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Patient Safety in the Emergency Department

Culture, Waiting, and Outcomes of Efficiency and Quality

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Abstract
Burström, L. 2014. Patient Safety in the Emergency Department. Culture, Waiting, and Outcomes of Efficiency and Quality. *Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine* 1009. 100 pp. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-554-8971-7.

The overall aim of this thesis was to investigate patient safety in the emergency department (ED) and to determine whether this varies according to patient safety culture, waiting, and outcomes of efficiency and quality variables.

I: Patient safety culture was described in the EDs of two different hospitals before and after a quality improvement project. The questionnaire "Hospital Survey on Patient Safety Culture" was used to investigate the patient safety culture. The main finding was that the staff at both hospitals scored more positively in the dimension *Team-work within hospital* after implementing a new work model aimed at improving patient flow and patient safety in the ED. Otherwise, we found only modest improvements.

II: Grounded theory was used to explore what happens in the ED from the staff perspective. Their main concern was reducing patients' non-acceptable waiting time. Management of waiting was improved either by increasing the throughput of patient flow by structure pushing and by shuffling patients, or by changing the experience of waiting by calming patients and by feinting to cover up.

III: Three Swedish EDs with different triage models were compared in terms of efficiency and quality. The median length of stay was 158 minutes for physician-led team triage compared with 243 and 197 minutes for nurse–emergency physician and nurse–junior physician triage, respectively. Quality indicators (i.e., patients leaving before treatment was completed, the rate of unscheduled return within 24 and 72 hours, and mortality rate within 7 and 30 days) improved under the physician-led team triage.

IV: Efficiency and quality variables were compared from before (2008) to after (2012) a reorganization with a shift of triage model at a single ED. Time from registration to physician decreased by 47 minutes, and the length of stay decreased by 34 minutes. Several quality measures differed between the two years, in favour of 2012. Patients leaving before treatment was completed, unscheduled return within 24 and 72 hours, and mortality rate within 7 and 30 days all improved despite the reduced admission rate.

In conclusion, the studies underscore the need to improve patient safety in the ED. It is important to the patient safety culture to reduce patient waiting because it dynamically affects both patients and staff. Physician-led team triage may be a suitable model for reducing patient waiting time and increasing patient safety.

Keywords: Emergency department, physician, triage, teamwork, HSOPS, grounded theory, waiting, patient safety, culture

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To my family and friends

It may seem a strange principle to enunciate as the very first requirement in a hospital that it should do the sick no harm

Florence Nightingale 1863

Preface

The emergency department (ED) is generally the department with the highest patient load within the entire health care organization and is characterized by a high degree of complexity. Nurses and physicians are under great pressure, both mentally and physically, yet it is very important to create an environment that makes patients feel confident about the care that they receive. Throughout my career, I have held various positions within EDs or have worked with EDs, from my early days as a student nurse and later on as a registered nurse and then as a Deputy County Council Director. I have encountered the ED from a work environment perspective in the context of patient safety, and I have led several investigations to assess the ED's place and role in the health system. These investigations were prompted by major structural changes in the local county council at the beginning of the new millennium, which had resulted in the closing of some EDs and a local surgical emergency room. Various interventions were tested to reduce patient load, ranging from collaborative agreements between the ED and primary care to compulsory referrals of patients from the primary care or other health care systems.

Despite these interventions, the number of patients seen in the ED has continued to increase every year. Serious and recurring problems have been reported, such as concerns about patient safety, increased staffs work-load, lack of certain professional skills, and displeased patients who are dissatisfied with the long wait before receiving care. The investigations did not result in any lasting changes, probably because of a lack of evidence for the actions taken. Another concern was the issue to have a specialist to be the first contact with patients at the ED.

In hindsight, I now see that the topic that I chose for my thesis was the right one. I wanted to focus on ED-related research related to patient safety. Specifically, I wanted to investigate how the culture of patient safety is influenced by how ED patients are received initially and how differences in these initial encounters influence the efficiency and quality of care in the ED. I also wanted to investigate what happens on a "typical day" in the ED and how that predicts how long patients wait before receiving care. As a result of this research, I can say confidently that I am well on my way to finding some answers to my questions.

List of papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

I Burstrom L, Letterstal A, Engstrom M-L, Berglund A, Enlund M. The patient safety culture as perceived by staff at two different emergency departments before and after introducing a flow-oriented working model with team triage and lean principles: a repeated cross-sectional study. (*Submitted)*

II Burstrom L, Starrin B, Engstrom M-L, Thulesius H. (2013) Waiting management at the emergency department—a grounded theory study. *BMC Health Serv Res 13:95.*

III Burstrom L, Nordberg M, Ornung G, Castren M, Wiklund T, Engstrom M-L, Enlund M. (2012) Physician-led team triage based on lean principles may be superior for efficiency and quality? A comparison of three emergency departments with different triage models. *Scand J Trauma Resusc Emerg Med 20:57.*

IV Burstrom L, Engstrom M-L, Castrén M, Wiklund T, Enlund M. Change of triage model to physician-led team triage explains better quality and efficiency at one emergency department. *(Submitted)*

Contents

Abbreviations

ADAPT	Adaptive Process Triage
AHRQ	Agency for Healthcare Research and Quality (in the USA)
CI	Confidence Interval
ED	Emergency Department
HSOPSC	Hospital Survey on Patient Safety Culture
IOM	Institute of Medicine (in the USA)
MTS	Manchester Triage Scale
LOS	Length Of Stay
LWBS	Left Without Being Seen
OR	Odds Ratio
QI	Quality Improvement
PCI	Percutaneous Coronary Intervention
PDSA	Plan, Do, Study, Act, cycle
RETTS	Rapid Medical Emergency Triage and Treatment System
UK	United Kingdom
WHO	World Health Organization

Definitions

Crowding/overcrowding	Crowding occurs when the identified need for emergency services exceeds available resources for patient care in the emergency department, hospital, or both
Delphi method	Is a structured communication technique, originally developed as a systematic, interactive forecasting method which relies on a panel of experts
Lean	Aims to improve streamlining processes, to reduce cost and to improve the quality and timeliness of product and service delivery
Leaving without being seen (LWBS) or treatment not completed	Percentage of patients leaving without being seen or receiving complete treatment
Length of stay (LOS)	Time from registration to discharge
Mortality 7 days	Percentage of patients dying within 7 days after the first visit to the ED
Mortality 30 days	Percentage of patients dying within 30 days after the first visit to the ED
Nurse/emergency physician triage (in tables: Nurse physician triage)	A registered nurse as the first contact person in front and an emergency physician in step 2 after triage
Nurse/junior triage or single nurse (in tables: Nurse triage)	A registered nurse meets the patient in triage, and the patient is examined by a junior physician
Physician-led team triage (in tables: Physician triage)	Team with a senior physician, junior physician and registered nurse
Time to physician	Time from registration to being seen by a physician
Triage	The process of prioritizing patients for care
Turnover rate 4-hour	Percentage of patients spending less than 4 hours in the ED
Unscheduled return 24-hour	Percentage of patients reattending an ED unplanned within 24 hours after the first visit for the same chief complaint
Unscheduled return 72-hour	Percentage of patients reattending an ED unplanned within 72 hours after first visit for the same chief complaint

Thesis at a glance

Paper	Aim	Study design	Conclusion
I	To describe the patient safety culture in an ED at two different hospitals before and after a quality improvement (QI) project that aimed to improve patient safety	A repeated cross-sectional study involving a questionnaire completed before and after QI, N=586	The result showed improvements relating to team-work and communication openness. Most of the improvements at follow-up were seen for the physicians, mainly at the county hospital in the dimensions *Overall perception of safety, Teamwork within the hospital*, and *Organisational learning–continuous improvement*. The low number of positive changes seen may have been influenced by the lack of team training and communication programmes in connection with the implementation of the new work model.
II	To explore what is going on at an ED	A grounded theory study, N=25	Managing non-acceptable waiting is a driving force behind much of the staff behaviour in the ED. Waiting management is performed either by increasing the throughput of patient flow or by changing the waiting experience.
III	To compare three Swedish EDs with different triage models in terms of efficiency and quality indicators	A retrospective cross-sectional study, N=147,579	This study found better results for the ED with physician-led team triage based on lean principles, as observed for both efficiency and quality aspects. This triage model was probably a major contributor to the result.
IV	To compare the efficiency and quality measures before and after a reorganization with a shift of triage model	A retrospective cross-sectional study, N=43,841	The findings indicated that physician-led team triage is a crucial factor for increasing patient safety. These results probably reflect the improved efficacy and performance during the ED stay.

Introduction

Patient safety is a broad term that includes safety throughout the entire health care system. The World Health Organization (WHO) definition of patient safety is "the prevention of errors and adverse effects to patients associated with health care" (1). This thesis does not claim to be comprehensive in the area of patient safety in the ED. The focus of this thesis is the culture that characterizes many EDs that experience crowding, waiting, and deficiencies in patient safety. A central question is how various triage models affect the patient safety culture and patient safety through waiting management. The different outcomes of efficiency and quality aspects were studied in relation to the choice of triage model used in EDs.

Patient safety

Patient safety is a serious global public health issue. Estimates show that in developed countries, as many as 1 in 10 patients is harmed while receiving hospital care (1). Patient safety is the foundation of good patient care. The unnerving fact that health care can harm as well as heal is the reason for suggesting that patient safety is at the heart of health care quality (2). Patient safety and good quality are interrelated. Patient safety is important for both patients and staff, and is essential for good care (3).

The structural basis of human contributions to safety and failure has been established in areas outside health care. The nuclear accident at Three Mile Island was a milestone in safety thinking (4). After much discussion with various researchers in different disciplines in the safety area, Reason et al. wrote the book *Human Error*, in which he presented a new perspective of human contributions to safety and risks where individuals were not to blame (5).

The "To err is human" (6) report from the US Institute of Medicine (IOM) was another important milestone for the patient safety movement and received wide international distribution. It was followed by another report from the IOM, "Crossing the quality chasm: a new health system for the 21st century" (7). This report defines six aims built around the core need for health care to be safe, effective, patient centred, timely, efficient and

equitable. These aims are now used in several international health care systems and as national indicators for a good standard of care, such as the Swedish Ministry of Health and Social Affairs (8, 9).

The Swedish Patient Safety Act (9) legislates that health care must be safe for patients. The Act's third chapter details the care provider's obligation to conduct systematic work to ensure patient safety which can be described as avoidance, prevention and amelioration of adverse outcomes or injuries that stem from the process of health care (9).

This is also stressed in The Swedish National Board of Health and Welfare's code of statutes (10). The Board's definition of patient safety is the absence of "injury inflicted through care", which in turn is defined as "suffering, discomfort, physical or psychological injury, illness or death caused by health care and which is not an inevitable consequence of the patient's condition".

However, safety is more than avoidance of adverse outcomes and identifiable errors of occurrence. Safety emerges can also be described as the results of interactions between material, components and processes in the ongoing system (11). The term "patient safety" refers to a property of a system that arises from the interactions occurring within a system. Because of difficulties in obtaining an exact measure of patient safety, we can only make a rough estimate of the balance between risk and benefit in the real system (11).

Even if it is difficult to measure patient safety it is significant for health care to improve the care continuously. Improving patient safety requires grasping the dynamics and recognizing the full complexity and uncertainty that comes with them (12). Furthermore, improving safety depends on learning how safety emerges from the interaction of the various components.

A survey by The Swedish National Board of Health and Welfare showed that almost 9% of Swedish patients in somatic in-patient care experienced a preventable adverse event (13). Failures in communication and team-work are frequent contributors to medical injuries in health care (14). According to the US Joint Commission on Accreditation of Healthcare Organizations, communication failures are the leading causes of inadvertent patient harm and underlie 70% of all negative events (15).

Patient safety culture and climate

Awareness of patient safety culture is fundamental to all patient care. This is accentuated in the ED because of high numbers of patients and staff, and the often dramatic circumstances involved. The concepts of safety culture and safety climate have their roots in more general concepts such as organisational culture and organisational climate. Patient safety culture, which is a component of organisational culture, includes and influences staff member attitudes and behaviours in relation to their organisation's ongoing patient safety performance (16, 17).

Morello et al. wrote about patient safety by describing the relationships and interactions between organisational culture, patient safety culture, patient safety climate and individual attitudes and behaviour towards patient safety (18) (Figure 1). The current focus is on measuring and improving patient safety culture to improve patient safety in hospitals. The description in Figure 1 shows that patient safety culture includes the shared beliefs, attitudes, values, norms, and behavioural characteristics of employees (19).

Patient safety culture as the approaches and attitudes of individuals and groups at a care unit influences patient safety (20, 21). Even an organisation's climate/culture can directly or indirectly affect risk and safety (22). To study this topic several studies have used the concepts of safety climate and safety culture as analytical tools (23-26).

In the dissertation "Measures of Patient Safety", Öhrn reported on Denison's argument about the methods that researchers can use for distinguishing between studies measuring culture and those measuring climate (27, 28). Denison stated that culture can be measured by using qualitative methods and climate by using quantitative ones because techniques such as questionnaires cannot capture the underlying safety culture (27). Similarly, it is suggested that "safety climate" is a better term for survey results because a survey allows only a superficial evaluation of staff attitudes at a certain point in time (21, 26, 28). The concepts of climate and culture are nowadays often used interchangeably in the literature.

Measurement of patient safety culture is limited by the ability to define measureable components of culture (29). A common definition of patient safety climate is the employees' perceptions and attitudes about the surface features of patient safety culture at a given point in time (26, 30). Therefore, targeting changes in practice by changing the patient safety climate is considered to be a key strategy for strengthening and improving patient safety and outcomes in hospitals (20, 31, 32). To make this possible, Davies et al. noted the need for culture strategies to be more selective and flexible to be able to adapt to contextual factors in the climate in which they are delivered (17).

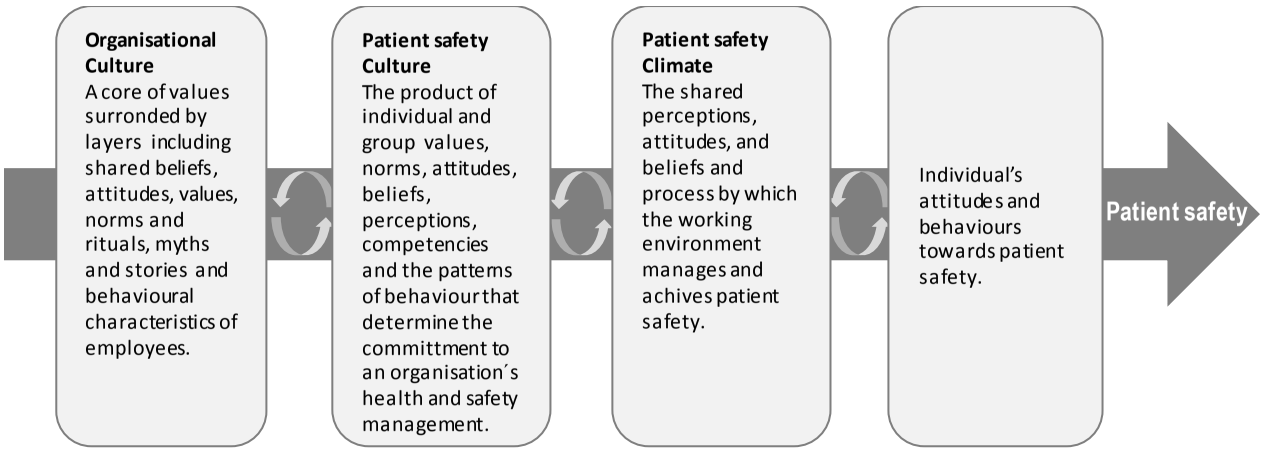

Figure 1. Patient safety culture model

Published with permission from R. Morello (18).

Patient safety at the ED

An ED receives patients seeking acute care. The ED's task is to provide timely care to acutely ill or injured persons and to make immediately available special resources for those in need of urgent or emergency care 24 hours a day (33). The goal is the safe care of patients and an efficient patient flow (34).

The care in the ED has several diagnostic and therapeutic challenges because most patients come to an ED having symptoms without a simple diagnosis and needing immediate intervention. It is essential that health care professionals should be highly skilled and well trained to deliver high-quality care. The high number of patients increases the risk of a poor treatment and long waiting periods, which may compromise patient safety and patient satisfaction (35-40). Crowding also makes it difficult to create a safe care and work environment, a problem that is related to high staff mobility. Working conditions are greatly affected by both the patient flow rate and the staff turnover rate. Poor patient flow and high staff turnover can compromise patient safety (41-43).

In Sweden and other Western societies, health care has changed recently, and EDs have been closed at the same time as the number of hospital beds has declined (44, 45). The reasons for these changes are the need to reduce costs and difficulties in maintaining staff competence.

Triage

Different triage models have been introduced in the ED with the aim of prioritizing acute patients and thereby facilitating safer care. During triage, the patient's medical priority is evaluated, and this evaluation is used to sort and prioritize the patient's condition and need for care (46, 47). International and national studies have described the experiences of various triage models and how patient safety can be improved by triage assessments (48-50). However, there is insufficient scientific documentation to determine whether the safety, reliability and reproducibility differ between the three most common triage models in Sweden: the Rapid Medical Emergency Triage and Treatment System (RETTS), Adaptive Process Triage (ADAPT) and the Manchester Triage Scale (MTS) (51-54).

Using team triage in these models, with a specialist physician in the front line decreased the percentage of patients at the ED leaving without being seen (LWBS) (55, 56). Shorter decision pathways between physicians and other team members lead to increased patient safety (49). Christmas et al.

found that having a senior consultant on the night shift in the ED was associated with faster care and a reduced admission rate (57). One area that has been studied, but that needs to be developed, is the interconnection between pre-hospital triage and triage in the ED (58).

Lean principles

Lean principles have been implemented internationally and at a number of hospitals in Sweden. This method includes a comprehensive view of health care, the efficient organisation of processes and the development of systems to allow for the discovery and correction of problems (59-62). Lean principles allow for better care of patients' needs, more effective flow of patients through the unit, and improving the early diagnosis of cardiac care in the ED (63-66). Combining lean principles with team triage reduced the time to see a physician and the entire stay in the ED (49, 67).

Patient safety risks in the ED

Common problems in the ED that are more likely to lead to patient safety risks or patient injuries are communication failures and also communication in connection with handoff and transfers, overcrowding, and a lack of teamwork, rather than medical mishaps or lack of knowledge (68).

Communication failures

Thus, handoff and transition of patients have become the focus of efforts aimed at reducing errors. As much as 50% of errors in communication occur during handoff (68, 69), and also the shift change is a critical moment (68-70). The safety aspects of the transfer of patients from the ED to an admitting physician have not been studied thoroughly. The working environment, which demands constant multitasking, is a particular challenge (71). The specific factors critical to patient safety are the patient flow rate, workload, "communication and information technology resources and processes" and assignment of responsibility. To improve patient safety, it is important to develop communication skills; e.g., Situation, Background, Assessment, Recommendation (or SBAR), which is a communication tool used in many health care settings (72, 73).

Overcrowding

Overcrowding is one of the leading problems and one of the most common patient safety risks at the ED (74). The definition of overcrowding is often referred to as an extreme number addition of patients in the treatment areas beyond the ED's capacity, which can require medical care to be provided in hallways and similar areas (33, 75). Crowding can also be defined as a situation in which the demand for emergency service exceeds the ability to provide care in a reasonable amount of time (76, 77). Crowding increases the work-load and limits the ability to monitor the patients, who may be physically distant from standard care locations (68).

The primary cause of overcrowding is boarding, the need to hold patients in the ED after they have been admitted to the hospital because no in-patient beds are available. This leads to further problems in the ED, such as longer waiting times, and increased suffering for the patients who must wait. The causes of ED crowding can be divided into three groups: input factors, throughput factors, and output factors. These factors correspond to a conceptual framework for studying ED crowding. Input factors reflect sources and aspects of patient inflow. Throughput factors reflect bottlenecks within the ED (78, 79). Output factors reflect bottlenecks in other parts of the health care system that might affect the ED.

Lack of competence in the triage may lead to further hospitalizations and more problems in output (80). High number of patient in turn generates a high demand for hospital beds, and if there are not enough beds, patient safety may be compromised in other parts of the hospital (33, 44, 81, 82).

Team-work

Employing emergency physicians, as implemented in certain hospitals in Sweden, aims to improve the emergency care and continuity, to increase the overall view in the care of the patient, to improve the care processes involving specialist clinics and to improve overall patient safety (83).

In contrast to emergency physicians, attending physicians who work temporarily in the ED as "guests" from other clinics can find it difficult to develop a sense of affinity with the other staff, and "team building" is therefore hampered. According to the Swedish National Board of Health and Welfare, there is great potential for improvement by raising the status of the physicians from other specialist clinics who work in the ED. This would likely encourage a positive work environment and improve patient safety. An increased sense of belonging and well-established routines from the perspective of team-work should increase collaboration and thereby improve patient

care (60, 84-86). Studies show positive results in terms of efficiency and quality measures when staff works in teams. Team-work itself has positive effects on the work environment by reducing stress when staff members know their roles and team members communicate effectively. Team training is needed to develop efficient and effective teams. Studies involving team-work in health care have shown improved results (87, 88).

Evidence-based care and quality improvement

System-based interventions may prevent adverse events and consequently improve patient safety (89). Therefore, methods for measuring and developing patient safety are needed (90).

Knowledge-driven and evidence-based care should be based on science and proven experience (91-93). The health care system has an obligation to ensure good care through the application of guidelines and care programs that are well established, evidence based, and updated, and followed up regularly (10, 32). Challenges for the ED culture include the time, need for unified colleagues, management skill, and specific activities. Experiences from the literature may help to achieve the objective of the current process of change (92, 94). To develop strategies for reducing risks and for ensuring the success of evidence-based research, some studies have highlighted the need for unanimous classifications in the area of patient safety (95, 96). The authors have emphasized the importance of an ongoing process that aims to develop common international understanding of terms and concepts relevant to patient safety.

Batalden et al. proposed a definition of QI as: "the combined and unceasing efforts of everyone – healthcare professionals, patients and their families, researchers, payers, planners, and educators – to make the changes that will lead to better patient outcomes (health), better system performance (care), and better professional development (learning)". This definition arises from the conviction that health care will not realize its full potential unless repeated adjustments of care principles become "an intrinsic part of everyone's job, every day, in all parts of the system" (97).

Perhaps the most widely used method for QI is the Plan, Do, Study, Act (PDSA) cycle (98). Attention to improvements that lead to safer care is important. It is especially important to implement actions to improve health care in accordance with evidence-based care. The PDSA cycle provides support for improvements in both work and outcomes (98).

Leadership

When leadership and management are committed to a culture of safety, the whole organization will follow, and disclosing adverse events and finding the root causes will become an organisational process. According to Leape et al., teams that receive support from hospital leaders and front-line care-givers can develop effective methods for team-work and communication (99).

Team success correlates with active engagement of leadership, and engagement of physicians. This is of particular importance regarding team-work at EDs, operating rooms, and intensive care units (32). There are expectations that hospital management will develop new management approaches to provide a more supportive and stimulating focus for ED staff (100). Other studies have also shown that increased leadership standards, team-work and multidisciplinary collaboration in patient care are associated with lower mortality rates and reduction in the duration of hospital stay (87, 101, 102). Thus, strong leadership is a key component of programs aimed to improve patient safety.

Measures of patient safety in the ED

Efficiency indicators that focus on patient safety are sometimes described in relation to the patient's condition and to the time that each patient spends in the ED (79, 103). One frequently used measure is based on whether the patient spends more than 4 hours in the ED (104). Mason et al. found that the percentage of patients who stayed more than 4 hours was lower after establishment of the 4-hour target. Most patients departed within the last 20 minutes of the 4-hour interval, and most patients were elderly (105). Weber et al. found that the 4-hour target in the United Kingdom (UK) did not appear to have a negative effect on quality or patient safety (106). However, this measure has been discussed widely, and the relevance of the measure has been questioned (74). Focusing on a single time-related measure does not necessarily lead to better quality but may instead lead to dysfunctional performances, as described for the 4-hour standard in the UK (107). For example, observations have noted that it is possible to manipulate the measurement in different ways, including directing ambulances to another hospital (108). Thus, it remains controversial whether researchers should measure the percentage of patients spending more than 4 hours in the ED.

A common view in many countries is that EDs are used inappropriately. It is difficult to determine the extent of this phenomenon because of the lack of criteria to define inappropriate use of the ED (109). Carret et al. showed that there may be a substantial proportion of people who attend the ED whose

visit may be defined as inappropriate (109). However, a study of Backman et al. showed that there are few inappropriate visits and stressed that it is difficult to know the number of visitors who use the ED inappropriately (34). To determine the proportion of inappropriate users requires triage scales that allow the staff to assess clearly that the patient's needs are not urgent. When patients present to the ED, they are first assessed by triage staff who determine their symptom severity and degree of urgency. All triage scales include a level of non-urgency. It is a challenge for the health care system to organise another type of medical service to meet non-urgent needs for treatment and support.

Another measure of patient safety includes the percentage of patients who return within 24 or 72 hours from the first visit for the same chief complaint (110, 111). Other measures reflecting quality of care include the percentage of patients who leave without being seen (LWBS), and mortality within 7 or 30 days after the first visit to the ED (40, 112, 113). Sibbritt et al. have provided a list of quality measures to be used as indicators of the patient's progression through the ED: time from arrival to triage, time from triage to treatment, length of stay, readmission rate, LWBS and death in the ED (82). Other measures to assess ED crowding is described with goals for input, throughput and output (77).

Drawing comparisons between EDs nationally or internationally can be difficult because there are no completely unambiguous definitions of the described outcome measures (114). Different measures of efficiency, quality and, hence, patient safety have been in use for several decades, and others are under development (115).

Pines et al. performed research to find predictors for benchmarking to achieve greater coherence in the measures and to apply them in the public health care system (116). There is ongoing development of various dimensions within emergency medicine, both nationally and internationally, often using the Delphi method (117).

We decided to use the measures that have support in the literature as valid, reliable, and efficient quality indicators. The main measures that we used were: time to physician, length of stay, 4-hour turnover rate, LWBS, unscheduled return and mortality (82). The results of such measurements provide important feedback about the unit's performance.

Aims

The overall aim of this thesis was to understand more about patient safety in the ED, specifically about the culture, waiting, and outcomes of efficiency and quality variables.

The specific aims were as follows.

Paper I: To describe the patient safety culture in the EDs of two hospitals before and after a quality improvement project aimed at improving patient safety.

Paper II: To use grounded theory to explore what is going on at an ED from the patient and staff perspectives.

Paper III: To compare efficiency and quality indicators in three Swedish EDs with different triage models.

Paper IV: To compare the efficiency and quality measures before and after a reorganisation involving a change in the triage model in a single ED.

Paper I

Materials and methods

Study design and instrument

This study included a repeated cross-sectional design using the Hospital Survey on Patient Safety Culture (HSOPSC) questionnaire before and after a QI project that aimed to improve patient safety in the ED at two hospitals.

Participants

Two EDs at two different hospitals, one a university and one a county hospital located in two different cities in central Sweden, were included.

The county hospital is a trauma level II centre located in a minor city and serves a population of 251,000 by providing medical, surgical, and orthopaedic care. The ED at this hospital has an average of 53,000 attending patients annually and serves adults and children in three main specialties. In 2009, at the first questionnaire survey, the ED used a traditional single-nurse triage. After triage, a junior physician examined the patients. At the start of the study, the ED used a locally modified version of the MTS.

The university hospital is a trauma level I centre in Stockholm, the capital of Sweden, and serves a population of 150,000 by providing medical, surgical and orthopaedic care. The ED at this hospital has an average of 75,000 attending patients annually. In 2008, at the first questionnaire survey, the ED used the ADAPT model, in which the patient is assessed using a two-step triage model. In step 1, a single nurse assessed all patients, and thereafter they were referred either to a team triage, comprising a nurse and an emergency physician, or to a senior specialist physician within the ED.

Figure 2. Study timeline, *start of QI project in the section of medicine, and

**start of QI project in the section of orthopaedics

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Data collection and questionnaire

The HSOPSC questionnaire (cf. Appendix) was completed by the staff before and after the QI project. All registered nurses and assistant nurses and those physicians who frequently worked in the ED at the county hospital were included. Registered nurses and assistant nurses were analysed as one group because they were all employed in the ED. In contrast to the physicians at the county hospital ED, all physicians in the university hospital ED were employed in the ED and had no obligations at other hospital clinics.

The first questionnaire was distributed in 2009 at the county hospital and in 2008 at the university hospital. The second questionnaire was distributed two years after the baseline measurement in 2011 and 2010, respectively (Figure 2).

HSOPSC

The HSOPSC was developed for the Agency for Healthcare Research and Quality to obtain a better understanding of the patient safety culture within an entire hospital or specific departments. The HSOPSC is used primarily for intra- and inter-institutional comparisons (118). The HSOPSC is based on a set of pilot studies involving 1,461 hospital staff in 21 hospitals across the USA. The original questionnaire comprised 42 items grouped in 12 dimensions. The HSOPSC is a validated and widely used instrument (119-121) and has been translated into Swedish by the Swedish National Board of Health and Welfare (122).

The modified Swedish version was validated by Hedsköld et al. (123). Two dimensions have been added to the Swedish version, *Information and support to patients at adverse events* and *Information and support to staff at adverse events*. The questionnaire comprises 51 items, which are aggregated into 15 dimensions to measure respondents' attitudes about various aspects of patient safety (Table 1). Each dimension includes one to four items that are rated on a 5-point Likert scale. Percentages were calculated for the number of responses to specific questions or dimensions. Responses with scores of 1 and 2 were considered negative in terms of patient safety, 3 was neutral, and 4 and 5 were positive. Some questions were negatively worded, so the answers were reversed before recording as positive or negative. The dimensional scores were expressed as percentages of answers within each dimension that indicated a positive response towards patient safety (124). Statistically significant improvement in outcomes between the baseline and follow-up are defined as a "higher score" or a "positive score". In the Swedish manual, an index of <50 is considered low and should lead to action, 51–69 suggests potential for improvement, and ≥70 indicates that the unit is functioning well.

Table 1. The Swedish version of the Hospital Survey on Patient Safety Culture (HSOPSC). Patient safety culture dimensions and composites.

Patient safety culture composites	**Definition**	**Survey items (cf. appendix)**
1. Non-punitive response to error	Staff feel that their mistakes are not held against them, and mistakes are not recorded in their personnel file.	A10, A14, A18
2. Staffing	There are enough staff to handle the work-load, and work hours are appropriate to provide the best care for patients.	A4, A7, A9, A16
3. Frequency of event reporting	Mistakes are reported and followed up.	D1, D2, D3
4. Hospital management support for patient safety	Supervisors/managers consider staff suggestions for improving patient safety, praise staff for following patient safety procedures, and do not overlook patient safety problems.	F1, F8, F9
5. Team-work across hospital units	Hospital units co-operate and co-ordinate with one another to provide the best care for patients.	F2, F4, F6, F10
6. Hospital handoff and transition	Important patient care information is transferred between hospital units and during shift change.	F3, F5, F7, F11
7. Information and support to patients at adverse events *	Information given to patients who have been through an adverse event.	G3, G4, G5, G6.
8. Information and support to staff at adverse events*	Information to staff who have been through an adverse event.	G7, G8
9. Overall perception of safety	Procedures and systems are good at preventing errors, and there are few patient safety problems.	A12, A17, A19, A20
10. Safety culture dimension at the unit level**	Management support of patient safety at the unit level.	B1, B2, B3, B4
11. Organisational learning – continuous improvement	Mistakes have led to positive changes, and changes are evaluated for their effectiveness.	A8, A11, A15
12. Team-work within the hospital	Staff supports one another, treat each other with respect and work together as a team.	A3, A5, A6, A13
13. Communication openness	Staff will freely speak up if they see something that may negatively affect patient care and feel free to question those with more authority.	C2, C4, C6,
14. Feedback and communication about errors	Staff are informed about errors that occur, are given feedback about changes put into place based on event reports and discuss ways to prevent errors.	C1, C3, C5
15. Patient safety grade	A personal general assessment of patient safety at the unit level.	E1

*Swedish version. **Not answered by physicians.

Intervention—QI project in the EDs

Project aiming for QI at the county hospital

In September 2009, physician triage with a supporting team, based on a flow process and lean principles (125), was introduced to the internal medicine section of the ED in a limited manner for a few hours a day. The purpose of the QI project was to shorten the time to first contact with a physician and thereby to lead to a shorter stay and improved patient safety in the ED. The model was extended in spring 2010 to be in use from 8:00 to 16:00 h, and in May 2011, it was modified further to be in use from 9:00 to 20:00 h (Figure 3). In this model, the patients were first triaged by a nurse, and if assessed as requiring treatment by an internal medicine physician, they were transferred directly to a physician, a specialist in internal medicine in the ED. Physician triage was introduced to the orthopaedic section of the ED in August 2010 to be in use from 10:00 to 16:00 h and started in the surgical section in April 2012 from 10:00 to 16:00 h.

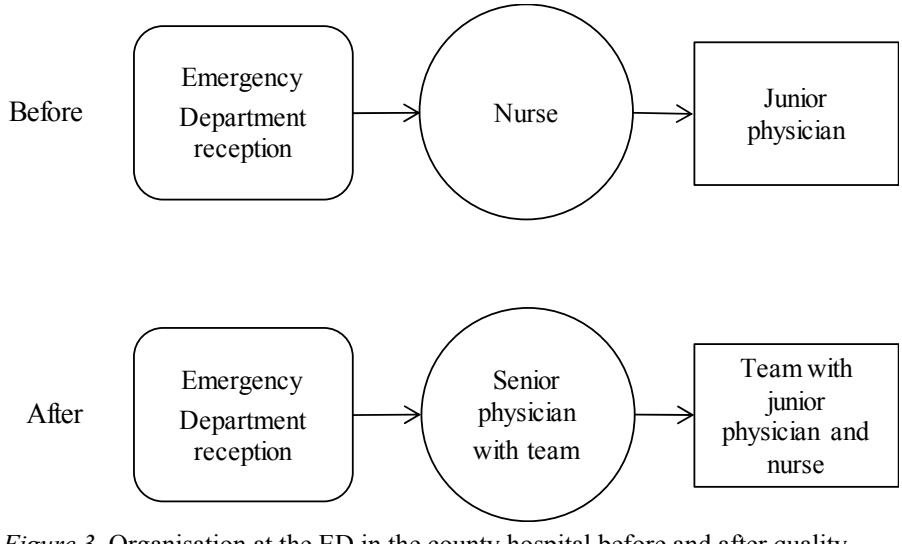


Figure 3. Organisation at the ED in the county hospital before and after quality improvement project.

Project aiming for QI at the university hospital

A major organisational change was implemented in the ED of the university hospital in 2008, with the main purpose of improving patient safety by increasing the patient flow in the ED, hence shortening the total visit time and the time to see a physician (Figure 4). This QI project was based on lean principles (125) and involved all specialties in the ED. The model comprised an initial assessment ("spot check") of the patient by the triage nurse before the patient was referred to a team comprising a specialist, a nurse and an assistant nurse. Improvements were made during the implementation process

based on the principles of continuing improvement, using the PDSA cycle, meaning that adjustments and evaluations were both ongoing processes.

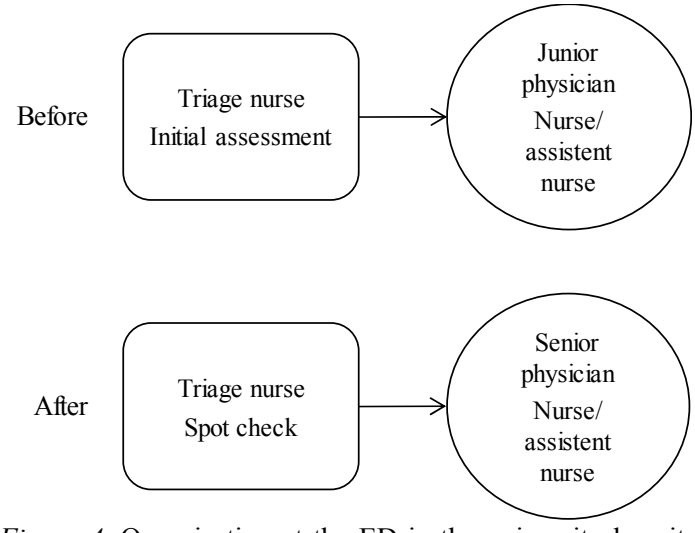


Figure 4. Organisation at the ED in the university hospital before and after quality improvement project.

Results

Changes in the dimensions between baseline and follow-up within each hospital

At the county hospital, two of the 14 dimensions differed between baseline and follow-up—*Team-work within the hospital* and *Communication openness*—and both showed a positive score. At the university hospital, a difference was observed for two dimensions—*Team-work across hospital units* and *Team-work within the hospital*—and both showed a positive score. Thus, the dimension *Team-work within the hospital* was scored more positively in both EDs after the intervention.

Changes in the dimensions within each hospital according to occupation

The physician group at the county hospital scored higher in three of 14 dimensions at the follow-up: *Overall perception of safety*, *Team-work within the hospital* and *Organisational learning–continuous improvement*.

For the physician group at the university hospital, a higher score was observed at the follow-up in one dimension, *Team-work across hospital units*.

We observed a change in six of 15 dimensions for the registered nurses/ assistant nurses at the county hospital. Two of these dimensions: *Safety culture dimension at the unit level* and *Communication openness* scored higher at the follow-up. We observed a higher score in one of 15 dimensions for the registered nurses/assistant nurses at the university hospital: *Team-work within hospital*. The score for team-work increased for physicians at both hospitals and for registered nurses/assistant nurses at the university hospital.

Differences in the changes in the dimensions between occupations at baseline and follow-up at the hospitals

At the county hospital, a difference between physicians and nurses/assistant nurses was observed at the baseline and the nurses/assistant nurses had higher scores in four dimensions: *Hospital handoff and transition, Organisational learning–continuous improvement*, *Team-work within the hospital* and *Feedback and communication about errors.*

At the follow-up, the physicians scored higher than the nurses in seven dimensions: *Non-punitive response to errors, Staffing, Hospital management support for patient safety, Team-work across hospital units, Information and support to patients at adverse events, Overall perception of safety,* and *Patient safety grade*. At the university hospital, the physicians scored higher in three of 14 dimensions: *Staffing, Overall perception of safety,* and *Communication openness.* At follow-up, the physicians scored higher in two dimensions: *Overall perception of safety* and *organisational learning–continuous improvement*. *Overall perception of safety* dimension was the only one for which physicians scored higher than nurses/assistant nurses at both baseline and follow-up.

Paper II

Materials and methods

Grounded theory was used in Paper II because it is a well-established, documented, genuine method for qualitative analysis. This method was developed by the medical sociologists Barney Glaser and Anselm Strauss, who began applying the "constant comparative method", later called grounded theory (126), while collaborating on a study of dying patients at a Californian hospital. Since then, grounded theory has developed in different directions. In its classical meaning, grounded theory is not a method for exclusively qualitative data but may be used for all kinds of data, even quantitative data, and all types of data are classified as data. An important starting point in grounded theory is that the researcher should be as open as possible to his/her research field. Grounded theory is a method for the conceptualization of behavioural patterns involving people (127, 128), and it is used when researching a question for which one expects completely new answers.

In grounded theory, it is peoples' behaviours rather than the people themselves that are categorized (129). Concepts emerge from data and are used to form a hypothesis within a theory that serves as a possible explanation for the behaviours forming the pattern that is the main concern for study (130). Theoretical selection is a process by which the researcher collects and analyses the data and determines which data will be collected next, and where, in order to develop the grounded theory (127). The data collection is stopped when saturation is achieved; that is, when more interviews or observations will not make any further significant contribution to the theory (127).

Participants and data collection

The preliminary results of the HSOPSC questionnaire about patient safety culture obtained from the staff in the ED in Västerås (Paper I) inspired a more in-depth study of the survey responses.

The research question asked in accordance with grounded theory was: "What happens in the ED?"

The study began with 76 hours of observation, during which field notes were made, analysed and coded by LB. Focus-group interviews were then held, all beginning with the question: "What happens during a normal day in the emergency department?" The people asked to participate in the focus group interviews were those individuals working on the day of the interview. Three researchers conducted six focus group interviews with groups comprising assistant nurses (5), nurses (5), junior physicians (2), senior physicians (4), specialists (4), and local managers (5). The groups of assistant nurses and nurses contained a total of seven women and three men, the groups of senior physicians and specialists contained three women and seven men, and the five local managers were all women. Everyone except the two junior physicians had worked in an ED or other hospital care organisations for 10 or more years.

The focus group interviews lasted between 90 and 110 minutes. During the interview, ideas arose about the questions to be asked, which is a fundamental part of grounded theory (127, 128). We were also able to generate more specific questions for the interviews.

The focus group interviews were audiotaped and later transcribed verbatim. During the interviews, field notes were made. All the data from the six focus group interviews were first coded and analysed line-by-line by each researcher, and the analyses were later compared.

Questions based on the data were asked during the stages of coding and analysis, such as: "What do these data say?", "What is this study about?", "Which category does this event indicate?", "What is actually happening in the data?", and "What is the main point of what appears in the interviews?" The concepts generated from the data thus represented underlying patterns. Each concept was compared with the next, and new indicators were discovered in the data.

Waiting management emerged as a core category. After the emergence of this core category, the selective coding continued, and the coding was performed only in relation to the core category.

During the entire analysis process, theoretical "memos" were made in the form of text and figures. Memos are theoretical notations of ideas about the substantive codes and the significance of the theoretical codes that emerge during the coding, collection and analysis of data, as well as during "memoing" (128). During the sorting of the memos, relationships between the categories and the core category are studied. In the final step, the memos are compiled into a theory in accordance with grounded theory methodology (127, 128). In accordance with the principles of grounded theory, a literature

review was then performed to obtain more ideas about how the substantive theory should be formulated. The literature was used as another data source in accordance with the process of the constant comparative method (128).

Results

The results of the study are formulated as a theory on waiting, which proposes that the main concern in the ED is to reduce the patients' waiting time. This can be achieved either by increasing throughput of patient flow by "structure pushing" and shuffling around of patients or by changing the experience of waiting by calming patients and feinting to cover up.

Acceptable and non-acceptable waiting

Management of waiting in the ED starts with the distinction between acceptable and non-acceptable waiting. Acceptable waiting is perceived as justifiable, and the patient agrees to wait. Non-acceptable waiting is judged as unjustifiable. The definition of what is a non-acceptable waiting time is determined in an interactive process between staff and patients, in which the staff observe different signs given by patients and accompanying persons.

Signs of non-acceptable waiting

Signs of non-acceptable waiting are physical densification, contact-seeking behaviour and the emergence of critical situations (Figure 5).

Physical densification refers to an *accumulation of people* in the ED, making it more difficult to survey patients and eventually increasing the waiting time. Densification may lead to a stop in the flow of patients and a sense of complete stand-still in the ED. One obvious sign of physical densification is that almost all chairs are taken. Both the regular and spare seats are filled in the entrance area, sometimes even outside the entrance. Another sign of physical densification is the presence of high numbers of patients in corridors.

Contact seeking behaviour is another sign of non-acceptable waiting and is characterized by patients or accompanying persons who repeatedly try to make contact with the staff to alert them to their presence in the ED and about their state of health. Recurrent attempts to make contact with the staff by appealing or challenging glances are examples of contact seeking. Physical activities such as walking in and out and, off and on without making a fuss or patients entering and leaving the treatment room are other examples. Tapping the "glass cage" (reception desk) is also a way to make

contact, even if signs on the walls say that patients are supposed to wait in the waiting room until further notice from the staff. People who seek help in the ED are acutely ill with a more or less poor health status. Therefore, it is important to be cautious of changes in critical health status.

Critical situations are present if patients are very ill or show deterioration in health status. A critical situation may arise when a patient or an accompanying person, for different reasons, does not indicate a change in health status or there is a lack of health status surveillance. Lack of surveillance may cause a critical situation to emerge in the waiting room. Patient surveillance can fail during physical densification and may lead to critical situations. Another serious risk of critical situations can occur when referrals go in circles from one specialist to another.

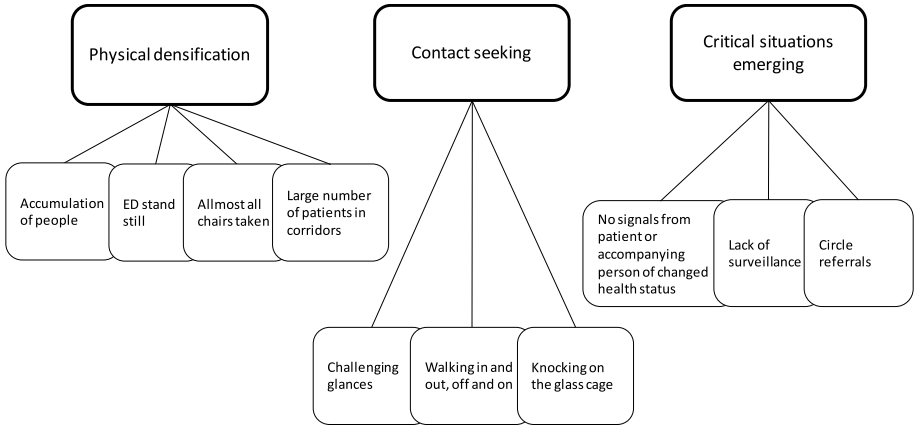


Figure 5. Signs of non-acceptable waiting.

Waiting Management

Management of non-acceptable waiting is done either by reducing the actual waiting time by increasing the patient flow, in order to make the work run smoother, or by changing the waiting experience (Figure 6).

Increasing patient flow

When waiting times increase, it is necessary to increase the flow of patients and patient turnover. Structure pushing is an expression used by the staff to refer to different strategies to increase patient flow to prevent physical densification, contact-seeking behaviour and, most importantly, the emergence of critical situations, with the ultimate aim of reducing the risk of jeopardizing patient safety. The staff uses structure pushing for three reasons: to prevent problems, to resolve problems and to create long-term solutions.

To increase patient flow, the staff needs to reprioritize the needs of patients who are waiting. This means that one patient must leave the treatment room or the stand-by mode to allow the entry of a patient with a worse health status who needs a faster assessment. There are two main ways of shuffling around patients. First, the staff tries to juggle the shuffling of patients by being one step ahead and planning for the unforeseen. When the staff noticed a critical situation approaching, they act quickly. A patient who is in a treatment room is moved out, and a patient in stand-by mode who is deteriorating is moved in. Second, the staff tries to "zigzag" patients in and out of the treatment rooms so that they can treat those most in need of immediate treatment.

Changing the waiting experience

To manage non-acceptable waiting, the staff tries to alter the patients' experience of waiting to make them feel that it is acceptable. This is done by calming and informing or by feinting to cover up. It is important for the staff to show respect and concern, and to take the time to listen to the patients because this promotes safety. To calm patients, it is also important to inform them how the ED works; i.e., that those with the worst health status are always examined first. Another aspect of informing patients is making patients comfortable so that they perceive that the ED is running normally.

Feinting illusion manoeuvers refers to one or several actions performed to cover up and divert interest from a situation to change the patients' perception of that situation. The staff performs different feints, so that the patient and accompanying person will experience waiting as acceptable. There are two types of feinting manoeuvers. In one type, the staff is visible and looking busy. In the second type, the staff makes themselves invisible to make the patients believe that the staff are busy tending to other patients. A common goal for the two types of feinting is to make patients and accompanying persons perceive the waiting as necessary, and it is therefore important that the feinting should not be discovered.

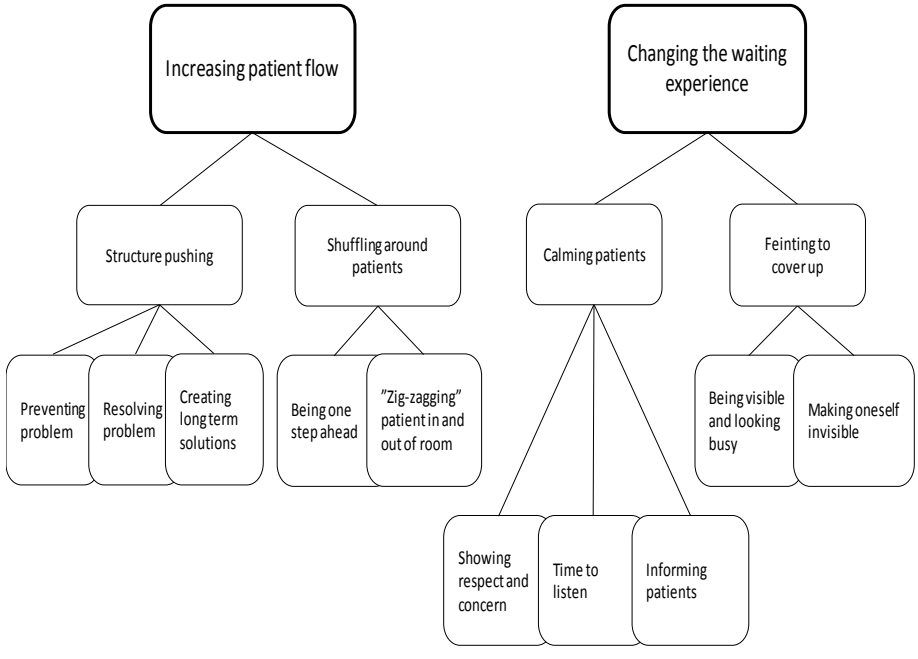


Figure 6. Managing non-acceptable waiting in an ED.

Staff reactions to unsuccessful managing of non-acceptable waiting

The staff wants the patients and accompanying persons to receive efficient, quality treatment in the ED and do not want them to perceive the waiting time as non-acceptable. The discrepancy between the care quality that the staff wants to achieve and the actual quality of the care creates frustration of different types, and the staff can become upset and ashamed.

Paper III

Materials and methods

This retrospective study involved the EDs at three hospitals in Sweden, two urban and one rural, with different patient reception processes.

Participants and data collection

All patients included in the study were registered between 08:00 and 21:00 h in each ED throughout 2008. This time was determined by the scheduling of triage between 08:00 and 21:00 h in Capio St. Görans Hospital, one of the participating EDs. Because the proportion of children differed between the EDs, all attendants aged up to 18 years of age were excluded to equalize the EDs (Figure 7). Data were collected from the ED patient administrative computer systems used by personnel from the EDs to enter data and to set time stamps. Data were then automatically collected in a database in each hospital, from which we subsequently extracted the data. This procedure was identical for all three hospitals. Data were also extracted from the National Mortality Register. Data on patient educational level were obtained from Statistics Sweden.

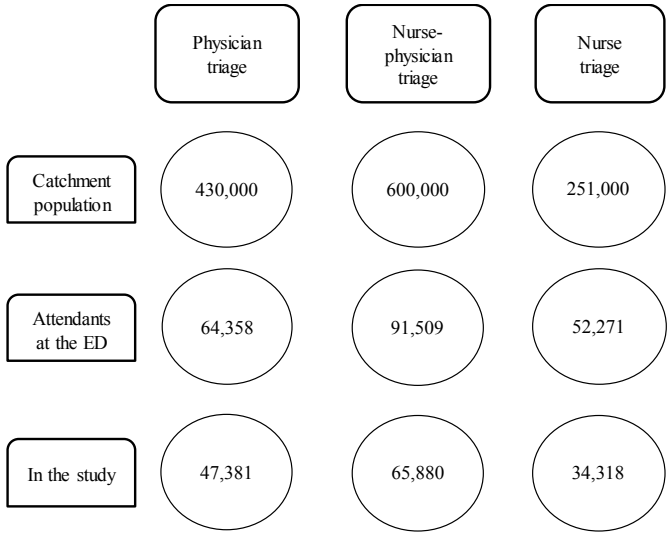


Figure 7. Some characteristics of the three participating hospitals and their EDs.

Different triage models

Physician-led team triage

A team triage system was developed at the urban hospital of Capio St. Görans Hospital in 2007. The working model is a flow-oriented team triage led by a senior physician with a custom number of teams required for optimal patient flows. Each team comprises a junior physician and a nurse, and has a detailed protocol for performing standardized work (Figure 8). All acute processes have been redesigned according to lean principles (61). This working model is hereafter referred to as "physician triage". The hospital does not use a standardized model of patient acuity assessment. The ED at this hospital is a trauma level II ED, which provides acute medical, surgical, and orthopaedic services. The ED serves adult individuals (minimum 15 years of age). The hospital has fast-track percutaneous coronary intervention (PCI) for patients with myocardial infarction and another fast track for patients with stroke.

Nurse–emergency physician triage

The second urban hospital, Södersjukhuset in Stockholm, has since 2008 used the nurse–emergency physician triage model, which has a registered nurse as the first contact person in front and an emergency physician in step 2 (Figure 8). The ED uses the ADAPT triage scale. This working model is hereafter referred to as "nurse–physician triage". The general ED at this hospital is a trauma level II ED, and it serves adult individuals in acute internal medicine, cardiology, orthopaedics (minimum 18 years of age) and surgery (minimum 15 years of age). The hospital has fast-track PCI for patients with myocardial infarction and another fast track for patients with stroke. It also has a see-and-treat area for patients with less acute conditions.

Nurse–junior triage

The Central Hospital in Västerås uses the model of traditional single-nurse triage in the ED. Following triage, the patient is examined by a junior physician (Figure 8). The ED uses a locally modified version of the MTS. This working model is hereafter referred to as "nurse triage". The ED is a trauma level II ED, and it serves adults and children in three main specialties: internal medicine, surgery, and orthopaedics. The hospital has fast-track PCI for patients with myocardial infarction and another fast track for patients with stroke.

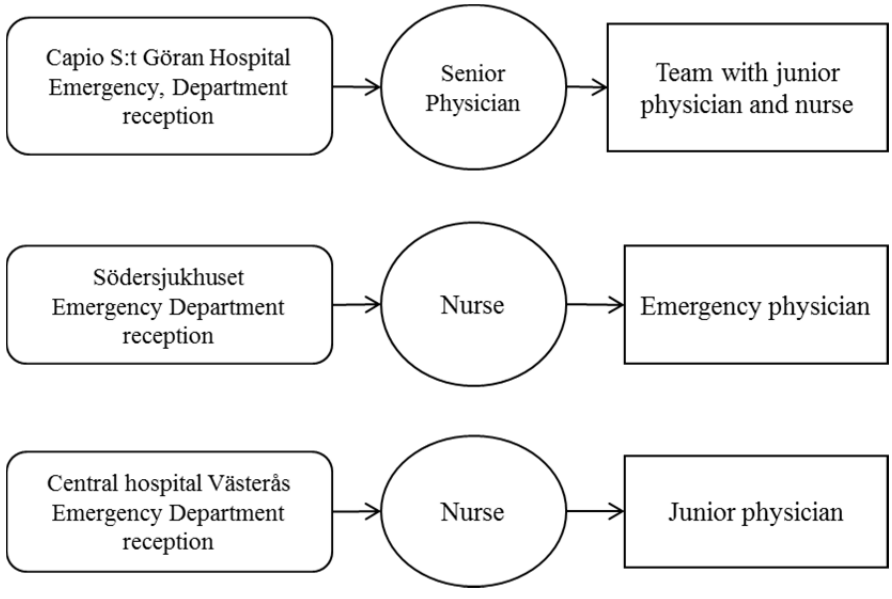


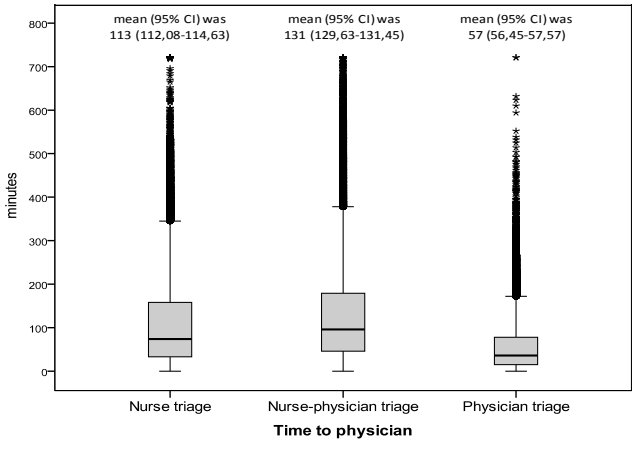
Figure 8. The principal organisation of the three triage models studied

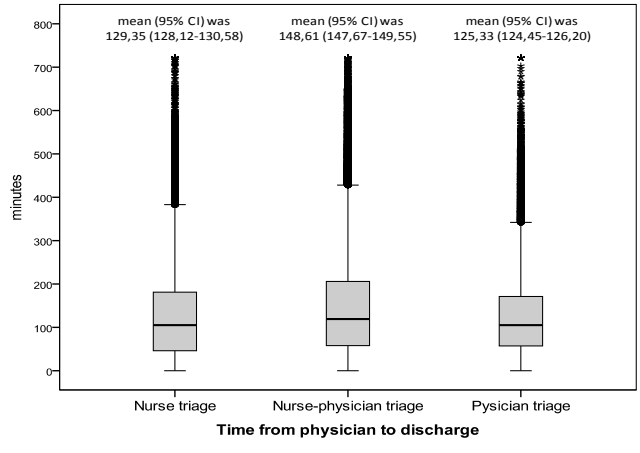
Results

Efficiency outcome

The median LOS of 158 minutes was shortest in the ED with physician triage but was 39 minutes longer in the ED with nurse triage and a further 46 minutes longer (i.e., 85 minutes longer than physician triage) in the ED with nurse–physician triage (Figure 9). The time from physician to discharge constituted the main part of LOS and differed only slightly between the EDs.

The major differences in LOS resulted from differences in time to physician. We also adjusted our model in the linear regression analysis of waiting time for the confounders, mode of arrival, sex, age and originating hospital. The only variable associated with waiting time was female sex. In the model with nurse–physician triage as the reference, both EDs with nurse triage and physician triage had shorter waiting times. The components in the regression models explained 9.2% of the differences in time to physician. A similar pattern was found in an adjusted LOS regression model. Compared with the EDs with nurse–physician triage and nurse triage, the ED with physician triage had shorter LOS. Female sex and age >80 years were related to LOS. A significantly higher percentage of patients seen in the ED with physician triage were treated within 4 hours compared with the other ED triage models.





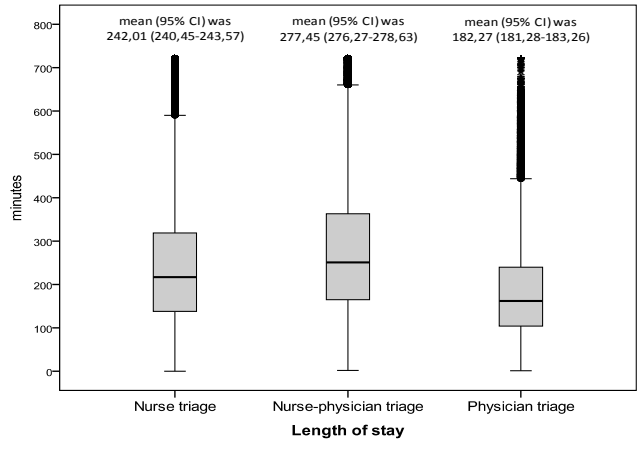


Figure 9. LOS and its time components at the three EDs.

Patient safety outcome

The ED with physician triage had the lowest percentage of patients leaving the ED before treatment was completed, and the ED with nurse triage had the highest percentage. The percentages of unscheduled returns to the ED within 24 and 72 hours were significantly lower for physician triage compared with the other triage models (Table 2).

The rate of death within 7 days after the first visit to an ED was significantly higher in the EDs with nurse physician triage and nurse triage compared with the physician triage (Table 2). This was also the case for 30-day mortality and within different age groups (Table 5, in paper III). Male sex, age ≥60 years and being treated in an ED with nurse–physician triage were significant predictors of death within 7 days (Nagelkerke R^2=0.093).

Table 2. Quality indicators at the three EDs with different triage models.

	Physician triage		Nurse–physician triage		Nurse triage		Total		p-value
	n	%	n	%	n	%	N	%	
Left before treatment completed	1557	3.1	3566	5.3	3344	9.6	8467	5.6	<0.001
Unscheduled return within 24 hours	649	1.0	1446	2.1	889	2.5	2984	2.0	<0.001
Unscheduled return within 72 hours	1195	2.4	2365	3.5	1304	3.7	4864	3.2	<0.001
Mortality within 7 days after first visit	402	0.8	658	1.0	328	1.0	1388	0.9	<0.001
Mortality within 30 days after first visit	864	1.8	1281	1.9	685	2.0	2830	1.9	<0.001

Paper IV

Materials and methods

This retrospective cross-sectional study involved the ED at a county hospital. The study compared two triage models—the traditional single-nurse triage used in 2008 and physician-led team triage used in 2012.

Participants

In 2008, none of the sections in the ED used physician-led team triage, whereas in 2012, all patients in the internal medicine section were triaged with this model between 09:00 and 20:00 hours, in the orthopaedic section between 10:30 and 16:30 hours, and in the surgical section between 10:00 and 16:00 hours. The times differed between sections because of differences in the availability of senior physicians.

The hospital is a county level II trauma centre located in a minor city and covered a catchment population of 254,000 in 2012. The ED at this hospital had 53,000 attending patients in 2008 and 61,000 in 2012. The hospital serves adults and children in three main specialties: internal medicine, orthopaedics and surgery. The hospital has a fast-track PCI line for patients with myocardial infarction and another fast-track line for patients with stroke.

Data collection

We collected data through the hospital's regular databases, which contained the statistical data for all hospital operations. Data were also extracted from the National Mortality Register.

Triage models used in 2008 and 2012

The triage model used in 2008 included traditional single-nurse triage, in which the patient first met a registered nurse and thereafter was examined by a junior physician. The junior physician could then be assisted by a senior physician, if needed. This model is called nurse triage in this paper. In September 2009, physician triage was introduced in a limited manner to the internal medicine section of the ED. This triage model is flow oriented and was led by a senior physician. In this model, a number of teams are needed

for optimal patient flow. Each team comprises a junior physician, registered nurse and assistant nurse. The team has a detailed protocol for performing standardized work. This model is called physician-led team triage in this paper (Figure 10). During both study years, the ED used a locally modified version of the MTS (47, 49, 52).

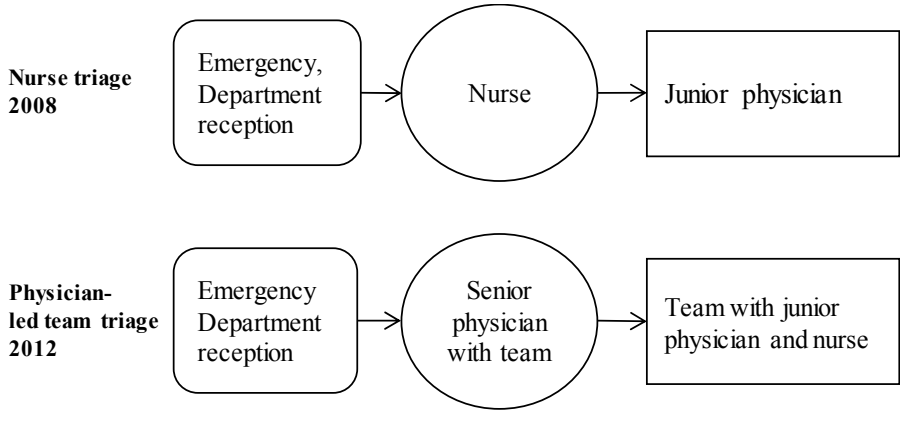


Figure 10. The distribution of chief complaints in the two different study years at the ED.

Results

Efficiency outcome

Time to physician decreased by 47 minutes, and LOS decreased by 34 minutes from 2008 to 2012 (Table 2 in paper IV). Time from physician to discharge, which comprised most of the LOS, was significantly longer in 2012 (Table 2, in paper IV).

The general linear model (GLM), analysing factors predicting waiting time, was adjusted for the following confounders: mode of arrival, sex, age, admission, and study year. Variables associated with time to physician were age group, mode of arrival, hospital admission and study year. The model explained 13% of the differences in time to physician. A similar pattern was found in the adjusted GLM model of LOS. Variables associated with time from physician to discharge were sex, age group, hospital admission and study year. The model explained 6% of the differences in time to physician. Notably, the differences between the study years were more evident in the model of LOS compared with time from physician to discharge.

To investigate further the effect of the introduction of physician-led team triage, we used GLMs to compare the main effects of the type of triage (physician-led team triage vs nurse triage) and triage time (physician-led team triage time vs nurse triage time) and their interaction effects. We found main effects of the type of triage (superior physician-led team triage vs nurse triage; $F=468.883$, $p<0.001$) and triage time (significantly shorter physician-led team triage time vs. nurse triage time; $F=255.413$, $p<0.001$). Most importantly, there was a significant interaction effect between the type of triage and LOS ($F=154.322$, $p<0.001$), indicating that when adjusted for LOS during nurse triage, the effect of the introduction of physician-led team triage had a significant effect on the LOS (Figure 11). As shown in Figure 11, there was a profound decrease in the LOS during physician-led team triage in 2012 compared with nurse triage.

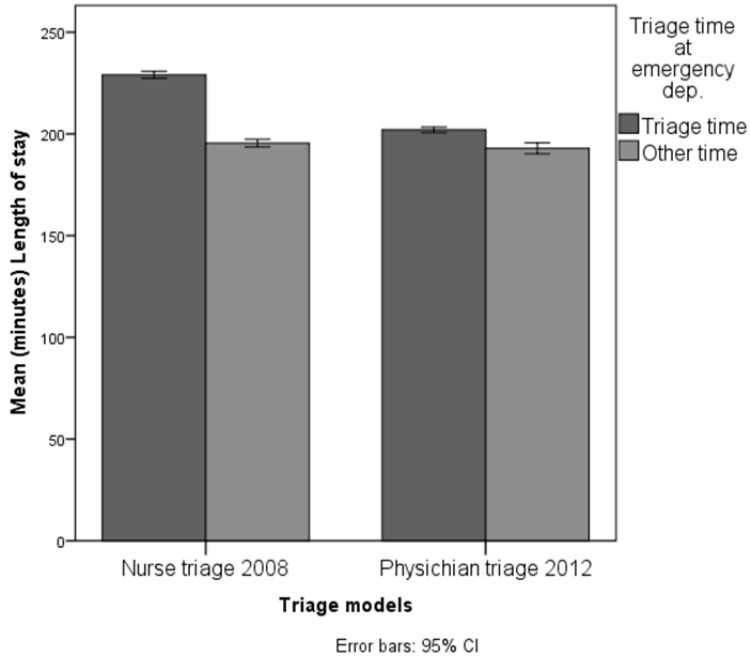


Figure 11. Illustrates the differences in length of stay in the ED as a function of physician vs nurse-led triage, adjusted for triage and time of the day.

Patient safety outcome

All outcome variables, LWBS, unscheduled return (24 and 72 hours), admission rate, and 7- and 30-day mortality improved significantly from 2008 to 2012 (Table 3).

Table 3. Quality indicators at the ED during the two study periods involving different triage models.

	Nurse triage, 2008		Physician triage, 2012		p-value
	n	%	n	%	
Left before treatment completed	444	2.2	360	1.5	<0.001
Unscheduled return within 24 hours	1112	5.5	499	2.1	<0.001
Unscheduled return within 72 hours	1654	8.2	762	3.2	<0.001
Mortality within 7 days after first visit	195	1.0	133	0.6	<0.001
Mortality within 30 days after first visit	415	2.0	367	1.5	<0.001
Admitted patients	7498	37.0	7605	32.0	<0.001

Based on the results of the univariate analysis, the multivariate logistic regression models were adjusted for mode of arrival, sex, age, admission, and study year. The effects of study year after adjustments are shown in (Table 4 in Paper IV).

The multivariate model showed a 38% lower probability for LWBS (odds ratio (OR)=0.62, 95% Confidence interval (CI)=0.54–0.72) in 2012. Females had a 22% lower probability for LWBS than men in 2012 (OR=0.78, 95%, CI=0.67–0.90). The model explained 13% of the variation in LWBS.

The percentages of unscheduled returns to the ED within 24 and 72 hours were significantly lower in 2012 compared with 2008, with 64% for both times (OR=0.36, 95% CI=0.32–0.40 for 24-hour return). The attendants in the age group 45–64 years had a higher probability for unscheduled return within 24 and 72 hours in 2012 compared with the other age groups (OR=1.50, 95% CI=1.25–1.75 for 24-hour return).

The mortality within 7 days was significantly lower in 2012 compared with 2008 (OR=0.72, 95% CI=0.59–0.88), and the probability of death was 30% lower for females than for males (OR=0.70, 95% CI=0.57–0.86). The probability of death within 7 days was three times higher for those arriving by ambulance (OR=4.5, 95% CI=3.56–5.72) and was higher for those admitted (OR=1.52, 95% CI=1.21–1.94). The multivariate model explained 17.4% of the variation in 7-day mortality.

The mortality within 30 days after the first visit to the ED was significantly lower in 2012 (OR=0.84, 95% CI=0.73–0.97), with a 20.0% degree of explanation. Females had 24% less probability of dying within 30 days (OR=0.65, 95% CI=0.65–0.87). Patients who arrived by ambulance or were admitted had a 2.7 and 2.0 increased probability of dying within 30 days, respectively (OR=2.78, 95% CI=2.39–3.25) and (OR=2.03, 95% CI=1.72–2.39).

Compared with the triage model in 2008, the triage model in 2012 had significantly lower percentages of patients leaving the ED before treatment was completed, lower percentages of unscheduled returns to the ED within 24 and 72 hours, and lower rates of death within 7 days and within 30 days after the first visit to an ED (Table 3, paper IV).

Statistics

For all statistical analyses, p-values ≤0.05 were considered significant, and all tests were two-tailed. The statistical analyses were performed using SAS statistics software (Paper I) and SPSS version 20.0 (Papers III and IV). A summary of the analyses used is presented in Table 4.

Table 4. Analyses used in studies I–IV in the thesis.

Statistical method	Paper I	Paper II	Paper III	Paper IV
Binomial test	X			
Chi-square test			X	X
t test				X
Analysis of variance (ANOVA) with Scheffé post hoc test,			X	X
Mann–Whitney *U* test				X
Kruskal–Wallis test			X	
Multivariate binary logistic regression			X	X
Linear regression			X	X
Multivariate GLM				X
Grounded theory		X		

The binominal test was used to analyse the proportions of positive scores at baseline and follow-up, by occupation or by type of hospital (Paper I).

The chi-square test was used to analyse differences between the hospitals in terms of the percentages of patients in different age groups and those spending <4 hours in the ED, and for the analysis of quality indicators. The chi-square test was also used to analyse differences between the hospitals in the percentages of patients in different age groups in relation to mortality within 7 and 30 days. The chi-square test was used to identify differences between the different triage models for the percentages of patients in

different age groups and the quality indicators: LWBS, unscheduled return within 24 or 72 hours, and 7- and 30-day mortality (Papers III and IV).

***t* tests** were used to compare differences between two group; sex, admission (yes or no), and mode of arrival in relation to the measured efficiency variables between the two study periods (Paper IV).

ANOVA was used to analyses differences in three or more group comparison between age groups, for time to physician and LOS, and between clinics in the two study years. When significant differences were found, Scheffé's post hoc test was used to identify which age groups, study years and clinics differed significantly (Papers III, IV).

The Mann–Whitney *U* test was used for analyses in two-group comparison of time to physician and time from physician to discharge between years, as those variables exhibited a skewed distribution of attendants and age groups (Paper IV).

The Kruskal–Wallis test was used to investigate differences between hospitals caused by skewed distributions of time variables (Paper III).

Multivariate binary logistic regression models were used to identify predictors for LWBS, unscheduled return within 24 or 72 hours, and 7- and 30-day mortality (Papers III, IV).

Linear regression was used to find predictors for the time to physician and LOS (Papers III, IV).

Multivariate general linear models GLMs were used to identify predictors of the time to physician and LOS (Paper IV).

Grounded theory is a set of rigorous research procedures leading to the emergence of conceptual categories. These concepts/categories are related to each other, as a theoretical explanation of the action(s) that continually resolves the main concern of the participants in a substantive area (Paper II).

Ethical considerations

The participants in Papers I and II were given oral and written information about the purpose and procedures of the study. The information included the option of refusing to participate. The participants in the focus groups were asked for and were informed that they were free to withdraw from the study at any time and without having to declare any reason. Participants gave verbal consent before the interviews. Ethical approval was obtained from the Regional Ethics Review board at Uppsala University, Uppsala, Sweden, for all studies: Papers I–III, approval number 2009/414; Paper IV, approval number 2013/006.

Discussion

This thesis highlights the importance of patient safety within the ED. Patient safety is a main concern because of the special purpose of the ED and the vulnerability of the patients. Patient safety is influenced by a culture characterized by waiting, which may be caused by several reasons. The importance of efficient quality care for the patients, and the possible conflict between improving patient safety while also reducing waiting time was also highlighted. The four studies have examined these partly conflicting aspects from different perspectives. Reflections drawn from the surveys are discussed in the following section, which is divided into three parts: culture, waiting, and outcome in terms of efficiency and quality.

Culture

Patient safety culture is important for good performance in health care (3). Singer el al. showed that there is empirical evidence of a link between safety climate and safety performance at hospital level (30). Because of the difficulty in defining the measurable components of patient safety culture, we used one of the established patient safety climate questionnaires (HSOPSC). Blegen et al. have concluded that the questionnaire, seem to be moderately reliable and valid at both the individual respondent level and the unit level, for which the questionnaire was designed (25). However, they showed that the tool was sensitive to differences between hospital units and to differences over time and across disciplines. This tool can therefore be used to describe differences in each dimension of the safety climate across time, discipline, unit, or institution. Nygren et al. showed that health care leaders who hold strategic positions in patient safety work emphasize organisational culture as a support mechanism for reporting of adverse events and for avoiding blaming of individual practitioners (131). Importantly, a change of culture requires time-consuming engagement from health care workers and, importantly, good management (132).

When it comes to analysis of the results of a survey of safety climate, as used in this thesis, it is particularly important to consider that the results can be regarded only as an indicator of the safety climate of the ED and cannot explain the total patient safety culture.

The main finding of the thesis was that the staff at both hospitals scored more positively in the dimension *Team-work within hospital* after implementing the QI project according to a new working model aimed at improving patient flow and improving patient safety in the ED. An improvement was also seen in the dimensions *Communication openness* at the county hospital and *Team-work across units* at the university hospital. The improvement for the dimensions *Team-work across units* and *Team-work within hospital* can likely be explained by the QI project based on lean principles. Muntlin et al. showed that work in multi-professional teams seems to contribute to QI in the ED (133).

For the two overall dimensions *Patient safety grade* and *Overall perception of patient safety*, there was a tendency for both physicians and registered nurses/assistant nurses to estimate a lower value after the QI project. An exception to this tendency was the physicians at the county hospital, who gave a significantly higher value for *Overall perception of safety*. This higher score may be explained by the introduction of senior physicians instead of junior physicians in the triage front line; for example, this may have provided a better overview of the patients than in the previous model. The same explanation may be valid for the scores for *Patient safety grade*. Although both groups at the county hospital scored lower at the follow-up, the physicians scored higher than the registered nurses/assistant nurses.

Another finding was that the staff at the university hospital scored lower than the staff at the county hospital in the dimension *Feedback and communication about error* at the follow-up. At the university hospital, the initiative for the QI project was a top-down decision. Our findings demonstrate the important role of the hospital management in improving patient safety. Zohar et al. showed that a security commitment of top management and supervisors led to a better safety climate and to fewer accidents (134).

In the Swedish manual for the HSOPSC, an index of <50 is considered low and should lead to action, 51–69 suggests potential for improvement, and ≥70 indicates that the unit is functioning well according to the answers in respectively dimension. Although there were only minor differences from before to after the QI, the generally low scores indicate the need for action and improvement (Table 5). Un-published data at the Swedish national level showed that EDs in general have lower overall scores in the HSOPSC than other clinics.

Table 5. Number of dimensions from the HSOPSC, before and after a QI project. Classifications with respect to index and suggestions to action.

County hospital	**Before**			**After**		
Index*	**<50**	**51–69**	**≥70**	**>50**	**51–69**	**≥70**
All staff, 14 dimensions**	11	3	0	10	4	0
Physicians, 14 dimensions**	11	2	1	11	3	0
Nurse/assistant nurse, 15 dimensions**	12	3	0	11	4	0
University hospital	**Before**			**After**		
Index*	**<50**	**51–69**	**≥70**	**<50**	**51–69**	**≥70**
All staff, 14 dimensions**	10	2	2	10	2	2
Physicians, 14 dimensions**	7	4	3	10	2	2
Nurse/assistant nurse, 15 dimensions**	11	3	1	10	3	2

* Index <50 is considered low and should lead to action, 51-69 suggest potential for improvement, and ≥70 indicates that the unit is functioning well according to the answers in respectively dimension.

** The 51 questions were grouped in 15 dimensions: 14 dimensions for physicians and 15 for nurse/assistant nurse in the current study; 14 dimensions were used when all staff categories were grouped together.

County hospital

There were only a few positive differences between the baseline and follow-up, which may be explained by a limited effect of the QI project itself. At the follow-up, eight dimensions differed between the physicians and the nurses/ assistant nurses. The physicians scored higher in seven dimensions: *Non-punitive response to error*, *Staffing*, *Hospital management support for patient safety, Team-work across hospital units, Information and support to patients at adverse events, Overall perception of safety*, and *Patient safety grade*. The improved results for the physicians at the county hospital in the dimensions *Overall perceptions of safety, Team-work within unit* and *Organisational learning–continuous improvement* may indicate better control and supervision of the patients and patient flow.

After the QI project senior physicians worked in a team in the front line instead of the previous regimen with initial nursing triage and junior physicians at the second stage. The co-operation between staff groups also increased, which can be seen in the improvement in the dimension *Communication openness* in both groups and the higher score for physicians at follow-up. These indicators may also explain why physicians scored higher than registered nurses/assistant nurses after the QI project. Differences between types of personnel were also shown in a study by Singer et al. (135). Among the clinical staff, nurses gave more pessimistic responses than physicians.

The fact that registered nurses/assistant nurses had increases in their scores in the dimensions *Safety culture dimension unit level* and *Communication openness* may be explained by the new triage model at the county hospital and the emphasis on team-work. Improved team-work is beneficial for communication, and vice versa (15). This may explain the positive result for the dimension *Communication openness* at the county hospital. Failures in communication and team-work are considered to be frequent contributors to medical injuries in health care (14). One explanation for the few positive differences between the baseline and follow-up may be that the QI project had not been implemented fully at the county hospital at the time of the follow-up and that only 1 year had elapsed between the completion of the QI project and the follow-up.

University hospital

The physicians at the university hospital scored lower in the dimension *Staffing* compared with the registered nurses/assistant nurses. This may be interpreted as an expression of the increased work-load, as well as difficulties in having a specialist in place in every team. An additional explanation may be differences in experience of the staff at the unit between the baseline and follow-up. At the follow-up, a higher percentage of physicians had worked in the ED for less than 1 year.

Registered nurses/assistant nurses scored *Team work within hospital* higher at the follow-up, which was in accordance with the physicians' scores. Both groups employed in the ED at the university hospital responded similarly according to working conditions. They all shared the same daily environment and the same values set by the department. One of the dimensions, *Patient safety grade*, was scored higher by the physicians at both the baseline and follow-up compared with the registered nurses/assistant nurses. This may reflect the physicians' role in the team; i.e., in contrast to the registered nurses/assistant nurses, the physicians are in control of the patients' treatment plans and thus are able to plan the next move. It is also possible that the treatment plan may not always be communicated adequately to the team.

The poor results for *Patient safety grade* at the university hospital may be explained by the top-down initiation of the change process and hence the lack of support at the unit level. As the main purpose of the project was to improve patient flow and the working environment, the aspect of patient safety may not have been communicated very clearly to the staff.

The HSOPSC used in the QI project

Some of the studies using HSOPSC have focused on the instrument's validity in different countries, and there are a few studies of the HSOPSC questionnaire for evaluation of QI (24, 123, 136-138). Some of these studies were ordinary QI projects and others used the TeamSTEPPS system for communication and team training (14, 100, 139, 140). One study reported positive effects on two of 12 dimensions of HSOPSC: *Frequency of event reporting* and *Organisational learning* (14). Another study showed positive changes in four dimensions of HSOPSC: *Team-work within unit, Feedback and communication*, *Communication openness* and *Overall patient safety grade* after a QI project using the same TeamSTEPPS training program (140). In a study at five hospitals, Hellings et al. found improvement in only one dimension: *Hospital management support for patient safety* (100) after implementation of action plans such as improving medication safety.

Barriers to achieving successful QI in the ED

Several barriers must be overcome to achieve successful QI in the ED. Firstly and most importantly is the problem of overcrowding. The steady increase in patient numbers in recent years may have had a negative impact on improvement processes. The high numbers of patients presenting at the ED increase the work-load for staff and reduce the time for reflection and improvement projects.

Problems in leadership and working organisation are two other important barriers to improving patients' input, throughput and output (77, 141). To address these barriers, we need to understand the strengths and weaknesses of the different triage models and to identify which model provides for faster patient flow through the ED. Even if there is a good working model in the ED, we have to overcome the most important problem of an insufficient number of hospital beds. Often, this leads to non-acceptable waiting time for the patients in the ED, which by itself is a barrier to successful QI and frustrates the staff. Such a working situation makes it difficult to convince the staff to accept top-down projects.

Implementing QI projects in a beneficial way requires clear action programmes. Including a questionnaire, as we did in our study, initiates expectations about what the coming process might lead to in terms of changes. Later, implementation of a change, especially if it is relatively small, may

make staff feel disappointed. In retrospect, such precautions were not taken which may have contributed to the modest results shown in Paper I.

Waiting

Reducing waiting times may be necessary for two reasons. Firstly, it is medically necessary for the acute cases requiring rapid treatment and, secondly, it is socially necessary because waiting is also an experience that may be affected by the actions taken by staff. Perceived waiting can lead to anxiety and worry (142, 143), and even anger and wrath (144, 145). The issue of social necessity to reduce the experience of waiting also raises the issue of the deeper meaning of waiting, which has been the subject of discussion. The American sociologist Robbins believes that it is possible to affect a person's experience of waiting with various interventions. The wait itself is basically neutral, but depending on the situation, it can be perceived as either negative or positive. It is thus the situation and circumstances that determine the person's way of relating to waiting (146).

From the perspective of the not-too-urgent patients and their relatives, the ED visit may be characterized by waiting, uncertainty, uneasiness and irritation. The non-acceptable waiting elicits emotions such as fear and anxiety, and irritation may arise when the waiting time is long. Fear signals threat to life and limb. Anxiety signals social characteristics, such as insecurity, which, when recognized by the staff, can affect their behaviour. The negative impacts of waiting and crowding may lead to a delay in medical evaluation, thereby affecting patient safety. Long waiting times may lead to medical and emotional risks that adversely affect the patients' health status (147). The main finding in this thesis was that the new triage model in the ED affects patient safety, efficiency and quality measures. The QI project performed at the hospital focused on the reception of patients, but there are obviously more areas that can affect patient safety. Changes in waiting time and treatment time in the ED are good indicators of how the patient safety culture changes. Morello et al. advocate that ideally, patient safety culture strategies would benefit from evaluation using quantitative and qualitative methodology (18). This quantitative study prompted us to conduct a qualitative study on our county hospital's ED to find out what really happens on a typical day in the ED.

In accordance with classic grounded theory, the qualitative analyses in Paper II found that the management of non-acceptable waiting was central to the ED staff in terms of patient care. The staff acts to reduce the negative effects of crowding. By managing the patients' fears and worries, the staff seems to be eager to care for patients as soon as they enter the waiting room. The

patients and the staff interact with each other, creating a bilateral dependency. The staff needs signals from the patients, and the patients need signals from the staff. This is a part of the process control in the ED (148) that can increase patient satisfaction, particularly if patients are informed about the expected waiting time (149).

Paper II showed that the staff focused on preventing non-acceptable waiting and identified the emotions of staff and their reactions when they failed to increase throughput or alter their patients' perceptions of non-acceptable waiting. The ability to influence the experience of waiting differs between the objective "clock time" wait and the subjective anticipation of time. Knowing these dimensions seems to be important to the safety culture in the ED. It was obvious that the staff distinguished between actually measured waiting time and perceived waiting time, and that the perceived waiting is the one easiest to influence (150). Not surprisingly, the management of waiting time plays an important role in the level of patient satisfaction (151).

The subjective and relational dimensions of waiting are important for understanding the safety culture. The social treatment of patients considered by the staff to experience non-acceptable waiting requires emotional and relational skills by the staff—so-called "emotion management" (152). The subjective experience can affect employees' behaviour and thereby the safety culture. The perceived difference between an acceptable and non-acceptable waiting time, and the actions taken by staff to reduce non-acceptable waiting, raises the question of what waiting actually is (146). Our study adds some knowledge to this field.

Outcomes of efficiency and quality

In the absence of other obvious explanations, we found different outcomes for efficiency and quality variables with different triage models (Paper III). Physician-led team triage positively affected the reception of patients at the EDs and improved efficiency and quality outcomes (Papers III and IV).

The results in Papers III and IV indicated that with the physician-led team triage, more patients left the ED before the 4-hour target after the QI project. This 4-hour target has been decided and implemented by several governments in Western societies (74, 108). However, such national targets are controversial, not least because of problems with ED crowding.

Triage model and efficiency indicators

Paper III: comparison of the three EDs

The time from physician to discharge was significantly longer with nurse–physician triage compared with the other two triage models. There were large differences in several outcome variables between the three EDs with their three different triage models. Overall, having physician triage in the ED that is based on lean principles seemed to be advantageous. A number of studies have shown benefits of having physicians in the front line (57, 153, 154). These findings were not substantially changed after adjustment for well-known confounding factors. Time to physician, time from physician to discharge, and LOS contribute to the ED patient flow. In our study, LOS was significantly shorter with physician triage compared with the other two models. This was explained solely by time to physician because the physician performed the triage. Moreover, the rest of the team was in place, able to perform their tasks according to the standardized protocols at the same time instead of acting in series. In this triage model, which is based on lean principles, a significantly higher percentage of patients were treated within 4 hours, which was in accordance with other studies (155). In one study, in which LOS was assessed in relation to diagnosis, it appeared that there may be risks generated by placing too much emphasis on efficiency measures, such as LOS. The authors highlighted the importance of using multiple measures (156), a requirement that we tried to meet by the simultaneous measurement of quantitative and qualitative outcome measures.

Paper IV: comparison between 2008 and 2012 at one ED

We found that physician-led team triage led to a faster input for the patients, more effective throughput with increased quality and more efficient output. The percentages of patients admitted were 37% and 32% in 2008 and 2012, respectively. Time to admission was 34 minutes shorter for the physician-led team triage than for the nurse triage. This shorter time is because the initial assessment of the patient is made by a senior physician, thus allowing for earlier and more accurate decisions about the diagnosis, admission and treatment. Imperato et al. found a similar result when physicians were involved in ED triage (157).

There may be additional opportunities to develop a method for the safer reception of the acutely ill patient in the ED through pre-triage systems in primary care and in pre-hospital settings by using the same triage systems in two or more settings (58). Despite the lower percentage of admitted patients, the 7- or 30-day mortality rates decreased between 2008 and 2012. The LOS was shorter for the physician-led team triage in 2012 compared with the nurse triage in 2008. However, time from physician to discharge was longer

in 2012, which probably reflected the longer time for examination and treatment in the ED in 2012. This may have had a positive impact and may explain the lower LWBS, fewer unscheduled returns within 24 or 72 hours and reduced 7- or 30-day mortality rates. The shorter LOS may also be explained by the specialist physician's greater knowledge and more precise prioritization of the patients' needs (153, 155, 158, 159). In accordance with the political goal of "LOS less than 4 hours", we found that 57% of all patients went through the ED within 4 hours with the nurse triage compared with 68% patients with the physician-led team triage.

Other possible explanations for the differences found between the two years include differences in morbidity or severity of trauma patients. We were unable to identify such dissimilarities. The problem of insufficient in-patient bed capacity and its effects on output cannot be emphasized enough.

Triage model and quality indicator

Paper III: comparison of the three EDs

Patients' leaving before treatment was completed by a physician is a growing concern in overcrowded EDs and is a serious health issue, which may delay care and result in adverse outcomes. Such effects have been seen in other studies; e.g., by Oredsson et al. (49). We found a higher percentage of patients leaving before treatment was completed with both nurse triage and nurse–physician triage compared with physician-led team triage. The prolonged waiting times to be seen by a physician with the nurse triage and nurse–physician triage models might contribute to, or even explain, the higher percentage of patients who left before treatment was completed. This is consistent with the results of an earlier study (160).

Several studies have used the rate of unscheduled return to the ED as a quality performance indicator (111, 161-163). However, there is no consensus on the length of time used to define unscheduled return, which ranges from 24 to 72 hours. In this study, we used both time frames, and unscheduled return was significantly lower for both periods with physician triage for both time frames. The triage model based on lean principles with a senior physician in the first line might well explain this outcome.

Mortality within 7 days after the first visit to the ED was significantly lower, but not impressively so, with physician triage and nurse triage, 0.8 vs. 1.0%, respectively. The difference in 7-day mortality might be explained by the different triage models (112). In the binary logistic regression, we found that male sex, older age and treatment by the nurse–physician triage were predictors of 7-day mortality, although with a very low degree of explanation. The

corresponding mortality within 30 days was 1.8% with physician triage or nurse triage vs. 1.9% with nurse–physician triage, and 2.0% at the ED with nurse triage (164).

Paper IV: comparison between 2008 and 2012 at one ED

Patients leaving the ED before treatment was completed may be at risk because the key tenet of emergency medicine is to provide rapid evaluation and treatment of patients with urgent conditions. We found that fewer patients left without completing treatment after the change in triage model. Patients aged 19–29 years were the most likely to leave without completing treatment during both study years. Similar results have been reported for models using physicians in triage (153, 155, 165).

Moreover, fewer patients returned for an unscheduled visit after 24 and 72 hours in 2012 compared with 2008. The number of patients returning for an unscheduled visit was highest in the 45–64-year-old group in 2008, whereas the 19–29- and 30–44-year-old groups were the largest in 2012. Kuan et al. found that patients younger than 30 years were most likely to return for an unscheduled visit (111). The differences in unscheduled return between age groups may reflect different reasons for the return or the fact that inadequate investigations were conducted at the first visit (e.g., the patients were sent home instead of being observed and treated at the hospital) (113, 161-163). Alternatively, the patients may have received insufficient information and advice at the first visit. The lower number of unscheduled returns in 2012 may indicate that the patients had received the correct advice with the physician-led team triage.

Mortality is the "hardest" outcome measure of all. Increased mortality is associated with crowding (93, 112, 113, 141, 161, 164, 166). Most interestingly, both 7-and 30-day mortality rates decreased from 2008 to 2012 despite a 20% increase in the number of attendants and without a proportional increase in staff. Most likely, the physician-led team triage was a major contributor to the result. This may be explained by factors such as the fact that the patients are met earlier in the process so that decisions about appropriate laboratory tests, radiology examinations and treatment are made sooner and with greater accuracy.

It was remarkable that the increase in qualitative outcome measures paralleled closure of rural hospitals, resulting in an increased number of attendants at the county hospital ED and fewer available beds. One may speculate that, with a constant number of attendants and a constant number of available beds during the two study periods, all outcome measures would have been even better.

Contributing factors

Paper III: comparison of the three EDs

A number of potential contributing and confounding factors warrant discussion.

Hospital characteristics

The percentage of attendants relative to the number of inhabitants in the catchment areas was higher in the ED with nurse–physician triage. This ED is located in a major city, where several EDs are available; thus, the patients not in need of ambulance transportation had an opportunity to choose where to go. Relative crowding at one particularly "popular" ED may at least partly explain the worse outcome measures.

Patient characteristics of age, sex, educational level, mode of arrival and chief complaint, and staff characteristics

The age and sex distribution differed between the EDs. However, the association between these non-independent variables was weak in our multivariate models and was considered to be of no clinical importance.

The two EDs operating in the major city serve quite different populations, as illustrated by the differences in educational levels between the two populations. Patients who attended the ED with physician triage, in a wealthy part of the city, were more highly educated than those attending the ED with the nurse–physician triage. The well-known coupling between low educational level and mortality should be considered here. The socio-economic gradient between the two EDs using physician triage and nurse triage was even greater, possibly explaining a higher demand for hospital resources at the hospital offering nurse triage (167). However, the impact of the socio-economic gradient is difficult to estimate because the freedom for patients to choose between hospitals may either strengthen or weaken the impact of the gradient on outcomes.

The way that patients came to the hospital differed significantly between hospitals. A higher percentage of patients arrived by ambulance at the EDs with physician triage and nurse–physician triage. According to the regression model, as expected, patients arriving by ambulance experienced a shorter time from arrival to physician. However, this association was weak. Obviously, the difference would be attributable to the fact that most of the patients arriving by ambulance would have been given a high priority, which would have reduced the time to physician for physician and nurse–physician triage models and would not contribute to the explanation of waiting time in any significant manner.

The six most common chief complaints at each ED were the same, although there were differences in their order of proportions.

Staff characteristics differed in that there were more nurses and physicians in service at the ED with nurse triage. Still, the outcome measures for this ED were inferior to those of the ED with physician-led team triage. The staffing power of physicians in the first line is often used in the description of the burden in an ED, but there was not a perfect correlation between the staff characteristic and the outcomes in the EDs studied.

Paper IV: a comparison between 2008 and 2012 at one ED

The main difference between the study years 2008 and 2012 was that the number of visitors increased by 20%, whereas the number of hospital beds decreased during the same time. These differences strengthen the positive outcome for 2012. However, other potential contributing factors must also be discussed. In 2012, a higher percentage of patients aged 19–29 years were seen in the EDs, and in 2008 a higher percentage of patients aged ≥80 years were seen in the EDs. These differences may have contributed to the better results in 2012. There were no significant differences between years in the patients' sex or in the mode of arrival. However, as noted above, because of the reduced number of hospital beds, fewer patients were hospitalized in 2012 compared with 2008. There were fewer physicians and nurses/assistant nurses in 2012. Those differences make the outcome for 2012 even more impressive.

To our knowledge, there have been no major "evolutions" that may have significantly affected the outcomes in Paper IV. Medical development (e.g., the use of faster diagnostic instruments, such as ultrasound) did not seem to progress much between the two periods. Other factors may have changed over the years, but these have not been identified.

Strengths and limitations

Paper I

The strength of paper I is the high response rate in both study years. The internal loss of answers was <5% in total.

The study was based only on a self-reported questionnaire. Thus, the reliability should be considered, particularly the risk of information bias because of false or omitted answers. One limitation of this study was that 10–15% of responders chose a middle alternative (neither/nor). This may reflect that

some questions, covering special situations, were not relevant to every individual.

Other limitations of this study are that the study groups were not quite identical at baseline and follow-up, and that a higher percentage of physicians at the university hospital had worked in the ED for <1 year.

Paper II

The strength of grounded theory, as an explorative method, is that it makes it possible to generate new theories, models, and understandings. Grounded theory is a method for generating theories and thus is not a method for testing theories.

One limitation is that the participant observation data is from one ED only. The strength and generalizability of our proposed waiting management theory must be explored in future research.

Papers III and IV

The main strength of Papers III and IV was the high number of patients included with few missing data. From a statistical point of view, the study populations may be regarded as the total population rather than as a sample. Thus, the data may be considered to be highly trustworthy. It must be emphasized that the high number of subjects could mean that small differences between groups or years would be statistically significant without being clinically meaningful.

Another strength of Papers III and IV was that we included several important efficiency and quality indicators, which make our analyses robust and consequential.

A less obvious strength of Paper IV was that we were unable to identify any factor in the ED or in the entire hospital as powerful as the triage model in predicting outcomes. The critical question is: Did we look hard enough? We believe we did.

The weakness of Papers III and IV was that we had no access to the priority of each patient's medical condition as assessed in the ED. We used the recordings of the patients' chief complaints and noticed that they were equally distributed between the three hospitals in Paper III and between the two years in Paper IV. A problem with the registration of the chief complaint was that it was, to some extent, a subjective consideration. Moreover, it was sometimes registered afterwards or was even missed when there was a high

degree of emergency. The six dominating chief complaints were the same at the three EDs, although there were differences in their proportions. Thus, the impact of different patterns of chief complaints on outcome should be considered with some care. Our own interpretation of the differences seen in the data analyses was that the various triage models had greater impact on the results than any differences in chief complaints.

In Papers III and IV, different individuals recorded the original data during busy working days, which might not have been optimal for data gathering but was necessary given the work-load in the EDs. Moreover, each ED in Paper III had its own computer system, and in Paper IV, different computer systems were used for the two study years. Thus, data management was complicated and cumbersome, but it was not impossible to merge all data into one database that could be secured meticulously.

Conclusions

Paper I

The results showed improvements relating to team-work and communication openness. Most of the improvements at follow-up were seen for the physicians, mainly at the county hospital, whereas overall, the physicians at the university hospital scored higher on most of the dimensions. The low number of positive changes may have been influenced by the lack of team training and communication programs in connection with the implementation of the new work model. Previous studies have shown that such programs are important and that cultural change is challenging and takes time. The time from implementation to follow-up may have been too short to demonstrate any effects on patient safety.

Paper II

A central issue for ED staff is how to reduce waiting times. The postulated model contains suggestions for how this can be done. The main concern is that the waiting time has to be handled in two ways: a reduction in the actual time and a change in the patients' waiting experiences from being non-acceptable to acceptable. When waiting times are experienced as non-acceptable, various steps are taken involving two types of effort: increasing the patient flow or changing the waiting experience for the patient.

Paper III

We found better results for the ED with physician-led team triage based on lean principles, as expressed in terms of both efficiency and quality aspects. The chosen triage model was most likely a major contributor to the result.

Paper IV

Physician-led team triage seemed to be the crucial factor responsible for the noted increase in efficiency and quality. The lower percentage of patients leaving before completing treatment, fewer unscheduled returns and fewer deaths within 7 and 30 days indicate greater patient safety for physician-led team triage in the ED.

This thesis presents four studies that together underscore the need to improve patient safety in the ED. It is important for patient safety culture to reduce patient waiting because it dynamically affects both patients and staff. A triage model with physician-led team triage, based on lean principles, may be a model that can promote and improve patient safety.

Future studies

This thesis contributes to the knowledge about patient safety in EDs in terms of culture, waiting, and outcomes of efficiency and quality.

However, further research is needed to examine several aspects of patient safety. Some areas of special interest are described below.

- To compare patients with the same chief complaint who are assessed with the same triage instrument through the entire acute process (including pre-hospital care such as medical information by telephone or ambulance care) with patients only triaged upon arrival at the ED, according to patient safety outcome.

- To use grounded theory to explore patients' perceptions of the safety culture in the ED, with a focus on waiting.

- To explore how socio-economic and socio-demographic factors affect the outcomes of emergency patients.

- To study the ongoing discussion about patients with inappropriate conditions attending the ED and how they affect the ED in terms of overall efficiency and quality.

Summary in Swedish (Sammanfattning)

Det övergripande syftet med avhandlingen var att få ytterligare kunskap om patientsäkerheten på en akutmottagning (AM) med avseende på personalens upplevelse av patientsäkerhetskulturen, väntan för patienterna, effektivitet och kvalitet när det gäller genomströmning och omhändertagande av patienterna.

Vad gäller effektivitet och kvalitet så har vi studerat hur olika triage-modeller påverkar patientsäkerhetskulturen och patienternas väntan på AM. Triage är en process för att sortera och prioritera patienter med utgångspunkt från anamnes och symtom och som har utvecklats under åren för att öka patientsäkerheten.

Patientsäkerhet är ett brett begrepp som omfattar hela vårdsystemet. Patient-säkerhet handlar ytterst om skydd mot vårdskada. Med vårdskada menas kroppslig eller psykisk skada eller lidande som en patient drabbas av i kontakten med hälso- och sjukvården. Patientsäkerhet är kärnan i begreppet kvalitet i vården.

Delarbete I. Syftet var att beskriva hur patientsäkerhetskulturen uppfattas av personalen på AM vid två sjukhus efter ett kvalitetsförbättringsprojekt.
Båda sjukhusen, ett länssjukhus och ett universitetssjukhus, genomförde en förändring av triage-modellen på respektive AM. Förändringen innebar en övergång från triage av en sjuksköterska till en flödesorienterad arbetsmodell med teamarbete och lean-principer för att minska tiden till första kontakt med läkare och även den totala tiden på AM. Den avgörande skillnaden mellan modellerna var således att patienterna först togs emot av en specialistläkare med team i den nya modellen medan patienterna i den ursprungliga modellen först bedömdes av en sjuksköterska.

Mätningarna gällande patientsäkerhetskulturen utfördes före och två år efter införandet av den nya modellen. Mätningarna gjordes med den amerikanska enkäten HSOPSC (Hospital Survey On Patient Safety Culture), som är översatt och validerad i Sverige, och heter ”Att mäta patientsäkerhets-kulturen”. Samtliga anställda och de som frekvent arbetade på mottag-ningarna deltog i undersökningen.

Resultatet visade endast små förändringar av den självskattade patientsäkerhetskulturen. Vid uppföljningen skattades *Teamarbete inom sjukhus* och *Öppenhet i kommunikationen* mer positivt vid länssjukhuset och vid universitetssjukhuset skattades *Samarbete mellan vårdenheterna* och *Samarbete inom vårdenheterna* mer positivt.

Delarbete II. Syftet var att undersöka vad som händer en vanlig dag på en AM. Ständig jämförelseanalys enligt klassisk grundad teori tillämpades med observationsstudier och intervjuer i fokusgrupper med personal från ett länssjukhus.

Resultatet av studien visade att den huvudsakliga drivkraften bland akutmottagningens personal i denna studie var att minska icke acceptabel väntan, vars kännetecken var fysisk förtätning, kontaktsökande och att kritiska situationer uppstod. Personalen reagerade med frustration, skam och slutligen resignation när de inte kunde minska icke acceptabel väntan. Att hantera problemet med väntan innebar antingen att man minskade verklig väntetid via ett ökat flöde av patienter genom att ”stöta på i systemet” och flytta runt patienter, eller att man förändrade patienternas upplevelse av väntan genom att lugna dem eller bedriva aktiviteter så att väntan inte skulle kännas lång. Ett exempel på en sådan ”skenmanöver” var att personalen i väntan på läkare försökte se ut att vara upptagen utan att vara det.

Delarbete III. Syftet med studien var att jämföra tre svenska AM med olika triage-modeller med avseende på effektivitet och kvalitetsindikatorer.
De effektivitetsmått som vi studerade var tid till läkare, tid från det att patienten registrerades på AM till utskrivning alternativt tiden till inläggning på sjukhus.

Resultatet visade bl.a. att mediantiden från det att patienten träffade läkaren till utskrivningen från AM var 158 minuter för akutmottagningen med triage-modellen specialistläkare med team, jämfört med 243 minuter för triage-modellen med sjuksköterska i första ledet efterföljd av akutläkare och 197 minuter för sjuksköterska i första ledet och underläkare därefter.
Olika kvalitetsindikatorer studerades. Ett exempel var andelen patienter som lämnade akutmottagningen innan behandlingen avslutades. Detta kvalitetsmått skiljde sig klart åt mellan de olika AM. Andelen oavslutade patienter var 3,1 % för AM med modellen specialistläkare med team, 5,3 % för sjuksköterska i första ledet efterföljd av akutläkare och 9,6 % för sjuksköterska i första ledet och underläkare därefter.
Resultatet gällande andelen patienter som återkom inom 24 timmar var signifikant lägre för AM med specialistläkare med team: 1,0 %, jämfört med 2,1 % för sjuksköterska i första ledet och akutläkare därefter och 2,5 % för sjuksköterska i första ledet och underläkare därefter.

Dödligheten inom 7 dagar var 0,8 % för AM med specialistläkare med team och 1,0 % för de två andra AM.

Studien visade att en mottagande organisation med teamarbete ledd av specialistläkare med arbete enligt lean-principer visade sig vara överlägsen de andra två modellerna gällande såväl effektivitet som kvalitet. Inga andra betydelsefulla faktorer för utfallet kunde identifieras.

Delarbete IV. Syftet med denna studie var att jämföra effektivitet och kvalitetsindikatorer under två hela år, 2008 och 2012, före respektive efter byte av triage-modell vid en AM. Patienternas tid till att träffa en läkare och tiden för den totala vistelsen på AM studerades jämte samma kvalitetsutfall som i Studie III.

Före förändringen bedömdes patienterna först av en sjuksköterska, och därefter togs de omhand av en underläkare. Efter förändringen bedömdes patienterna först av en specialistläkare, därefter togs de omhand av ett team bestående av en sjuksköterska och en underläkare.

Resultatet visade att tiden från registrering till att träffa läkare minskade från 2008 till 2012 med 47 minuter, och tiden för hela vistelsen på AM minskade med 34 minuter.

Flera kvalitetsvariabler skilde sig åt mellan de två studerade åren till förmån för 2012. Färre patienter lämnade AM innan behandlingen avslutades, färre patienter återkom till AM inom 24 respektive 72 timmar och färre dödsfall noterades inom 7 och 30 dagar efter besöket på AM. Alla resultat var statistiskt signifikanta.

Studien visade att specialistläkare med ett team bestående av sjuksköterska och underläkare verkade ha en avgörande betydelse för en förbättrad effektivitet och kvalitet. Inga andra betydelsefulla faktorer för utfallet kunde identifieras.

Sammanfattningsvis innehåller denna avhandling fyra studier som tillsammans understryker behovet av att förbättra patientsäkerheten på AM. En triage-modell med specialistläkare med team enligt lean-principer kan vara en mottagandeform som befrämjar patientsäkerheten. Det är viktigt att minska patientens väntan, eftersom den påverkar både patienter och personal, såväl medicinskt som emotionellt.

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Appendix

- HSOPSC Questionnaire used in Paper I

Hur arbetar vi med patientsäkerhet?

Med den här enkäten vill vi få dina synpunkter på frågor som rör patientsäkerheten på din vårdenhet. Syftet är att få underlag för förbättringsarbete.

Definitioner

Ta del av definitionerna innan du besvarar frågorna

Vårdskada lidande, obehag, kroppslig eller psykisk skada, sjukdom eller död som orsakas av hälso- och sjukvården och som inte är en oundviklig konsekvens av patientens tillstånd

Negativ händelse händelse som medfört vårdskada

Tillbud händelse som hade kunnat medföra vårdskada

Avvikelse negativ händelse eller tillbud

Risk möjligheten att en negativ händelse skall inträffa

Patientsäkerhet skydd mot vårdskada (SOSFS 2005:12)

Vårdenhet en organisatorisk enhet som tillhandahåller hälso- och sjukvård. Vårdenhet kan vara t.ex. vårdcentral, klinik, basenhet, mottagning, vårdavdelning eller motsvarande (Modifierat från Socialstyrelsens termbank)

Det är frivilligt att svara, men för att få ett rättvisande resultat är det viktigt att så många som möjligt deltar - dina svar kan inte ersättas av någon annans.
Enkäten tar 15 till 20 minuter att besvara.

- Tänk på att svaren ska återspegla dina egna erfarenheter!
- ***Om inget svarsalternativ stämmer, hoppa över frågan!***
- Om du kryssar fel, stryk över det felaktiga svaret och fyll i det rätta!

Avsnitt A: Din vårdenhet

A1 Arbetar du främst inom? Kryssa i ETT alternativ

1 ☐ Öppenvård
2 ☐ Dagsjukvård
3 ☐ Hemsjukvård
4 ☐ Slutenvård

A2 Vilken typ av vårdenhet arbetar du på? Kryssa i ETT alternativ

1 ☐ Vårdcentral/Distriktssjuksköterskemottagning
2 ☐ Psykiatri
3 ☐ Rehabilitering
4 ☐ Geriatrik
5 ☐ Medicinsk specialitet
6 ☐ Kirurgisk specialitet
7 ☐ Anestesi
8 ☐ Obstetrik och gynekologi
9 ☐ Barn- och ungdom
10 ☐ Akutmottagning
11 ☐ Radiologi
12 ☐ Intensivvård
13 ☐ Laboratorium
14 ☐ Många olika vårdenheter
15 ☐ Annan, ange vilken:

_____

Ange om du instämmer eller inte i följande påstående om din vårdenhet.
Kryssa i ETT alternativ

Tänk på din vårdenhet. (OBS! se defintionerna på s. 1)		**Stämmer mycket dåligt**	**Stämmer ganska dåligt**	**Varken eller**	**Stämmer ganska bra**	**Stämmer mycket bra**
A3	På vår vårdenhet stöttar personalen varandra	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A4	Vi har tillräckligt med personal för att klara arbetsbelastningen	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A5	När det är mycket arbete som måste utföras snabbt arbetar vi tillsammans som team för att få arbetet avklarat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A6	Inom den här vårdenheten behandlar personalen varandra med respekt	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A7	Personalens arbetspass (planerad + eventuell övertid) på den här vårdenheten är längre än vad som är bra för vården av patienterna	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A8	Vi arbetar aktivt för att förbättra patientsäkerheten	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A9	Vi använder personal från bemanningsföretag/tillfällig personal mer än vad som är bra för vården av patienterna	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A10	Personalen upplever att deras misstag läggs dem till last	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A11	Misstag har lett till positiva förändringar här	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A12	Det är ren tur att inga allvarligare misstag sker här	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A13	När det blir hektiskt för någon del inom vårdenheten, kommer vi andra och hjälper till	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A14	När ett tillbud eller negativ händelse (se def. sid. 1) rapporteras känns det som att det är personen som utpekas istället för problemet	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A15	När vi har infört förändringar för att förbättra patientsäkerheten utvärderar vi deras effektivitet	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A16	Vi arbetar under mycket hård press och försöker utföra alltför mycket, alltför snabbt	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A17	Vi gör aldrig avkall på patientsäkerheten för att hinna mer	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A18	Personalen oroar sig för att de misstag de gjort sparas i personalakten	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A19	Vi har problem med patientsäkerheten inom den här vårdenheten	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
A20	Våra rutiner och system är bra på att förhindra att fel inträffar	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Avsnitt B: Din närmaste chef

Tänk på din vårdenhet. Kryssa i ETT alternativ (OBS! se defintionerna på s. 1) Ange om du instämmer eller inte i följande påstående om din närmaste chef		**Stämmer mycket dåligt**	**Stämmer ganska dåligt**	**Varken eller**	**Stämmer ganska bra**	**Stämmer mycket bra**
B1	Min närmaste chef ger beröm när han eller hon ser att en uppgift utförs i enlighet med fastställda patientsäkerhetsrutiner	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B2	Min närmaste chef beaktar på allvar personalens förslag till förbättringar av patientsäkerheten	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B3	När arbetsbelastningen ökar vill min närmaste chef att vi ökar tempot, även om det innebär att vi måste ta genvägar	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
B4	Min närmaste chef låtsas inte om de patientsäkerhetsproblem som uppträder om och om igen	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Avsnitt C: Kommunikation

Tänk på din vårdenhet. Kryssa i ETT alternativ (OBS! se defintionerna på s. 1)		**Stämmer mycket dåligt**	**Stämmer ganska dåligt**	**Varken eller**	**Stämmer ganska bra**	**Stämmer mycket bra**
C1	Vi får återkoppling om de förändringar som genomförs baserade på avvikelserapporter	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C2	Personalen säger, utan att tveka ifrån, om de ser något som kan påverka vården av patienterna negativt	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C3	Vi informeras om de misstag som görs inom vår vårdenhet	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C4	När de med högre status/ställning tar beslut eller utför handlingar vågar personalen ifrågasätta	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C5	På den här vårdenheten diskuterar vi hur vi ska undvika att fel inträffar igen	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
C6	Personalen är rädd för att ställa frågor när något inte verkar stå rätt till	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Avsnitt D: Benägenheten att rapportera händelser

Tänk på din vårdenhet. Kryssa i ETT alternativ (OBS! se defintionerna på s. 1)		**Aldrig**	**Sällan**	**Ibland**	**Oftast**	**Alltid**
D1	När ett misstag inträffar och rättas till innan det påverkar patienten, hur ofta rapporteras det?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D2	När ett misstag inträffar som inte kan skada patienten, hur ofta rapporteras det?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
D3	När ett misstag inträffat som hade kunnat skada patienten, men inte gjorde det, hur ofta rapporteras det?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Avsnitt E: Generell bedömning av patientsäkerheten

Gör en generell bedömning av patientsäkerheten på din vårdenhet. Kryssa i ETT alternativ

Utmärkt	Mycket bra	Acceptabel	Mindre bra	Dålig
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Avsnitt F: Ditt sjukhus eller motsvarande

Ange om du instämmer eller inte i följande påstående. Kryssa i ETT alternativ

Tänk på ditt sjukhus eller motsvarande		Stämmer mycket dåligt	Stämmer ganska dåligt	Varken eller	Stämmer ganska bra	Stämmer mycket bra
F1	Sjukhusledningen eller motsvarande har skapat ett arbetsklimat som främjar patientsäkerheten	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F2	Vårdenheterna inom sjukhuset eller motsvarande kan inte samverka på ett bra sätt	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F3	Saker och ting "faller mellan stolarna" då patienter överförs från en vårdenhet till en annan	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F4	Det råder ett gott samarbete mellan de vårdenheter som behöver arbeta tillsammans	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F5	Viktig information om vården av patienterna går ofta förlorad mellan arbetspass/skiftbyten t.ex. mellan kväll/natt	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F6	Det är ofta otryggt att arbeta tillsammans med personal från andra vårdenheter	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F7	Problem uppstår ofta vid informationsutbytet mellan vårdenheter	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F8	Sjukhusledningens eller motsvarandes agerande visar att patientsäkerheten har högsta prioritet	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F9	Sjukhusledningen eller motsvarande verkar endast intressera sig för patientsäkerheten när en negativ händelse har inträffat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F10	Vårdenheterna samarbetar bra för att ge patienterna den bästa vården	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
F11	Skiftbyten är problematiska för patienterna på den här vårdenheten	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Avsnitt G: Antal rapporterade avvikelser

G1 Hur många tillbud/negativa händelser (OBS! se definition sid 1) har du skriftligen rapporterat de senaste 12 månaderna? Kryssa i ETT alternativ

1 ☐ Ingen avvikelse
2 ☐ 1 till 2 avvikelser
3 ☐ 3 till 5 avvikelser
4 ☐ 6 till 10 avvikelser
5 ☐ 11 till 20 avvikelser
6 ☐ 21 avvikelser eller fler

G2 Hur många risker (OBS! se definition sid 1) har du rapporterat under de senaste 12 månaderna? Kryssa i ETT alternativ

1 ☐ Ingen
2 ☐ 1 till 2 risker
3 ☐ 3 till 5 risker
4 ☐ 6 till 10 risker
5 ☐ 11 till 20 risker
6 ☐ 21 risker eller fler

Information och stöd till patienter, närstående och personal vid negativ händelse		**Stämmer mycket dåligt**	**Stämmer ganska dåligt**	**Varken eller**	**Stämmer ganska bra**	**Stämmer mycket bra**
G3	På vår vårdenhet får patienter/närstående som varit berörda av en negativ händelse en ursäkt/ett beklagande av det som inträffat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
G4	På vår vårdenhet får patienter/närstående som varit berörda av en negativ händelse information om vad som hänt, dess konsekvens, samt vad som görs för att förhindra att liknande händelse inträffar igen.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
G5	På vår vårdenhet får patienter/närstående som varit berörda av en negativ händelse stöd och hjälp att bearbeta och hantera det som inträffat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
G6	På vår vårdenhet får patienter/närstående som varit berörda av en negativ händelse information om möjligheten att söka ersättning från patientförsäkringen	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
G7	På vår vårdenhet får personal som varit berörda av en negativ händelse information om vad som görs för att hindra att liknande händelse inträffar igen	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
G8	På vår vårdenhet får personal som varit berörda av en negativ händelse stöd och hjälp att bearbeta och hantera det som inträffat	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Avsnitt H: Bakgrundsinformation

H1 Är du man eller kvinna?

1 ☐ Man
2 ☐ Kvinna

H2 Hur gammal är du?

1 ☐ 18-24 år
2 ☐ 25-34 år
3 ☐ 35-44 år
4 ☐ 45-54 år
5 ☐ 55-64 år
6 ☐ 65 år eller äldre

H3 Hur länge har du arbetat inom vården?

1 ☐ Mindre än 1 år
2 ☐ 1 till 5 år
3 ☐ 6 till 10 år
4 ☐ 11-15 år
5 ☐ 16 till 20 år
6 ☐ 21 år eller längre

H4 Hur länge har du arbetat inom din nuvarande vårdenhet?

1 ☐ Mindre än 1 år
2 ☐ 1 till 5 år
3 ☐ 6 till 10 år
4 ☐ 11-15 år
5 ☐ 16 till 20 år
6 ☐ 21 år eller längre

H5 Hur många timmar per vecka arbetar du i genomsnitt på din vårdenhet?

1 ☐ Färre än 20 timmar per vecka
2 ☐ 20 till 39 timmar per vecka
3 ☐ 40 till 59 timmar per vecka
4 ☐ 60 till 79 timmar per vecka

H6 Vad har du för befattning på din vårdenhet? Kryssa i ETT alternativ

1 ☐ Sjuksköterska
2 ☐ Specialistsjuksköterska
3 ☐ Biomedicinsk analytiker
4 ☐ Undersköterska
5 ☐ Skötare
6 ☐ Specialistläkare
7 ☐ ST-läkare
8 ☐ AT-läkare
9 ☐ Annan läkare: _____
10 ☐ Dietist
11 ☐ Sjukgymnast, arbetsterapeut eller logoped
12 ☐ Kurator
13 ☐ Psykolog
14 ☐ Assistent/kontorist/sekreterare för vårdenheten
15 ☐ Tekniker (Medicin teknisk avdelning, laboratorium, radiologi)
16 ☐ Administratör, vårdutvecklare
17 ☐ Chef: _____
18 ☐ Annan: _____

H7 Har du kontakt med patienterna i din befattning?

1 ☐ Ja, jag har kontakt med patienterna
2 ☐ Nej, jag har inte kontakt med patienterna (ex. adminstrativ personal)

H8 Hur länge har du arbetat inom din nuvarande specialitet eller ditt nuvarande yrke?

1 ☐ Mindre än 1 år
2 ☐ 1 till 5 år
3 ☐ 6 till 10 år
4 ☐ 11-15 år
5 ☐ 16 till 20 år
6 ☐ 21 år eller längre

Avsnitt I: Dina kommentarer om patientsäkerhet

I1 Här kan du ge kommentarer avseende patientsäkerhet, misstag och rapportering av tillbud eller negativa händelser på din vårdenhet

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