good results on performance objectives cost-efficiently. However increasing process flexibility with doctors' competence is costly, why increased input variety generates a less cost-efficient solution.

7 Final remarks

7.1 Conclusion

The aim of this report was to explore how an *S&T* unit can be used in PHC. An *S&T* unit can be used to provide care quality, safety, timeliness and efficiency. Reconfiguration of process activities made doctors have all relevant information for making clinical decisions available when meeting patients, in contrast to earlier where tests were taken after the consultation and clinical decisions was postponed to after laboratory testing. To merge payment with laboratory tests decrease the number of separate activities in the care process. The symptom form seems to have an important role as it serves as a gatekeeper that decreases input variety in the *S&T* care process. By further guiding the activities of the care process depending on the patient's symptoms, in a mass-customizing way, the symptom form contributes to manage the variety within the *S&T* unit. As the symptom forms guides tests and clinical examination they contribute to manage inherent variability within the specific symptom group through standardization. Furthermore the symptom form seemed to have a positive effect on other performance

objectives as well. However as a higher variety in patient input is allowed in the studied *S&T* unit than initially designed for, the symptom form loses some of its value. The symptom form have potential to ensure build in quality in the actual care process, however, as a higher variety are allowed than stated, the process becomes more dependent on the doctors competence.

7.2 Further research

One interesting finding with much impact on the care process was the symptom form. Therefore, a future research topic is the impact of the symptom form on the care process performance. A study could be designed were the symptom form e.g. is introduced and evaluated in a drop-in PHCC. In addition to an operations management perspective, the impact of the symptom form on care quality could be studied. Another interesting toying would be to analyse the symptom forms potential effects on patients' understanding of their diseases and treatment. Finally, medical outcomes of Lättakuten should be studied. For example, antibiotic prescription could be studied since one potential risk of taking many laboratory infection tests is overprescription of antibiotics.

7.3 Managerial implications

Managers of PHCCs should consider how their care processes are designed in relation to local patient needs. This thesis suggests that introducing a separate care process for acute patients with minor complaints might both generate quality of care and patient satisfaction, as well as an increased healthcare production.

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9 Appendix 1

Interview guide used at all interviews.

Intervjuguide för Lättakuten vid Åkermymntan VC

I. INLEDANDE FRÅGOR (5 min)

1. Skulle du kort kunna berätta:

Vem är du?

Ditt yrke?

Hur länge du har arbetat här

Vilka är dina arbetsuppgifter/ansvarsområden?

II. PROGRAMTEORI

2. Kan du beskriva i dina egna ord vad "Lättakuten" är?

Vad är din roll i "Lättakuten"?

3. Vad skulle du säga är de bärande idéerna eller principerna som ligger till grund för "Lättakuten"?

Vilka mål sattes upp?

Har Lättakuten utformas efter någon existerande modell och/eller har modellen inspirerats från något?

4. Hur tycker du att lättakuten bidrar till vårdcentralens verksamhet?

Vad har vårdcentralen för verksamhetsmål?

III. CONTENT

5. På vilket sätt har ditt dagliga arbete förändrats?

Vad gör ni annorlunda på idag jämfört med traditionellt omhändertagande på vårdcentralen?

Hur har ditt arbete förändrats? (positiva och negativa saker)

Vilka anser du är de största förändringarna? (till följd av vidtagna åtgärder)

6. Hur har patientens besök påverkats av förändringarna?

Kan du i detalj beskriva alla steg en patient går igenom från att den kommer till mottagningen tills att den är färdigbehandlad och lämnar mottagningen.

Hur såg patientens hela vårdbesök ut innan starten av Lättakuten? Vad skiljer sig nu jämfört med tidigare?

Hur handlägger ni komplicerade patienter?

7. Hur påverkar Lättakuten er övriga verksamhet?

Finns likheter och skillnader med liknande modeller?

IV. PROCESS

8. Hur kom lättakuten till?

Rita eventuellt en tidslinje och be personen att förklara.

9. Hur genomfördes implementeringen/införandet av lättakuten? (särskild metod, särskilda projekt)

Vilka personer/aktörer var (särskilt) aktiva/delaktiga i förändringsarbetet?

10. Hur har "konceptet" Lättakuten utvecklats/förändrats/förfinats/eller ändrats under resans gång?

Varför förändrades de planerade förändringar?

Nya insikter under resans gång?

Makt/politik/Motstånd

Kontexten – t ex datasystemet klarade inte, tid/resurser, chefsbyten etc.

Från idén om en lättakut, vilka aktiviteter har genomförts för att hamna där ni är idag?

11. Om du blickar framåt – vilka är Era största utmaningar?

V. KONTEXT

12. Vilka faktorer/händelser har påverkat införandet och utvecklingen av Lättakuten ?

När och på vilket sätt har de påverkat?

1) Olika nivåer: på vårdcentralen, nationellt, landsting, sjukhus

2) Olika aspekter: organisatoriskt, chefsbyten, andra utvecklingsprojekt, sparkrav, nytt IT-system etc.

3) Hur har samspelet mellan olika systemnivåer sett ut över tiden?

13. Vilka är nyckelaktörerna? Hur har nyckelaktörerna arbetat med/påverkat omgivningen?

Agerat uppåt/utåt för att skapa förutsättningar eller inåt för att få det att hända?

14. Hur har vårdcentralens förutsättningar varit (tex i jämförelse med andra vårdcentraler)? På vilket sätt har förutsättningarna påverkat förloppet?

Tex Stöd, motstånd, resurser, kompetens, erfa tidigare förändringar, kultur

15. Sammanfattningsvis – vilka faktorer/ omständigheter ser du har stöttat respektive hindrat utvecklingen av Lättakuten? 2-3 st.

Finns nyckelfaktorer som stöttat respektive hindrat förändringen? Kultur? Ledare? Engagerad personal?

VI. OUTCOME

16. Hur utvärderadera ni utfallen nu? (uppföljning: vem, när, hur)

17. Om du skulle utvärdera lättakuten, vad skulle du mäta?

18. Vilka resultat har du förväntat dig? (återkoppling till programteorin)

19. Vilka resultat har du observerat för patienter, personalen, organisation?

20. Är det något som vi har missat att fråga om som har varit/är viktigt i Lättakuten och som du skulle vilja berätta om?

21. Finns det någon annan vi borde prata med?

Vi vill tacka för din medverkan.

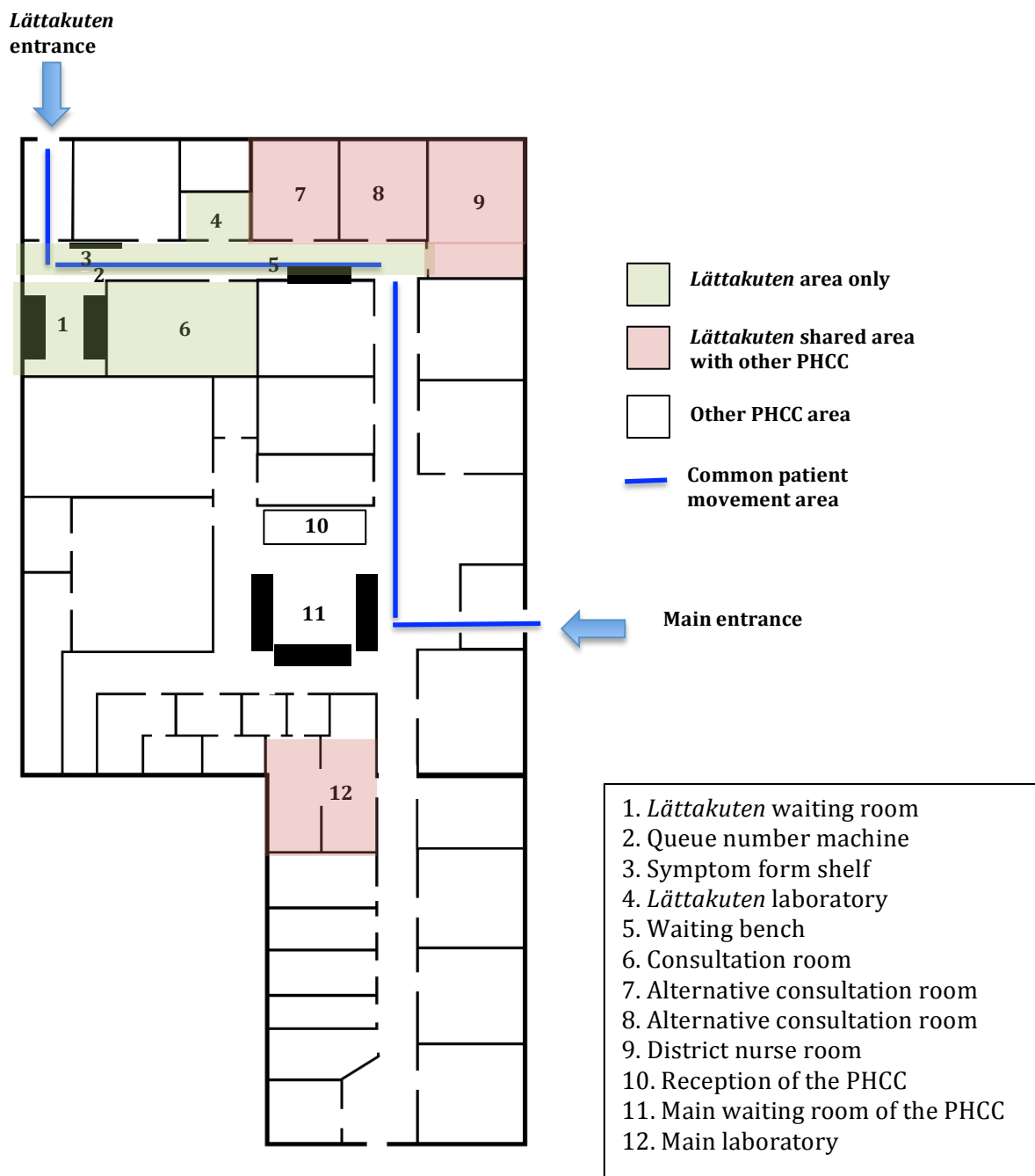
10 Appendix 2

Table of conducted interviews.

Interview index number	Interviewee work	Date for interview
I:001	Physician1/founder	20140218
I:002	Licensed practical nurse 1 (LPN1)	20140218
I:003 and I:004	Manager	20140218 and 20140311
I:005	Laboratory assistant	20140221
I:006	Physician 2	20140311
I:007	Physician 3/medicinskt ledningsansvarig	20140311
I:008	Medical Secretary	20140314
I:009	Physician 3	20140321
I:010	Licensed practical nurse 2 (LPN2)	20140328
I:011	CEO of provider company	20140331

11 Appendix 3

Floor plan of Åkermymntan PHCC.



12 Appendix 4

Example of a standardized patient form.

Halsont		
Fylls i av patient		
Namn		Datum
Personnummer		Telefonnummer

Symptom		
Hur länge har du haft ont i halsen?		
<input type="checkbox"/> Svårt att svälja	<input type="checkbox"/> Ömhet på halsen	<input type="checkbox"/> Hosta
<input type="checkbox"/> Feber	<input type="checkbox"/> Svullnadskänsla	<input type="checkbox"/> Snuva
- Hur mycket?		
Tidigare genomförd behandling?		
Har du någon känd läkemedelsallergi?		
Övrigt		
.....		
.....		

Fylls i av läkare		
MoS	Öron	Pulm
<input type="checkbox"/> UA	<input type="checkbox"/> Bilateralt ua	<input type="checkbox"/> Ausk Ua
<input type="checkbox"/> Lätt rodnad	TRH HÖ	<input type="checkbox"/> Krepitationer
<input type="checkbox"/> Kraftigt rodnad	<input type="checkbox"/> Ua	<input type="checkbox"/> Ronki
<input type="checkbox"/> Förstorade tonsiller	<input type="checkbox"/> Lätt rodnad	<input type="checkbox"/> Bronkiellt a-ljud
<input type="checkbox"/> Beläggningar	<input type="checkbox"/> Kraftigt rodnad	
Nil	- TRH VÅ	
<input type="checkbox"/> Ua	<input type="checkbox"/> Ua	
<input type="checkbox"/> Lätt förstorade	<input type="checkbox"/> Lätt rodnad	
<input type="checkbox"/> Kraftigt förstorade	<input type="checkbox"/> Kraftigt rodnad	
STREP A		CRP
Övrigt		
.....		
Diagnos	<input type="checkbox"/> Akut Tonsillit J039 <input type="checkbox"/> Akut Faryngit J029 <input type="checkbox"/> Akut ÖLI J069	
	<input type="checkbox"/> Körtelfeber B27.-	
Behandling	<input type="checkbox"/> EXP <input type="checkbox"/> AMR <input type="checkbox"/> SF	
	<input type="checkbox"/> LMEO	
	<input type="checkbox"/> Annan behandling	
Ankomsttid motl.		
Ankomsttid läk.		Läkares signatur <div style="border: 1px solid black; width: 60px; height: 30px; display: inline-block; vertical-align: middle;"></div>
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13 Appendix 5

Overview of the tests available in the *Lättakuten* See-and-Treat facility.

Test name	What test shows	Analysis Time (excluding the time needed to take the sample)	Symptom forms that include the test
StrepA (QuickVue In-line Strep A test, QuickVue)	If Group A β -hemolytic streptococcus (GAS) bacteria are present in the throat	5 minutes (in practice often faster)	Cough-cold-sore throat, sore throat
CRP (i-Chroma Reader, Sycomed)	The level of C-reactive protein in capillary blood (elevated in infections).	2 minutes	Cough-cold-sore throat, sore throat
Hb (HemoCue Hb 201+, HemoCue)	Blood haemoglobin levels	30 seconds	-
Capillary glucose (HemoCue Glucose 201+, HemoCue)	Glucose level in capillary blood	8 seconds	-
Urinary dipstick (Clintek Status, Bayer Healthcare)	Leukocyte, nitrite, urobilinogen, protein, haemoglobin, ketone, bilirubin, glucose levels in the urine (parameters change in infectious states)	1 minute	Urinary tract
Clinical ear thermometer	Body temperature (fever can be indicative of infection)	A few seconds	Optional for: urinary tract, pain in knee or foot, sore throat, cough-cold-sore throat, acute abdominal pain, headache, ear-eye

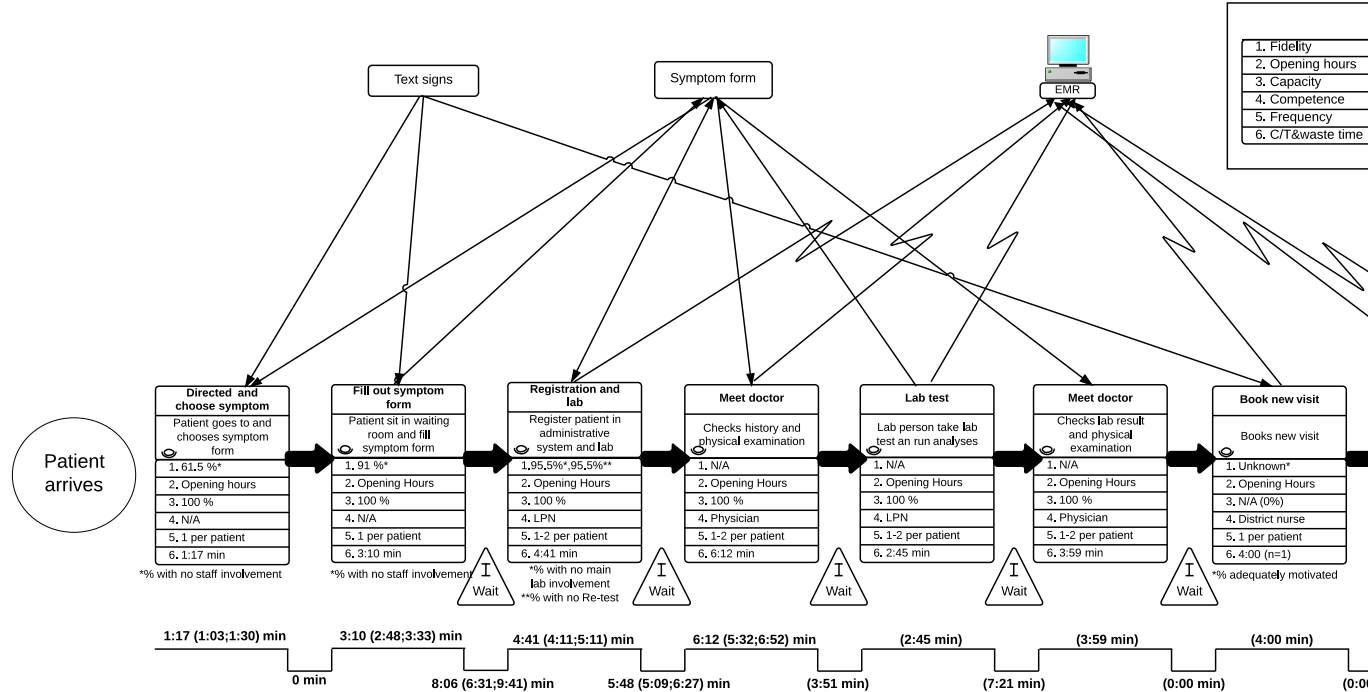
14 Appendix 6

Available symptom forms at Lättakuten.

Symptom form	Patient enter information about	Physician enter data about	Fieds for lab results
All	Personal details: name, date, civic number, telephone number General information about their symptom: duration, drug allergy, other information, earlier treatment	Other findings from clinical examination, diagnosis (a number of symptom form specific alternatives on each symptom form) and symptom specific treatment options, signature	-
Acute abdominal pain	Pain, nausea, diarrhea and fecal characteristics, fever, occurence of gynecological problems.	Structured examination of heart, lungs, abdomen, blood pressure, rectal palpation.	-
Sore throat	Occurence of dysphagia, fever, tenderness on throat, feeling of swelling in the throat (svullnadskänsla i halsen), cough, nasal catharr, previous treatment,	Structured examination of the oral cavity and pharynx, lymph nodes, ears, lungs	StrepA, CRP
Cough-rhinitis-sore throat	Characteristics of respiratory tract symptoms (e.g. chest pain, eye problems etc), fever	Structured examination of oral cavity, ears, lungs, heart.	StrepA, CRP
Dermatology	Characteristics of skin trouble, such as occurence tenderness, pruritus.	Structured skin examination	-
Back pain	Pain areas and distribution, pain characteristics, genital or intestinal problems	Back status, reflexes, neurological status	-
Ear-eye	Occurence of fever, red eye, eye pain, eye condition characteristics	Structured examination of oral cavity, lymph nodes, ears, eyes	StrepA, CRP
Prescription renewal	The disease(s) that the patient is treated for, characteristics of follow-ups of mediations, prescriptions that need renewal, the form also includes a list of drugs that do are not prescribed at Lättakuten (such as morphine).	Room for free notes	-
Shoulder pain	Characteristics of shoulder pain, trauma	Structured shoulder examination	-
Knee or foot pain	Characteristics and ocation of pain, fever	Sructured knee and shoulder examination	-
Urinary tract	Characteristics of urinary tract symptoms, fever	Abdominal status	Urinary dipstick
Headache	Characteristics of headache, other symptoms (vomiting, visual impairments), other diagnoses	General status, eye status, neurological examination, blood pressure, other	-

15 Appendix 7

Value stream map of Lättakuten care process



16 Appendix 8

The observation protocol used.

Obs. Index	Patient index	Activity ID	Staff involved	Information medium	Information type	Activity time			
						Begin	End		

