

OUTCOMES AND EXPERIENCES OF A FAST TRACK

**A direct admission process
from ambulance to stroke unit
for patients not eligible for acute intervention**

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Cover illustration: Frida Hellberg, Daughter-in-law

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*New day, new Opportunities
To all of You I will give all my time & all my
love
and my warmest thoughts to Dad*

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PREFACE

Some of you may wonder why a nurse after almost 40 years of clinical work, leadership and management within health and care organisations and only a few years before retirement would want to start a PhD project. This time in life should be devoted to things that are so much more valuable: in my case, six wonderful little grandchildren and their families, my lovely elderly mother and my husband. What are you going to do with “these three small letters – PhD?”, many have wondered. And really, I have also wondered many times, but there are, of course, several reasons: the feeling of tightening the bow, to learn more, to constantly evolve, and the pride in achieving a higher academic degree. But when I humbly try to reflect on this myself, I can with a good heart say my primary reason is to try to make a difference in the lives of those we, in healthcare, serve—the patients.

For most of my professional life, I have worked as a clinical nurse in the emergency department (ED), but also in positions where I have had the possibility and mandate to influence and improve overall processes within health and care organisations. Since the early 2000s, I have worked within emergency medical services (EMS) management, focusing on quality and development. I left the EMS in 2012 and started to work as a quality chief, focusing on issues related to strategic planning at Sahlgrenska University Hospital (SU). I am sincerely interested in improvements, especially for vulnerable and weak patients, as they are often subordinated in early care pathways, of which the ED and EMS are important parts. According to Swedish law in 2005, every single ambulance shall be manned by at least one registered nurse (RN). At that time, I was part of the EMS management in Gothenburg and saw the possibility of using the EMS as a mobile ED. These thoughts resulted in the development of so-called Fast Track processes for low priority patients. In this thesis, the patients’ condition is assessed as having a lower level of severity, according to the triage system. The concept used the EMS nurses’ competence, and according to the pre-defined criteria, it bypassed the ED and transported patients directly to an appropriate level of care. The intention was to shorten the time in the care pathway, reduce the patients’ suffering and use our common resources more efficiently.

Fast Track for low priority patients was developed at SU, Sweden, in the early 2000s. The idea of an ambulance as a mobile ED, focusing on low-priority patients, was ground-breaking and a paradigm shift within prehospital care and

hospitals' early care pathways. Initially, it addressed patients who were suffering from hip fractures, frail elderly, and those suspected of having a stroke who were not eligible for stroke alert (sometimes leading to acute intervention). Ideas about quickly identifying the most appropriate level of care have been further developed. For example, today the EMS staff provide care at the patients' home or transport patients to community health centres (CHCs).

It is with pride I tell you about the development within the EMS in Gothenburg, and I really want to attribute the credit to the ambulance personnel, my colleagues in the ambulance management and the ambulance manager for the permissive environment that allowed creative thoughts to have space and time to test new solutions. And at last.... A little memory, I was thinking about it right now ... while writing my thesis here in my workroom in our summer paradise. I am reflecting on the importance of leadership. Well, in conjunction with the yearly individual development conversation, which is about my goal fulfilment the past year and the plans for the coming one, I remember, my manager, Mats Kihlgren, who – influenced by his background in the fire brigade, where employees are referred to by their surnames – stated each time:

“Wennman, how are you going to tighten the bow next year? Increase your academic degrees? Acquire other knowledge? Build networks? Anything else? Do what you find the best, and I will promote your choices. But one reservation, you have to translate this into activities that create value for those we are here for—the patients.

In my view, it is only a wise, experienced and brave manager who understands their mission, who acts in this manner. This leadership resulted in a win-win situation, namely constant study, networking, speaking at conferences, publishing, awards, gaining attention for the EMS department in Gothenburg, but especially, several improvements that benefitted those we serve—the patients, in particular, the most vulnerable and low-priority ones.

ABSTRACT

Background

Stroke is a serious medical condition, and the time before acute intervention and care at stroke units is crucial. People who suffer from a stroke and are not eligible for stroke alert are often transported to the emergency department (ED), where they risk experiencing a long length of stay (LOS) before being admitted to the stroke unit. Long LOS in ED is associated with health-associated harms (both bodily and psychological harm), which can be avoided if sufficient measures are taken in the care pathway. For selected patients, a direct admission process (Fast Track) from emergency medical services (EMS) to the stroke unit has been tried to shorten the care pathway LOS, reduce health-associated harms and use resources more efficiently.

Overall aim

The goal of this thesis was to describe and explore a changed organisational care pathway process from EMS to the stroke unit for patients not eligible for stroke alert, focusing on both patient and organisational perspectives in terms of safety outcomes and factors affecting LOS in the care pathway.

Methods

Data were gathered through a case-control design, including both prospective and retrospective data (Study I) and individual explorative descriptive interviews with nurses from the entire care pathway (Studies II and III), and through a case-control design using quality registers (Study IV). Quantitative data were analysed using descriptive and inferential statistics (Studies I and IV), whereas qualitative data were analysed using the critical incident technique (Studies II and III).

Main findings

The changed care pathway (i.e. direct transport from nurse-manned EMS to the stroke unit) was indicated to be safe for selected patients and was associated with relatively high diagnostic accuracy. The care pathway LOS was significantly shortened, but there were no significant differences regarding complications or patient-reported outcome measurement (PROM) between the Fast Track patients and patients transported via the ED. The findings showed that the most prevalent critical factors that negatively affected the Fast Track

care pathway were connected to the participants' experiences of how different units other than their own worked, the challenges of assessing patients' symptoms, workflows/organisational silos, available hospital beds and the atmosphere in this context. The most common enablers of a well-running Fast Track were linked to patients' and relatives' involvement/participation, to staff members' level of experience/skills and to cross-sectional collaboration/professional relations.

To manage delays, staff members took actions by safeguarding the patients, striving to gain an overview of the situation, convincing others to work in different ways and building trust with patients/relatives. The situation affected the staff in all departments by causing unpleasant feelings that they kept to themselves and did not communicate. Over time, the Fast Track showed a decreasing trend regarding the number of contacts from EMS to the stroke coordinator, a decreasing trend regarding the acceptance of the Fast Track and an increasing trend regarding the denial of the Fast Track, associated with the number of hospital beds. The organisational prerequisites for maintaining this direct admission process became more and more limited over the years, and there was a failing degree of obedience to pre-defined guidelines. This might have consequences for the care pathway LOS, health-associated harms and strains on the healthcare resources.

Conclusions

The Fast Track concept was indicated to be safe for selected patients. It was feasible and was expected to shorten the patients' time in the care pathway compared to patients transported via the ED. However, there were no significant differences between Fast Track and ED patients regarding complications or PROM. The findings revealed several critical factors related to human and organisational causes that affect the Fast Track process both negatively and positively. In addition, the findings showed a decreasing trend in getting acceptance from the hospital for Fast Track when suggested and consequently fewer Fast Tracks.

Keywords

Fast Track, stroke, ambulance, emergency department, stroke unit, care pathway, patient safety, organisation, transition theory

SAMMANFATTNING PÅ SVENSKA

Bakgrund

Stroke är ett samlingsnamn för hjärninfarkt (propp) och hjärnblödning och är en vanlig anledning till såväl död som funktionshinder. Snabb transport till sjukhus för ställningstagande till akut intervention såsom trombolys o/e tromektomi, samt vård på strokeenhet är viktigt. I Sverige insjuknar ca 25 000 personer årligen i stroke, ca 75% inkommer till sjukhus med ambulans. 2021 var något fler män än kvinnor och medelåldern var 75 år (män 73 år och kvinnor 77 år). Ischemisk stroke är vanligast (propp), ca 87% får denna diagnos. Under det kritiska första dygnet får fortfarande var femte patient med stroke inte tillgång till kvalificerad strokevård på en strokeenhet eller en intensivvårdsavdelning – vilket är en tydlig kvalitetsbrist i strokevården. I Sverige är orsaken till detta framför allt brist på strokeenhetsvårdplatser på vissa sjukhus. Antalet strokelarm från ambulans till sjukhus ökar, antalet patienter som behandlas med någon form av akut intervention ökar och ledtiderna från att ambulans ankommer sjukhus till behandlingsstart minskar.

Men för de allra flesta patienter med misstänkt stroke är inte akut intervention möjlig. Den traditionella vårdvägen för dessa är via akutmottagningen (AKM) innan inläggning, vilket riskerar långa väntetider och är förknippat med patientsäkerhetsrisker. Att vänta på AKM beskriver patienter i termer av, att inte bli tagen på allvar, att känna sig maktlös, övergiven och osäker, att inte förstå vad som händer, en misstro mot sjukvården och att inte få stöd i situationen. Däremot att patientupplevelsen är positivt kopplad till både känsla av patientsäkerhet och effektivitet.

Detta är bakgrunden till att ett snabbspår (Fast Track) 2008 prövades för patienter som inte var aktuella för strokelarm. Tanken var att använda sjuksköterskans kompetens i ambulans och enligt predefinierade kriterier identifiera patienter med misstänkt stroke, ta kontakt med strokekoordinator på sjukhuset som validerade patientens status och därefter hade mandat att acceptera direktinläggning men också neka, även på andra grunder än enligt kriterierna. Intentionen var att korta tiden i vårdkedjan, minska trycket på AKM, reducera patientsäkerhetsrisker och patientens lidande samt använda gemensamma resurser mer effektivt.

Avhandlingens övergripande syfte

Beskriva och studera en förändrad process från ambulans till strokeenhet för patienter som inte är aktuella för strolalarm, genom att fokusera på både patient- och organisatoriska perspektiv i termer av utfall relaterade till patientsäkerhet och faktorer som påverkar tidslängden i vårdkedjan.

Avhandlingens fyra delstudier

Studie I var en kvantitativ case-control studie som syftade till att beskriva genomförbarheten av en Fast Track. Dels genom att undersöka om ambulanssjuksköterskan korrekt kunde identifiera diagnosen stroke i ambulans och om så, "bypassa" AKM och transportera direkt till strokeenhet och dels om ledtiden i vårdkedjan påverkades av denna Fast Track. Direktinläggningsgruppen jämfördes med en kontrollgrupp som utgjordes av patienter som transporterats i det traditionella spåret till AKM, därefter bedömda och inlagda på strokeenhet av läkare. Fast Track gruppen identifierades genom att inkludera patienter en efter en (konsekutivt, prospektivt) (n=53), kontrollgruppen identifierades genom retrospektiv journalgranskning, under samma period och med samma inklusionskriterier som case gruppen (n=49). Data till de båda grupperna samlades in retrospektivt i sjukhusets journalsystem och analyserades med hjälp av deskriptiv och jämförande statistik. *Studie II och III* syftade till att utforska erfarna händelser och vidtagna åtgärder som varit hindrande eller gynnande för ledtidens längd i vårdkedjan. Studierna var kvalitativa och kritisk incident teknik (CIT) användes. Studierna baserades på intervjuer med 22 sjuksköterskor från ambulans, AKM och strokeenheter från Universitetssjukhusets tre separata sjukhuskroppar. Sjuksköterskorna ombands noggrant beskriva verkliga händelser de upplevt. Dels där processen i vårdkedjan flutit på riktigt smidigt ("golden case") och dels där processen hängt upp sig och mycket långa ledtider skapats ("worst case"), avseende patienter som inte var kvalificerade för strolalarm. Ur dessa berättelser identifierades 363 kritiska incidenter som antingen varit gynnande eller hindrande för processens längd. Sjuksköterskorna beskrev också vilka åtgärder de vidtagit och som hade haft påverkan gynnande eller hindrande. 344 vidtagna åtgärder identifierades. Datan analyserades enligt CIT, genom att likheter och skillnader hos de kritiska incidenterna grupperades i subkategorier, kategorier och huvudgrupper. De erfarna händelserna presenterades i studie II och de vidtagna åtgärder i studie III. *Studie IV* var en kvantitativ case-control studie, där

registerdata från såväl lokala som nationella kvalitetsregister samt data från sjukhusets datasystem användes. Syftet var att beskriva och jämföra utfallsmått relaterade till patientsäkerhet, både medicinska i akutskedet och patientrapporterade (PROM) tre månader efter inläggning, hos patienter där ambulanssjuksköterskan initierat Fast Track och fått acceptans (case) med patienter där Fast Track inte accepterats av strokekoordinatören (Control). Kontrollgruppen hade sålunda transporterats via AKM. PROM inhämtades via livskvalitets instrumentet EQ-5D-5L, i vilket patienten skattat hälsa i fem dimensioner. De medicinska utfallsmåtten var död inom 90 dagar, inom 28 dagar och under vårdtid samt lunginflammation, fall, trycksår under vårdtid. Datan analyserades med hjälp av deskriptiv och jämförande statistik.

Övergripande resultat

De fyra studierna var på olika sätt designade för att svara upp mot det övergripande syftet, ”utfall relaterade till patientsäkerhet” och ”faktorer som påverkar tidslängden i vårdkedjan”. Genom att använda både kvalitativa och kvantitativa metoder kunde forskningsområdet studeras genom olika linser. Resultatet visade att det var möjligt att förändra en inarbetad traditionell vårdkedja för ambulanstransporterade patienter som inte var kvalificerade för strolarm. Dock visade resultatet på att det fanns utmaningar att upprätthålla Fast Track konceptet över tid. Detta resulterade i att allt fler patienter kördes till AKM och medarbetare i alla delar av vårdkedjan försökte att skydda patienten från vårdskador och lidande då väntan ofta var lång.

Utfall relaterade till patientsäkerhet studerades ur olika perspektiv

a) I termer av att beskriva och jämföra genomförbarheten av att en ambulanssjuksköterska korrekt identifierade patient med misstänkt stroke i ambulans. Resultatet visade att av de patienter som direktinlagts via ambulans hade 85% strolerelaterade diagnoser medan läkare på akuten hade en träffsäkerhet om 90% (Studie I).

b) I termer av att beskriva och jämföra tidslängden i vårdkedjan. Resultatet visade att tiden förkortades avsevärt då Fast Track praktiserades, i studie I förkortades tiden med 235 minuter (median) (larmad ambulans till inlagd på strokeenhet) och i studie IV med 237 minuter (medel) (tiden som kontrollgruppen väntade på akuten).

c) I termer av att beskriva och jämföra komplikationer i akutfasen och PROM tre månader efter inläggning. Resultatet visade ingen signifikant skillnad mellan de båda grupperna (Studie IV).

d) I termer av att utforska och beskriva erfarna händelser som påverkat ledtiden hindrande eller gynnande. Resultatet visade att "mänskliga relationer" och "organisatoriska strukturer" utgjorde de två huvudområdena. Exempel på frekventa subkategorier var, att det beskrevs att annan personal än just de som arbetade inom den egna verksamheten hade gjort fel, slarvat eller på annat sätt påverkat processen förträdevis hindrande, att det var utmanande att bedöma symtom, att arbetsflödena inte flöt på smidigt liksom organisering i "silos". Brist på vårdplatser var något som kommunicerades inom alla

verksamheter, och "dagens status" spred sig mellan verksamheterna och påverkade att inte ens försöka initiera Fast Track eller att vårdplatssituationen "idag var bra". Exempel på kritiska händelser som varit gynnande för vårdtidens längd var involvering av patient/närstående, erfaren och kunnig personal och samarbete över verksamhetsgränser. Det visade sig att sjuksköterskor från ambulanssjukvården oftast beskrev bedömning av symtom som hindrande faktor och involvering av patient/närstående som gynnande, medan sjuksköterskor från AKM beskrev arbetsflöden och AKM-"crowding" (trängsel) som hindrande och personal med stor kunskap som gynnande faktor och sjuksköterskor från strokeavdelningen beskrev hur andra medarbetare i vårdkedjan arbetat och processer som inte fungerade (Studie II).

e) I termer av att utforska och beskriva vidtagna åtgärder som påverkat ledtiden hindrande eller gynnande. Resultatet visade att "Främja vårdkedjeprocessen" och "Ta kontroll över situationen" utgjorde de två huvudområdena. Exempel på frekventa subkategorier var, att försöka skapa en överblick över situationen, att agera så att tillit skapades hos patienter/närstående, skydda patienten på olika sätt både genom ökad medicinsk översyn men också genom extra omvårdnad, övertala andra att ändra beslut och prioriteringsordning i arbetet. Inom alla verksamheter beskrevs en känsla av obehag och otillfredsställelse då vårdtiden blev lång och processer inte fungerade, men att man valde att inte kommunicera detta, utan bar på dessa känslor (Studie III).

Faktorer som påverkar tidslängden i vårdkedjan studerades ur flera perspektiv

Resultatet i alla studierna visade faktorer som påverkade tiden i vårdkedjan. Den förändrade processen fungerade initialt bra (Studie I), och visade att Fast Track medförde avsevärt kortare ledtider (Studie I och IV). Ledtidens längd var kopplat till ”mänskliga interaktioner” och ”organisatoriska strukturer” (Studie II). Dock indikerade resultaten att över tid sviktade de organisatoriska förutsättningarna för att Fast Track skulle fungera smidigt. Detta medförde att fler patienter transporterades via AKM, samt att ledtiden ökade (Studie IV). Resultaten visade att personalens följsamhet till Fast Track minskade (Studie II, III, IV), strokekoordinatorerna accepterade allt färre Fast Track (Studie IV) och allt fler nekade Fast Track kunde härledas till vårdplatsbrist (Studie IV).

Slutsatser

Resultatet indikerade att Fast Track var säkert för utvalda patienter. Ingen signifikant skillnad visades mellan grupperna avseende komplikationer i akutfasen eller patientrapporterade utfallsmått tre månader efter inskrivning. Organisatoriskt och kunskapsmässigt fungerade det att ändra processen och det var möjligt att undvika många timmars väntan på akuten, med risk för både hotad patientsäkerhet och lidande för patienten. Över tid noterades en minskande trend initierade Fast Track av ambulanspersonalen, en minskande trend accepterade Fast Track av strokekoordinatorn och en ökande trend nekade Fast Track som kunde härledas till vårdplatsbrist. Resultatet tydde på att det fanns utmaningar att vidmakthålla den förändrade vårdkedjan över tid. Avhandlingen gav förståelse för att såväl patient som personal var spelare som var inne i olika övergångar, till något nytt, som de ska hantera, vilket tar sig olika uttryck. Och organisationen, som också var i en övergång, pressades av yttre och inre faktorer som medförde att förutsättningarna förändrades över tid.

LIST OF PAPERS

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

- I. **Wennman, I.**, Klittermark, P., Herlitz, J., Lernfelt, B., Kihlgren, M., Gustafsson, C., & Hansson, P.-O. (2012). The clinical consequences of a pre-hospital diagnosis of stroke by the emergency medical service system. A pilot study. *Scandinavian journal of trauma, resuscitation and emergency medicine*, 20(1), 48.
- II. **Wennman, I.**, Carlström, E., Fridlund, B., & Wijk, H. (2021). Experienced critical incidents affecting lead-times in the stroke care chain for low-priority patients—A qualitative study with critical incident technique. *International Emergency Nursing*, 58, 101040.
- III. **Wennman, I.**, Carlström, E., Fridlund, B., & Wijk, H. (2022). Actions taken affecting lead time in the care pathway for low-priority patients with a suspected stroke: A critical incident study. *International Emergency Nursing*, 60, 101105.
- IV. **Wennman, I.**, Wijk, H., Jood, K., Carlström, E., Fridlund, B., Alsholm, L., Herlitz, J., Hansson, PO. Outcomes of a Fast Track process from the emergency medical service system to stroke unit for patients not eligible for acute intervention – a case-control register study based on 1066 patients. *Submitted*.

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ABBREVIATIONS

ADL	Activities of daily living
CHC	Community Health Centre
CI	Critical incident
CIT	Critical incident technique
DNT	Door to needle time
ED	Emergency department
EMS	Emergency medical services
EVT	Endovascular treatment
GBD	Global Burden of Diseases, Injuries, and Risk Factors Study
IVT	Intravenous thrombolysis
LOS	Length of stay
MSU	Mobile Stroke Unit
PROM	Patient Reported Outcome Measures
PU	Pressure ulcers
RCT	Randomised controlled trial
RETTS	Rapid Emergency Triage and Treatment System
RN	Registered Nurse
STEMI	ST-elevation myocardial infarction
SU	Sahlgrenska University Hospital

TIA	Transient ischemic attack
TVT	The patient's total length of time
uSS	Unique Stroke Symptoms
WHO	World Health Organisation

BRIEF DEFINITIONS

Boarding	From ED being admitted to hospital ward but not having a bed (ACEP, 2019b)
Crowding	Crowding occurs when the identified need for emergency services exceeds available resources for patient care in the ED, hospital or both (ACEP, 2019a)
Door-to-needle-time (DNT)/Door-to-balloon-time	Time from EMS arrival at the hospital to start of treatment at the hospital
Fast Track	A smooth process to shorten LOS in a care pathway, e.g. by bypassing ED and establishing a direct admission process from EMS to the stroke unit for those not eligible for acute intervention
Health-associated harms	Suffering bodily or psychological injury or illness, and deaths that could have been avoided if sufficient measures had been taken in the patient's contact with the healthcare system (<i>free translated</i>). (HSL, 2010)
Low priority	Refers to patients who were assessed as being low-acute according to the triage system
Patients not eligible for acute intervention	Refers to patients who were not eligible for stroke alert, and therefore no acute intervention

Stroke	Rapidly developing clinical signs of focal, and at times global, loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause, other than vascular origin (World Health Organisation. Task Force on Stroke and other Cerebrovascular Disorders, 1989).
Transfer	An event or series of events through which a person is referred between healthcare settings/providers
Transition	A passage from one life phase, physical condition, or social role to another, resulting in a temporary disconnectedness of everyday life, which demands an adjustment of the person and the environment
Unique stroke symptoms (uSS)	Stroke can disrupt any nervous system function, leading to uSS-symptoms that are unusual or different from the common stroke symptoms

INTRODUCTION

The patient's path through the care pathway is usually cumbersome, and the time spent is often unnecessarily long in relation to the activities and measures that are carried out. The number of patients seeking the ED and those treated by the EMS is increasing internationally as well as nationally (Berg et al., 2019; Coster et al., 2017; Lindström et al., 2015; Pines et al., 2011; Tärnqvist et al., 2017). In Sweden, recent statistics show that the waiting time in the ED tends to increase (Socialstyrelsen, 2021), which leads to crowding in the ED. Previous studies have shown that crowding in the ED is associated with risks regarding patient safety, increased morbidity and mortality (Af Ugglas et al., 2020b; Morley et al., 2018; Pines et al., 2011). In addition to suddenly being affected by illness, the situation is also associated with being in a health-related transition, putting the patient in a vulnerable position with reduced opportunities to control the situation (Meleis et al., 2000). Low-priority patients (according to the healthcare system's priority system) describe suffering psychological harm in terms of the experience of not being taken seriously, feeling powerless, abandoned, insecure and having a distrust in healthcare (Dahlen et al., 2012; Han et al., 2017; Rantala et al., 2021).

The patient is transferred into an organisational structure, including several sub-processes, with visible and invisible barriers within/between different units. Healthcare organisations are characterised by strong cultures, hierarchies and established working methods; moreover, the professionals are often allied to "their profession" and "their department" (Tistad et al., 2022). Employees also find themselves in a challenging situation when they carry out "their" care assignment, while relating to organisational changes, both long-term and rapid new conditions, and meeting patients in a professional way (Alverbratt et al., 2017).

For patients suffering from a stroke, who are not eligible for acute intervention, the traditional care pathway via ED before admission to the stroke unit is a challenge for the individual patient but also for the organisation, which is why this thesis focuses on both the patient and organisational perspectives, and why the transition theory was helpful in the working process. The intention is to focus on two different care pathway processes: one that excludes and one that includes the ED (Figure 1).



Figure 1. This thesis studied two care pathway processes from EMS to the stroke unit. 1. Fast Track concept where ED is passed. 2. Traditional transport by EMS via ED.

Hence, based on my work experiences and my interpretations of how patients perceived the ED, I present two cases of stroke patients who were not eligible for stroke alerts and, therefore, had a long LOS in the ED.

The 86-year-old single woman with beautiful silver-grey hair

It was the home-care personnel who discovered that not everything was as it should be. Since her husband had passed away, she had been all alone. Sister Sarah was the only one who really looked at her as she helped her with the morning chores. And this morning, everything was very strange. She felt dizzy and had difficulty lifting her left arm ... An ambulance came and picked her up. And now she was lying here, in a room at the emergency department. It would have been a long time because it seemed like there were new staff all the time; others opened the door a little and waved happily ... Someone said ...have a good time, now I'm going home ... And now it started to get dark outside... It was probably a long time. Several people had come in and said that the doctor would be here soon... But time just passed... and she did not know why ... The nurses didn't seem to know either ...she understood that in their vague answers... she felt so small and pitiful; her head was spinning, and she felt thirsty and longed for Sister Sarah... who would she ask about putting the blanket around her back.... It had slipped halfway off the stretcher. Her alarm watch was lying on the floor. How long had she been there freezing? She had no idea ... the 86-year-old single woman with beautiful silver-grey hair.

Woman, 51-years-old, amid friends, career and family life

She had just presented the quarterly report to the management team at the morning meeting... She was happy; it was beyond expectations. She was beautiful, well dressed, had a husband and successful children; she had access to large significant networks that could take her further in her career. She was up and coming... But now she didn't remember anything else in the morning; just a sense of how pleased she had felt about the result in the company ... The emergency department staff said that her colleagues at the company had told her to go and rest and that it had taken some time before her husband had come to the workplace. He had been somewhere else with the car when it all happened. And now, she apparently couldn't get the prized treatment; the one she'd heard you could get if you got to the hospital quickly ... and yet her husband had made sure that an ambulance was called when he arrived at the workplace ... The jacket lay rolled up below the stretcher, and the high-heeled shoes were on top. They were really shiny in the bright light of the lamp. It quickly hit her stomach... a stroke... It is a serious disease! Had she suffered a stroke? SPA weekend with friends for the weekend and the company...the VAT reporting, oh ... how indescribably tired she felt suddenly... It was all so confusing, lying on her back in a white, wrinkled, washed-out patient shirt and looking up at faces asking about things, people wondering how she was feeling... And the annoyance that she couldn't fix it herself at all... not even dial a cell phone number, write a text message or the most humiliating, to get a bedpan without any shielding in the corridor ... they treated her like a child, put their heads in a ridiculous way when they talked excessively clear, and with a meaning that they felt pity for her ... As if she wasn't capable of understanding anything. ... What were all the people running in the hallway doing back and forth? And what time was it? Day or night? ... It was impossible to know because the room she had just been rolled into didn't have a window. She remembered that she thought she would try to call and activate the health insurance ... but she felt completely incapable ... missed taking control... she who always arranged and directed most things ... And she slept for a while longer... And someone moved the stretcher from room 12 to room 13 and closed the door. The noise and clutter from the corridor, laughing colleagues in shift change, the "ding-donging" of the bell as another ambulance was on its way in ... was now heard far away... and she didn't care about it either... the time stood still ... for the Woman 51-years-old, amid friends, career and family life.

The intention of these narratives is to give examples of experiences from my time at an ED, both as a professional RN and as a human being. Thus, the examples show the challenges within hospital care; how the ED meets the needs of patients who are not eligible for stroke alert, in terms of 'bodily or psychological suffering, which could have been avoided if sufficient measures had been taken in contact with the healthcare system'.

BACKGROUND

The intention of the background structure is to follow the patient's tracks through time and space in the care pathway. Therefore, the first section provides an overview of the diagnosis of a stroke. The following three sections are about the three departments — EMS, ED and stroke unit — through which stroke patients who are not eligible for stroke alert or acute intervention often pass. Thereafter, in a section about Fast Track, the reader is given an understanding of the direct admission model. Finally, there is a section on health-associated harms, both bodily and psychological, related to the care pathway, followed by a description of transition theory in general.

STROKE DIAGNOSIS

CHARACTERISTICS OF STROKE

Stroke is a collective name for cerebral ischaemic and cerebral haemorrhage. About 85% of all strokes are caused by an ischaemic stroke and are due to a blood clot blocking one of the brain's blood vessels. Common symptoms of a stroke are a drooping mouth, weakness in one arm and/or leg, as well as difficulty speaking. Transient ischaemic attack (TIA) is a rapid transient lack of oxygen in an area of the brain. The lack of oxygen is caused by a blood clot in a blood vessel. The blood clot is dissolved by the body's own clot-dissolving system after a short time. The symptoms are the same as those occurring in stroke but pass within a few minutes/hours (Nordanstig, 2018). According to the World Health Organisation (WHO), the definition of stroke is 'rapidly developing clinical signs of focal, and at times global, loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin' (World Health Organisation. Task Force on Stroke and other Cerebrovascular Disorders, 1989).

INCIDENCE OF STROKE

Stroke is a serious condition that is common throughout the world. The Global Burden of Diseases, Injuries and Risk Factors Study (GBD) regularly compiles updated data on stroke, which aims to provide standardised and comprehensive measurement metrics at global, regional and national levels. Measurements showed that stroke was the second-leading cause of death in the world in 2017

(GBD 2017 DALYs and HALE Collaborators, 2018; Krishnamurthi et al., 2020). Globally, the incidence of ischaemic stroke is twice as high as that of haemorrhagic stroke (Feigin et al., 2009; Krishnamurthi et al., 2013), but in high-income countries, ischaemic stroke comprises approximately 85% of all strokes (Appelros et al., 2014). In Sweden, in 2021, the rate was reported to be 87% (RIKSSTROKE - The Swedish Stroke Register, 2021).

Worldwide, there are considerable differences in stroke burden, with a three-fold increase due to stroke in low-income countries compared with high-income countries. Furthermore, there is a greater reduction in stroke mortality rates in high-income compared with low-income countries (Feigin et al., 2015). There are several lifestyle factors that increase the risk of stroke, of which approximately 90% are related (Collins et al., 2016; Mons et al., 2015; O'Donnell et al., 2016; Xie et al., 2016). Even the level of education has been shown to make a difference. In Sweden, a register study including 86,316 patients registered with ischaemic stroke showed that low education was associated with an excess risk of a severe stroke compared to mid/high education (Lindmark et al., 2022).

Measurements over time suggest that the incidence of stroke has increased over the past 30 years, particularly among people older than 70 years. The reason for this increase is considered to be both an increasing and an ageing population (GBD 2015 Neurological Disorders Collaborator Group, 2017; GBD 2016 Stroke Collaborators, 2019; GBD 2019 Stroke Collaborators, 2021). In Sweden, about 25,000 persons suffer from a stroke every year, but during the 2000s, both the incidence and mortality of the disease have steadily decreased (Socialstyrelsen, 2022).

RISK OF RECEIVING UNEQUAL STROKE CARE

There has been an increasing focus on the risks for inequities within healthcare. Several groups are particularly vulnerable; for example, socioeconomic inequities relating to disability and survival following stroke have been reported (Andersen et al., 2014; Bray et al., 2018; Marshall et al., 2015). A nationwide study from Sweden showed that living alone, primary school education, non-European origin, previous stroke, diabetes, smoking and dependency in activities of daily living (ADL) were associated with a lower

probability of stroke alert, while younger age, atrial fibrillation (AF), living in an institution, reduced consciousness upon admission, and haemorrhagic stroke were factors associated with a higher probability of stroke alerts (Eriksson et al., 2017). Furthermore, throughout the entire care pathway, it has been found there are inequities in the stroke care received (Bray et al., 2018; Eriksson et al., 2017; Marshall et al., 2015; Niklasson et al., 2019).

There are also issues regarding gender. For example, women make up 60% of all stroke deaths annually in the United States (Mozaffarian et al., 2016). One reason for this may be that women experience unique stroke symptoms (uSS) more often than men, which are unusual or different from the common stroke symptoms (Madsen et al., 2016; Mozaffarian et al., 2016). Women are more likely to report altered mental status, symptoms of nausea/vomiting, headache, dizziness, and cognitive dysfunction compared with men (Colsch & Lindseth, 2018; Lisabeth et al., 2009). Research suggests there has been a delay in recognising uSS by both healthcare professionals and the general population (Itzhaki et al., 2016), and patients with these symptoms are much more likely to have their symptoms misdiagnosed (Lever et al., 2013). Managing stroke condition is complex and poses major challenges from several perspectives, in addition to substantial economic costs for post-stroke care (Rajsic et al., 2019).

INCREASED TREATMENT OPTIONS WITHIN STROKE CARE

The diagnosis of stroke and its challenges can be viewed with a different lens, as in recent decades, the development, in several ways, has undergone an immense knowledge development that is evidence-based. This has partly been driven by the fact that, in the case of stroke, timely treatment is crucial for the effectiveness of the treatments. Decisive breakthroughs include: I. Care at the stroke unit (Langhorne, 2021; Stroke Unit Trialists' Collaboration, 2013) (which is described in a later section), II. Intravenous thrombolysis (IVT) (Hankey, 2017) and III. Endovascular treatment (EVT) (Rodrigues et al., 2016).

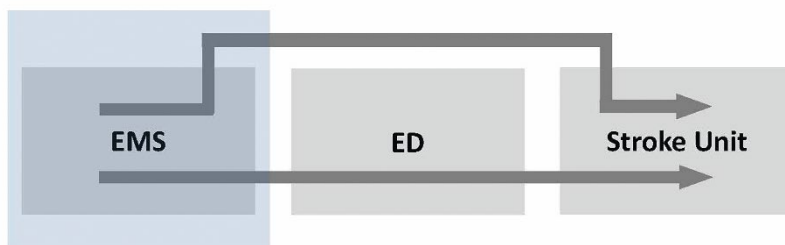
IVT was approved in 1996 in the US and 2002 in Europe as a treatment for acute ischaemic stroke. Specifically, IVT has been proven to increase the proportion of patients with good functional outcomes (Hacke et al., 1995), however, a critical point for the outcome was treatment within three hours

(Emberson et al., 2014). In 2015, EVT in combination with IVT was shown to be superior to IVT alone when treating large vessel occlusions. Patients treated with EVT in combination with IVT almost doubled the chance of a good functional outcome compared to patients treated with IVT alone. EVT was performed within 6 h of stroke onset (Goyal et al., 2016; Jovin et al., 2015). Development in stroke treatment is rapid and ongoing, with attempts to increase treatment possibilities and reduce time windows (Albers et al., 2018; Emberson et al., 2014; Nogueira et al., 2018). However, in the case of ischaemic stroke, treatment should be instituted as soon as possible since a short time from stroke onset to revascularisation is the most important prognostic factor for good functional outcome, although the time window for EVT is wider than for IVT (Berkhemer et al., 2015; Campbell et al., 2015; Goyal et al., 2015; Goyal et al., 2016; Jovin et al., 2015; Saver et al., 2015).

In Sweden, in 2021, 76% of patients suffering from a stroke were transported by EMS to the hospital. Furthermore, 33% arrived at the hospital within 3 h after stroke onset and 6% within 4.5 h, which is the same as in 2011. Of all EMS transported patients with finally diagnosed stroke, the percentage of stroke alerts from EMS to a hospital increased from 15% in 2010 to 42% in 2021. In 2020, 16% of patients with ischaemic stroke were treated with reperfusion, of which 11% were treated with IVT, 2% with IVT in combination with EVT, and 3% with only EVT. The proportion treated has more than tripled in 2020 compared to 2010 (RIKSSTROKE - The Swedish Stroke Register, 2021).

Therefore, although the treatment possibilities have increased and many patients have received this treatment, most stroke patients are not eligible for “stroke alert” and acute intervention and are therefore usually transported via the ED.

THE FIRST PART OF THE CARE PATHWAY – EMERGENCY MEDICAL SERVICES (EMS)



EMS – CHARACTERISTICS AND COMPETENCE

EMS is a system providing emergency medical care, including assessment, treatment and coordination of the appropriate level of care. The system manages a broad spectrum of patients of all ages, conditions with different medical risks from waiting, in an unselected patient population, which results in needs of both a medical and nursing nature. In Sweden, the EMS is organised in different ways. In the context of the present study, EMS 2008–2012 was organised under several private actors and from 2012 as a part of the University Hospital. The EMS staff are normally the first to meet and assess the patient at the scene. This is a challenge and both logical reasoning and clinical knowledge are required to determine a suspect diagnosis (Arocha et al., 2005). There are different formations, such as one or several ambulances, bicycle-/motorcycle ambulances, single responders, decision units and staffing from different professions, education levels and manned by varying numbers of staff.

Professional competence in the EMS varies internationally, and the optimal formatting has not been agreed upon (Bayley et al., 2008). Over time, competence within the EMS has been strengthened in Sweden. Already in the 1970s, in Gothenburg, senior management realised the benefit of more equipment and increased competence within the EMS and tested so-called advanced life support ambulances. These units were manned with an RN, manual defibrillators, electrocardiograms and drugs. A randomised controlled study (RCT) evaluated this concept and showed that long-term survival

increased compared to standard ambulances (Wennerblom & Holmberg, 1982).

About 50 years ago, staff in ambulance services did not require healthcare education (Gårdelöv, 2016). Forty years ago, the educational requirements were equal to assistant nurses. Since 2005, every ambulance must be staffed by one RN responsible for assessment, treatment and the administration of pharmacological drugs (Magnusson, 2021).

EMS – DEVELOPMENT AND CHALLENGES

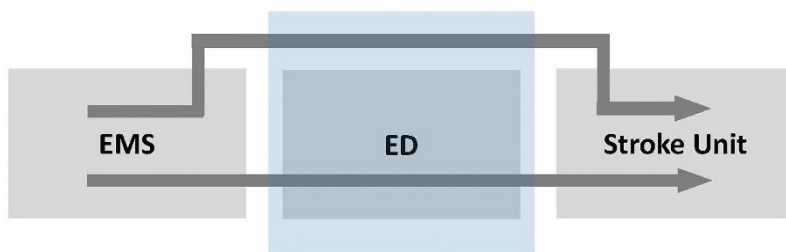
During the last decades, the EMS has undergone a change and development from being mainly a transport organisation to becoming an organisation with advanced life-saving potential (Magnusson et al., 2016). Today, the EMS can be compared to a mobile ED, including considerable treatment options and physician support by sending pictures from digital cameras. Nowadays, EMS is regarded as an important part of the entire hospital care pathway (Forsgårde, 2022).

EMS has been given and has also taken an important role in the hospital context by managing several early care pathway processes. During this time, several alternative processes have been developed by using EMS. For example, a nurse-staffed single responder may assess patients who describe vague symptoms to the dispatcher at the dispatch centre (Magnusson et al., 2016). Further, several processes bypassing the ED have been developed for patients with time-critical conditions (Bagai et al., 2013; Edwards et al., 2020; Santana Baskar et al., 2021; Shavadia et al., 2018), as well as processes for patients who were assessed as having low-acuity (Haugan et al., 2017; Jacobsson et al., 2020; Larsson et al., 2016; Vicente et al., 2014).

Over time, it has been shown that the EMS goes beyond the traditional assignment of solely focusing on patients with severe illness to acting more broadly by contributing to the entire healthcare system and also seeing opportunities to benefit society more generally. One example is from during the Covid-19 pandemic, when the EMS visited schools and vaccinated children on site. Another example is when EMS, in collaboration with representatives from the hospital stroke care pathway, provided information about stroke at a public event in a large shopping centre targeting the inhabitants.

However, this development from only transporting to the ED to deciding on the most appropriate level of care at the scene, and mode of transport in combination with increased utilisation, changes in care-seeking behaviour and competence among EMS clinicians, highlights several issues, challenges and possibilities (Magnusson et al., 2020). One challenge is that a number of patients are redirected to other forms of care upon assessment by ambulance staff on arrival to the patient's location (non-conveyed patients). This group including a small portion of time-critical conditions, which can pose a threat to patient safety. There is no general agreement on how to define and measure the extent of such EMS referrals and no agreement on what is acceptable (Magnusson et al., 2022). Further, because the complexity of EMS assignment is developing, there is a need for increased and complementary knowledge, support tools and a clarification about the level of competence required of EMS staff (Ebben et al., 2017).

THE SECOND PART OF THE CARE PATHWAY – EMERGENCY DEPARTMENT (ED)



ED – CHARACTERISTICS AND COMPETENCE

The ED context can vary between countries, nationally and even between hospitals in the same city. The conditions and prerequisites are therefore different for each ED, emphasising the complex nature of this part of the acute care pathway. In addition, the patients' characteristics are different because of the level of severity, type of diagnosis and place of residence. However, regardless of the type of ED, the department must provide treatment for a wide spectrum of injuries and illnesses. It is important that employees possess the

skills required to meet the patients' various needs. A qualitative study showed that the competence focuses in ED is preferably concentrated on life-saving skills. Skills that are most valued are found in the medical field (Andersson et al., 2014).

The nurses generally comprise RNs and nurse assistants. Most RNs have a bachelor's degree, and, in Sweden, many of them have specialist education (Wallin, 2022). Nurse assistants can obtain a professional title after 2-year upper secondary school education or a similar course. The physicians represent several specialities, but often they have their base at another site in the hospital than the ED. However, more and more emergency medicine specialist physicians are employed at the ED. Unlike other specialist education programmes within the healthcare, emergency specialist education programmes, both for RNs and physicians, are still in their infancy.

ED – DEVELOPMENT AND CHALLENGES

For patients arriving in different ways to the hospital, the ED is most often the "door" to seek acute care. The number of patients coming to the ED, and those treated by the EMS are increasing nationally and internationally (Berg et al., 2019; Coster et al., 2017; Lindström et al., 2015; Pines et al., 2011; Tärnqvist et al., 2017), leading to long waiting times.

National statistics have shown that in Sweden, the LOS in the ED is increasing (Socialstyrelsen, 2021). Asplin (2003) described three components related to the LOS in the ED: *input* (e.g. patients' arrival conditions, patient flows), *throughput* (e.g. the number of staff members, workload, access to a treatment bed in the ED) and *output* (e.g. available hospital beds). Except for the ED situation, which includes high input and long throughput, there are also challenges regarding output. Being admitted to the hospital ward but not having a bed is known as ED boarding (ACEP, 2019b). In Europe, OECD data show that the number of hospital beds per capita is declining. Sweden stands out regarding the number of hospital beds; in 2000, Sweden had almost the lowest number of beds per 1000 population (approximately 3.7), and in 2018, the lowest number (approximately 2.1) (OECD, 2022).

In the literature, crowding is a frequently used term. There are several definitions of crowding. One is a mismatch between the available resources in relation to the number of patients in the ED and when the LOS becomes

unacceptable (Morley et al., 2018). Another definition is ‘Crowding occurs when the identified need for emergency services exceeds available resources for patient care in the ED, hospital or both’(ACEP, 2019a). Previous studies have shown it is associated with patient safety risks, increased mortality and morbidity (Af Ugglas et al., 2020b; Morley et al., 2018; Pines et al., 2011) and is related to lack of a work environment (Aiken et al., 2002; Medley et al., 2012).

Studies have indicated several causes of ED crowding. For example, a relative increase in hospital bed occupancy is associated with increased crowding in the ED (Af Ugglas et al., 2020a). Another cause is due to patients’ desire for their health problems to be addressed immediately, even in cases that are not suited for an ED visit (Coster et al., 2017; Uscher-Pines et al., 2013; Van den Heede & Van de Voorde, 2016). Other studies looked at the management of patients with unclear diagnoses and multifaceted diseases who present to the ED as frequent or double-frequent ED users (Quilty et al., 2016; Raidla et al., 2018). Furthermore, it has been found that uncertainty caused by interpersonal, organisational and cultural issues within the ED and clinic/hospital seems to influence physicians’ ability to make decisions, which, in turn, can affect the LOS (Khorram-Manesh et al., 2019).

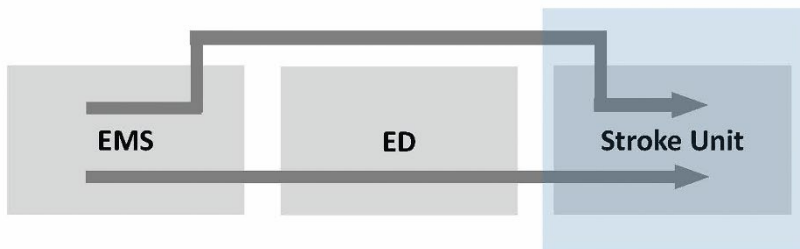
However, despite staff members at the ED and managers at different levels working with improvements to support the situation at the ED, today there is no golden solution that completely meets these challenges.

THE TRIAGE SYSTEM CALLED RETTS

To support nurses, both within EMS and ED, in assessing the severity of a patient’s condition, a triage system is used. Globally, there are several triage scales (Ringström et al., 2018), but their implementation varies widely (Farrokhnia & Göransson, 2011). The Medical Emergency Triage and Treatment System (METTS) was initially developed at the ED at SU to stratify patients based on severity and physician waiting time (Widgren & Jourak, 2011). Over the years, METTS has been developed and maintained; today, the system is known as the Rapid Emergency Triage and Treatment Scale (RETTS). In Sweden, RETTS is a common triage system within EMS and ED (Magnusson et al., 2020; Wireklint et al., 2021).

The RETTS is based on a five-level scale that includes emergency signs and symptoms (ESS) and vital signs (VS). The levels of severity both in ESS and VS are divided into the colours Red, Orange, Yellow, Green and Blue. Triage Level red signals life-threatening, while Level orange signals potentially life-threatening. Level yellow is more urgent than Level green, but both can wait in the ED without medical risk. Level blue is not used within EMS, but at the ED, this colour indicates a very limited urgent need for emergency medical care. The highest colour of either the ESS or the VS becomes the final triage level.

THE THIRD PART OF THE CARE PATHWAY—STROKE UNIT



STROKE UNIT – CHARACTERISTICS AND COMPETENCE

Stroke unit care is a specially designed concept intended to meet the needs of patients who have suffered a stroke. This can be provided in several contexts, in-hospital units dedicated to stroke patients, by using mobile stroke teams or with stroke units also consisting of rehabilitation wards. Organised stroke unit care is given by multidisciplinary teams that manage stroke patients and aim to provide coordinated care from several disciplines, using standard approaches to manage common post-stroke problems (Langhorne & Ramachandra, 2020).

STROKE UNIT – DEVELOPMENT AND CHALLENGES

The history of the concept of stroke units was outlined in a review by Langhorne in 2021 (Langhorne, 2021). According to Langhorne there have

been discussions about the stroke unit model for more than 50 years. Evidence of its effectiveness and benefits for patients emerged during the 21st century. Historically, various medical specialists (e.g. neurologists, geriatric specialists, and general practitioners and specialists in rehabilitation) in most countries have been responsible for stroke patients; however, international guidelines on how a stroke unit should be managed have been lacking. Managing patients who had suffered a stroke within a special stroke setting was first described in Northern Ireland in the 1950s. The idea was to have a team of specialists operating outside the stroke unit care for patients who had suffered a stroke. This ward focused on the rehabilitation phase. This stroke unit concept was initiated in the USA in the 1960s. In the 1970s, in Sweden, a model of a stroke unit that combined rehabilitation and acute stroke ward was developed (Langhorne, 2021).

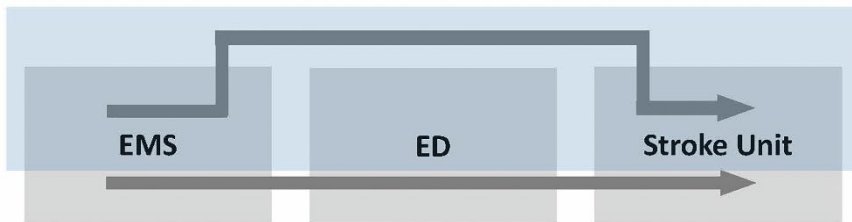
However, the first research with evidence of the benefits of the stroke unit was published in Norway in 1991. This study showed that caring for patients with acute stroke in a stroke unit improves clinical outcomes compared with treatment in general medical units (Indredavik et al., 1991). In a later study, Indredavik and colleagues showed that a shorter time to start mobilisation was the most important factor associated with being discharged home (Indredavik et al., 1999). Several reviews were presented about stroke unit outcomes.

The first updated collaborative review (19 trials, 3,249 participants) confirmed that managing patients in a stroke unit setting and followed up for 6 months to 1 year would result in fewer deaths, allow patients to be more independent physically, and avoid patients being institutionalised compared to those who were taken care of in a regular ward (Langhorne, 2021). A few trials suggested an improvement in quality of life. Other trials indicated post-stroke complications decreased, which provides support that being cared for in a stroke unit has benefits. Moreover, death or institutional care could be avoided for patients with more severe cerebral infarct or haemorrhage at the baseline measurements, while long-term disability could be avoided by patients who did not have a very severe stroke. Most of the evidence comes from stroke teams housed within in-hospital stroke care systems (Langhorne, 2021). In another trial Langhorne and Ramachandra (2020) concluded that independent of patients age, sex and initial severity they were more likely to survive and be independent and living at home one year after the stroke if they received

organised in-patient care. These benefits were most apparent in stroke units within the hospital's stroke ward.

Langhorne (2021) concluded that the best prognosis was to make sure that the patient receives the best care available which could be ensured by focusing on the ideal journey for a patient. This entails an acute intervention for most patients. However, the stroke unit concept will be necessary for the majority, including patient care that involves advanced nursing skills, physiological management, preventing complications, providing rehabilitation and having a team of specialists providing care.

THE CONCEPT OF FAST TRACK



PATIENTS ELIGIBLE FOR ACUTE CARE IN GENERAL – STREAMLINING THE WORKFLOW

Over the years, several Fast Track solutions have been developed for high-priority patients, referred to as time-critical disease states. For example, Van de Loo and colleagues showed that the median door-to-balloon (Time from EMS arrival at the hospital to start of treatment at the hospital) time was reduced by 27 min, and pre-clinical emergency diagnoses were correct in 95% of patients suffering from a suspected ST-elevation myocardial infarction (STEMI) when Fast Track from EMS to the cardiac catheterisation laboratory was used compared with established standard processes (van de Loo et al., 2006). In 2014, a systematic review aimed to describe the impact of the direct admission of patients with STEMI on the intervention and compare it with transport via the ED with regard to delays and outcomes. This review concluded that delay will be reduced, but the clinical benefit is not clearly

evidence-based (Hagiwara et al., 2014). Other studies have shown that when bypassing the ED, patients with STEMI have been reported to have shorter reperfusion times and lower mortality (Bagai et al., 2013; Shavadia et al., 2018).

Even stroke processes have been highlighted because the time to treatment is arguably the most important determinant of efficacy, with each minute reduction of onset to reperfusion time resulting in 1.9 million neurons saved and 4.2 days of extra healthy life (Meretoja et al., 2017; Saver, 2006). Efforts have been tested, with successful results, to optimise the stroke care pathway workflow to minimise treatment delay in acute stroke (Santana Baskar et al., 2021). The goal is to streamline triage and management workflow and reduce inefficiencies in process parameters, for example, by using telecommunication systems. This is an innovative and increasingly common concept of acute stroke care, connecting patients with expert neurology consultations. First proposed in 1999, there is a growing body of evidence supporting its use, efficacy, and potential to shorten the care pathway to acute treatment (Asaithambi et al., 2017; Blech et al., 2020; Levine & Gorman, 1999). According to other studies, telestrokes (digital solutions) can be used in triaging patients for EVT (Powers et al., 2019). Moreover, two meta-analyses confirmed no difference in functional outcomes or mortality with the implementation of a telestroke clinical decision-making system (Kepplinger et al., 2016; Zhai et al., 2015).

To streamline the workflow for patients suffering from a stroke, the effects of using EMS pre-notification have been studied (Hsieh et al., 2016). Studies have shown that improved prehospital stroke notifications are an important aspect in improving the hospital staff's preparedness and streamlining in-hospital workflows (Aghaebrahim et al., 2019; McKinney et al., 2013; Zhang et al., 2018).

Around the world, successful shortening of lead times in the stroke process to intervention has been achieved through the use of protocols (Candelaresi et al., 2017; Chen et al., 2017; Kamal et al., 2018), with the shortest time reported from Helsinki (Meretoja et al., 2012). Meretoja et al. (2012) concluded the key is to do so much as possible before arrival at the hospital. The Helsinki model comprised 12 streamlined workflow measures in the care pathway, including

EMS. The Helsinki model was tested in Melbourne and in New Zealand, with good results (Meretoja et al., 2013; Wu et al., 2018).

The intention to shorten time delay, both to start treatment earlier and also to identify patients suffering from stroke early, can be seen in both research and quality work. In that area, there are many examples. Nordanstig (2018) studied the effects of a stroke campaign, which showed that public awareness of stroke was rather low in Sweden and was increased by the Swedish National Stroke Campaign. The campaign was also associated with a sustained increase in the proportion receiving treatment by IVT and/or EVT and with a small improvement in the proportion arriving at a hospital within 3 h. (Turc et al., 2022) compiled knowledge about a mobile stroke unit (MSU) in a systematic review. The review showed that, compared with usual care, MSU use was associated with a 30-minute reduction in onset-to-IVT times, without safety concerns.

STROKE PATIENTS ELIGIBLE FOR ACUTE INTERVENTION – TREND OVER TIME

There are constant improvement projects and research geared towards streamlining the stroke care pathway. In Sweden, impressive, good results can be seen for high-priority patients suffering from strokes. Since 2012, the median time from arrival at the hospital to the start of treatment has almost halved, as the time has dropped from 55 minutes to 33 minutes (Figure 2). Moreover, the proportion treated with reperfusion treatment was more than triple in 2020 compared to 2010 (Figure 3). Of course, undoubtedly, this development is a benefit for patients, close relatives, healthcare and society at large.

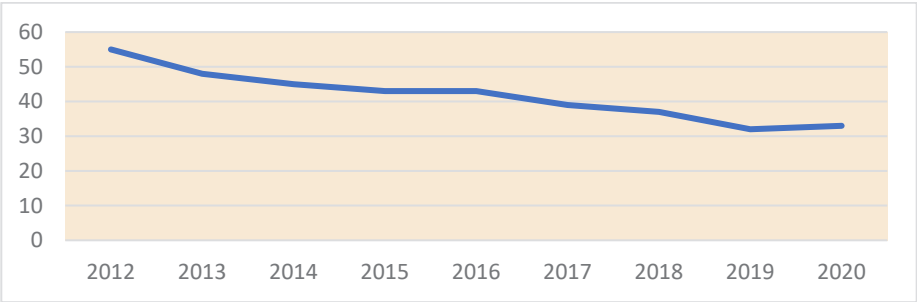


Figure 2. Number of minutes (median) - door-needle-time DNT - regarding stroke patients transported according to stroke alert in Sweden 2012–2020 (Ref: Annual Report 2020 National Stroke Register).

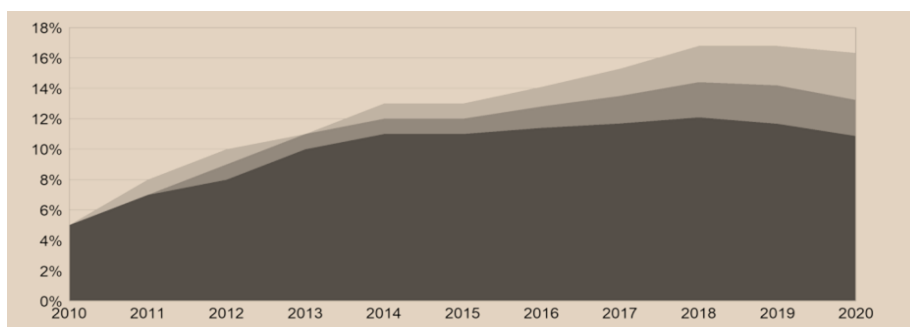


Figure 3. Percentage of patients who received reperfusion treatment in the target group ischaemic stroke 2010-2020. IVT dark coloured, IVT and EVT dark grey coloured, EVT light grey coloured. (Ref: Annual Report 2020 National Stroke Register)

PATIENTS NOT ELIGIBLE FOR ACUTE CARE IN GENERAL – STREAMLINING THE WORKFLOW

The Fast Track concept has been tested among several patient groups assessed as having a lower severity of illness. However, for these groups, there are fewer studies in the literature. In Sweden, knowledge regarding alternative and worthier care pathway processes for low-priority groups has been communicated through publications in scientific journals but also works in the field of quality improvement articles in media and highlighted through honourable awards. Together, these different channels have moved the positions and interests forward to change processes. The historically acute care pathway and its resources, earlier dedicated mostly to acute patients, have also been an issue for selected low-acuity patients for nearly 15 years.

Early in the 2000s, Fast Track from EMS directly to X-ray for patients suffering from a suspect hip fracture was developed at a University Hospital in western Sweden (Tornberg et al., 2006). In this time, no study had shown this Fast Track setup for this patient group. This concept, created by using quality improvement methodology, was a new way of thinking and was assessed as an innovative and pioneering process with great possibilities for spreading to other patient groups and other hospitals. Tornberg et al. (2006) showed that

bypassing the ED resulted in considerable time reductions in the acute care pathway. During the years, nationally and internationally, the Fast Track concept for these patients has been developed in several settings, with slightly different setups, all with decreased delays in the care pathway (Eriksson et al., 2012; Haugan et al., 2017; Larsson & Holgers, 2011; Pollmann et al., 2019). Bypassing the ED benefits patients suffering from a hip fracture because LOS in ED increase risk of not receiving recommended analgesics (Hwang et al., 2006). In addition, there is evidence of decreased adverse events and positive effects regarding recovery if there is a shortened time to operation (Leung et al., 2010). By using Fast Track directly to X-ray for patients with hip fracture, a RCT study showed the care pathway LOS was reduced by two hours compared with patients who were transported the traditional way via ED. The result did not show any impact on time to start surgery, hospital stay, post-operative complications or mortality (Larsson et al., 2016), which differs from (Eriksson et al., 2012) and (Haugan et al., 2017), who showed shorter lead times to surgery. The Fast Track did not influence the cognitive function of hip fracture patients (Larsson et al., 2019). However, other studies have shown that when using an intervention programme in the entire care pathway, based on early started and intensified care and supporting treatment within the EMS, the incidence of delirium during hospitalisation was reduced (Björkelund et al., 2010).

The possibility of a Fast Track has been transferred to other low-priority patient groups, and several alternative processes affecting the traditional steps and the time in the care pathway have been tested. Eklund et al. (2012) tried mobile radiography to avoid unnecessary transports to the hospital for vulnerable patients and in this way identify conditions such as hip fracture early on to decrease the number of steps later in the care pathway. Another care pathway concept based on rapid assessment at the ED for low-risk patients resulted in a shortened lead time until admission to the medical ward, with approximately >3h. Wireklint Sundström et al. (2014) and Jacobsson et al. (2020) presented a study regarding smooth processes for older persons from the EMS directly to the geriatric ward. Vicente et al. (2014) found that EMS nurses are able to identify and send older adults directly to an alternative healthcare facility. Norberg Boysen et al. (2019) developed a care pathway model where low-priority patients were transported either to CHC or to the ED to create smoother processes and earlier care at an appropriate level of care. However, the study

showed that patient safety appeared to be limited; for example, a proportion of patients suffering from stroke and TIA were missed.

Thus, in Sweden, in recent times, several different approaches have been tested and are ongoing to influence the flow and LOS in the care pathway. The approaches are based on using competent personnel within the EMS to make assessments, treatments and decisions, often supported by guidelines. The issue of safety risks regarding the ability to correctly identify patients who do not require ED resources and EMS personnel's level of education has been highlighted (Tohira et al., 2016).

Researchers have pointed out that the level of competence needed has not yet been clarified and that there is a need for more supportive tools within the EMS (Ebben et al., 2017). Other factors also affect prehospital settings, such as a wide variation regarding staffs' obedience to prehospital and ED guidelines (Ebben et al., 2013), where adherence to guidelines sometimes seems to be low (Hagiwara et al., 2013). Magnusson (2021) highlights the issue and believes the EMS patient population is an unselected population with assignments that span all the specialities, with the fact that this is challenging for the EMS nurse. Moreover, various guidelines and protocols, which Fast Track is based on, have been developed to support prehospital settings. Magnusson claims that EMS nurses must rely on professional judgement where guidelines and protocols on assessment or treatment are less suitable for patients presenting with diffuse vague symptoms.

HEALTH-ASSOCIATED HARMS IN THE EARLY CARE PATHWAY

Within healthcare organisations worldwide, issues about patient safety have been highlighted as an area of importance. Moreover, the WHO (2019) indicated that patient safety is being recognised as a large and growing worldwide challenge, as efforts to reduce the burden of patient harm have not achieved substantial change over the past 15 years. This resulted in a global action plan being drawn up (World Health Organisation, 2021). The Swedish law on patient safety (HSL, 2010) refers to *protection against health-associated harm*. In the law, health-associated harm means *‘suffering bodily or psychological injury or illness, and deaths that could have been avoided if sufficient measures had been taken in the patient’s contact with the healthcare system’* (free translated). This means that long LOS and the condition of the environment in the care pathway are examples of events that can result in patient suffering, which *could have been avoided if sufficient measures had been taken in the patient’s contact with the healthcare system*.

RISKS OF SUFFERING BODILY HARM

There are often delays in the care pathway from EMS to stroke units. For stroke patients, it is crucial to meet organised multidisciplinary stroke unit care by providing coordinated care from several disciplines using standard approaches to manage common post-stroke problems (Langhorne & Ramachandra, 2020). Previous research has pointed out areas in which patients with stroke especially risk suffering bodily harm.

Pneumonia is a major early complication associated with high morbidity and mortality (Koennecke et al., 2011; Westendorp et al., 2011). Nearly 10% of stroke patients experience pneumonia during the acute phase of hospital care, and the frequency is lower in patients receiving care in stroke units (Badve et al., 2019). The stroke unit concept can provide early screening for dysphagia and can take preventive actions against pneumonia (Yeh et al., 2011). Patients with acute strokes are at risk of infection. In a systematic review and meta-analysis, Westendorp et al. (2011) showed that infection complicated acute stroke in 30% of patients. Moreover, since stroke patients are often immobile and elderly, there are higher risks for complications, such as pressure ulcers (PUs) (Jaul et al., 2018), which have been recognised as an indicator for both

patient safety and quality of care in hospitals (NHS, 2010). Three focus areas have been identified as successful in preventing PUs: I) creating a good organisation, II) maintaining persistent awareness and III) realising the benefits for patients (Hommel et al., 2017). Finally, stroke patients have an increased risk of falling, which is a potentially deleterious consequence after a stroke (Persson et al., 2018).

RISK OF SUFFERING PSYCHOLOGICAL HARM

Calling for help is a crucial issue for patients. Before the decision to call for EMS, they often grapple with the situation to try to maintain their independence and autonomy (Ahl et al., 2006; Ahlenius et al., 2017; Vicente et al., 2013). It is therefore important that the patient him or herself describes how care, transfer and delay in the care pathway from EMS through ED and on the way to admission are experienced.

For patients, this is a decisive moment when the EMS arrives at the scene. The moment is described as a change from being vulnerable, anxious, afraid, and alone to being cared for (Holmberg et al., 2014) and it is of importance to receive reassurance during the transfer to alleviate anxiety (Togher et al., 2015). In Sweden, several EMS reorganisations have changed their assignment, meaning some patients are left at home, cared for by other care models. A review concluded that the patient experience of “this non-conveyance” is not fully known (King et al., 2021).

Patients who were cared for by EMS staff experienced dependency when they needed help; they felt objectified and not treated as individual human beings (Ahlenius et al., 2017). A lack of communication or professionalism compromised their sense of safety during their EMS encounter (Venesoja et al., 2020). Upon arrival to the ED, patients experienced loneliness and fear of being abandoned when handed over from EMS to the ED (Holmberg et al., 2014). In Sweden, in 2021, the patient’s total length of time (TVT) at ED for all age groups, independent of diagnosis, both for males and females, has increased (Socialstyrelsen, 2021). This resulted in overcrowding, boarding and long LOS in the ED. This means that there are patients waiting for initial care at the ED (input), waiting through the care process (throughput) and boarding in the ED, awaiting a hospital bed (output).

Except for being suddenly affected by an illness that is associated with the risk of being in a critical health-related transition (Meleis et al., 2000), low-priority patients were subjected to unnecessary suffering due to prolonged waiting times in the ED. They experienced that their symptoms were not taken seriously; they felt powerless and abandoned when care was delayed; and they did not understand what had happened (Dahlen et al., 2012). Han et al. (2017) found ED boarding patients experienced a distrust in the healthcare system. Moreover, Rantala et al. (2021) found that the meaning of being subjected to boarding at an ED resulted in a state of constant uncertainty and feelings of abandonment with no guidance or support from the clinicians.

On the other hand, trust was created when patients felt they were well received by the staff, when the staff connected with something in their lifeworld and environment (Norberg Boysen et al., 2017), when patients felt empowered being taken seriously (Rantala et al., 2016), and patient experience was positively associated with both patient safety and clinical effectiveness (Graham et al., 2019).

THEORETICAL FRAMEWORK

Theories within care science relate to four basic concepts: person, environment, health and nursing (Yura & Torres, 1975). They have been established as the cornerstones within care science, even though they have been expanded and modified over time. As an example, Meleis and colleagues argued that transition is a central part in nursing together with, e.g. communication and relation and therefore could be granted as an additional core concept (Dahlberg, 2010). In Meleis' transition theory, she describes different types of transitions addressing individual patients, individual staff and individual sections of the organisation. Their own transitions also affect the entire context (Meleis, 2010).

THE TRANSITION THEORY

Transitions have been defined in many ways. One definition describes it as a passage from one life phase, physical condition, or social role to another, resulting in a temporary disconnectedness of everyday life, which demands an adjustment of the person and the environment (Meleis, 2010; Schumacher & Meleis, 1994). The change can come from outside, which makes the person face a new situation, or the person can actively make choices that entail a new situation. Several forms of transition can occur simultaneously and overlap over a period. The transition brings about life changes and can lead to a vulnerability that affects the identity and health of the person, and it can also involve feelings of worry, insecurity, frustration, depression, ambivalence and feelings of loneliness (Meleis, 2010; Meleis et al., 2000).

Meleis describes four different types of transitions. The first is *developmental transition*, which relates to the life cycle that involves the migration from one phase of life to another. This includes when children move away from home or become older, a partner dies, becoming a parent and so on. The second is *situation-related transition*, relating to effects of different choices or ending up in a new situation, going from studies to work, nurses undertaking further education, retiring, moving to another place and so on. The third is *health-related transition*, which relates to health and illness, transitions from healthy to sick or vice versa. The last is *organisational transition*, which relates to the environment, new organisational conditions in the workplace, new policies, new ways of working, new political control systems, new managers and so on.

Transfer is another central concept that Meleis describes. This refers to a physical transition, such as a change in the level of care for a person or transport in a care pathway within or between activities or departments. Transfer can conceptually be defined as an event or series of events through which a person moves his or her care to a new healthcare setting or provider (Meleis, 2010; Moons et al., 2021).

When a care pathway is changed, several actors are involved. Patients and staff are not only involved in their own transitions, but also their transitions affecting each other. These transitions provide personal experiences which, in turn, affect an individual's behaviour, roles, relationships and abilities. The environment can be a hindrance or problematic and can contribute to increased vulnerability during the transition (Willman, 2022). For the patient, it could be about close support, attitudes, or socio-economic status. And for the staff, it can be about how prepared you are, what knowledge and experience you have or how much resources are allocated to the transition. The organisation can also undergo transitions, which can affect the lives of persons who work within them and their clients. The organisation is affected by both internal and external factors that change over a period. Transitions are complex processes, and multiple transitions may occur simultaneously during a given period. Both for the individual and also in the context (Meleis, 2010). Therefore, the transition theory has been helpful in this thesis work, in order to better understand and discuss the data.

RATIONALE

The well-known Fast Track routines within heart and trauma care are based on enabling direct transports of patients with time-critical conditions and a high level of severity of the illness from EMS to appropriate levels of care, thereby reducing unnecessary steps in the care pathway. The same applies to patients eligible for stroke alerts. The improved inter-professional teamwork has shortened lead times, resulting in earlier start of interventions, with better outcomes of care for the patients. However, a decade ago, this was not the picture for patients not eligible for stroke alert, where the care pathway traditionally still went through the ED, with a risk of long LOS at the ED and a possible increased risk of patient safety. A change in the traditional process bypassing the ED for stroke patients not eligible for stroke alert into a direct pathway in 2008 opened an opportunity to investigate the outcome of the changed role for the EMS nurse in identifying appropriate stroke patients and the consequences concerning lead times, diagnostic accuracy, and patient safety. This was the rationale for conducting Study I. Today, the use of the Fast Track concept for several patient groups assessed as not being severely ill is well established. However, it is a challenge to maintain obedience to the concept over time, despite its well-known benefits for care outcomes. The reasons behind this are not fully known, and this formed the rationale for Studies II and III, conducting interviews with staff working in the different steps of the care pathway to capture their experiences of reasons for and handling of a failed Fast Track for stroke patients not eligible for stroke alert. Finally, it is quite plausible that the lack of knowledge of optimal care pathways nurtures path-dependent routines detrimental to the patient. Therefore, these served as motivations to study the outcome of ED visits versus Fast Track in terms of safety risks in Study IV.

OVERALL AIM

The overall aim of this thesis was to describe and explore a changed organisational care pathway process from EMS to the stroke unit for patients not eligible for stroke alert, focusing on both patient and organisational perspectives in terms of safety outcomes and factors affecting LOS in the care pathway.

SPECIFIC AIMS OF EACH STUDY

- Study I** To evaluate the feasibility of an ambulance nurse correctly diagnosing an acute stroke patient and, if so, transporting the patient directly to a stroke unit without passing through the ED. We also wanted to estimate the delay from the emergency call to admission to a stroke unit.
- Study II** To explore favourable and unfavourable critical incidents (CIs) affecting lead times in the care chain from the alerted ambulance to the stroke unit, as experienced by nurses, for low-priority patients suffering a conceivable acute stroke.
- Study III** To explore the actions taken by nurses that affect lead times in the care pathway from the alerted ambulance to the stroke unit for low-priority patients suffering a suspected stroke.
- Study IV** To describe outcomes related to patient safety for stroke patients considered not eligible for acute intervention but still transported via Fast Track directly to the stroke unit, and to compare these patients' outcomes with the outcomes of patients considered but not accepted for Fast Track.

METHODS

DESIGN

To manage and achieve the overall aim—To describe and explore a changed organisational care pathway process from EMS to the stroke unit for patients not eligible for stroke alert, focusing on both patient and organisational perspectives in terms of safety outcomes and factors affecting LOS in the care pathway—as well as the specific aims of the thesis, descriptive and explorative designs with both quantitative and qualitative approaches were used in the four studies (Table 1).

Table 1. Overview of designs and methods used in Studies I–IV

Study	Design	Context	Participants	Data collection	Data analysis
I	Deductive Case-control Comparative Descriptive	Ambulance-transported patients with suspected stroke not eligible for stroke alert	53 patients were directly transported to the stroke unit 49 patients were transported via the ED	Consecutive patients admitted by EMS staff directly to the stroke unit (case). Retro-spectively consecutively collected controls	Descriptive and inferential statistics
II	Inductive Explorative Descriptive	Nurses working in the entire care pathway from EMS to stroke unit for patients not eligible for stroke alert	22 strategic selected nurses. EMS n = 6 ED n = 11 Stroke unit n = 5	Individual open interviews	Critical incident technique
III					

IV	Deductive Case-control Comparative Descriptive	Ambulance- transported patients, not eligible for stroke alert, diagnosed stroke (excluded TIA), hospitalised at any of the stroke units at SU during 130101- 191231	557 patients were included in the case group (direct admission) 509 patients were included in the control group (via the ED)	Data were collected from both national and local quality registers as well as from hospital databases. National (National Swedish Stroke Register) and Local (The Väststroke register) quality register	Descriptive and inferential statistics
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SETTINGS

All studies were conducted within a University Hospital in a city located in Western Sweden. The city is the second largest within the country, serving approximately 700,000 inhabitants. This hospital is one of seven University Hospitals in Sweden and one of the largest hospitals in Northern Europe. The number of available beds and the number of staff during the time the studies were carried out are presented below (Table 2).

Table 2. The number of staff divided into clinicians and administrators and available hospital beds at the University Hospital, 2008-2022.

	2008	2014	2019	2022
The number of clinical staff (permanent, substitute, hourly) n (% of total)	15 716 (97.9%)	16 463 (96.2%)	17 451 (95.4%)	18 014 (94.7%)
The number of staff in administration n (% of total)	344 (2.1%)	652 (3.8%)	844 (4.6%)	1010 (5.3%)
The number of available hospital beds (mean)		1783	1560	1291

The present University Hospital was located on three separate sites around the city, one in the city centre (Sahlgrenska hospital) and two in the suburbs (Östra

hospital and Mölndal hospital), all with their own stroke unit and ED. The EMS was runned as a private enterprise in 2008–2012 and after that by the county council. The prehospitaal organisation included several stations in the area, with nearly 19 ambulances. Transports to the hospitals were distributed according to a geographical key, based on the patients’ place of residence postcode; in accordance with pre-determined criteria, patients were transported to the centre hospital, as their condition required.

PARTICIPANTS

Study I: During the study period, 15 Sept 2008–2 Nov 2009, all patients in the case-group were consecutively included. A total of 53 patients were transported according to the Fast Track directly to the stroke unit at the pre-defined suburb hospital, Östra Hospital (case-group). The patients were not eligible for stroke alert and were identified according to a pre-defined checklist (Appendix 1, (in Swedish)). The control-group consisted of 49 patients. They were included retrospectively and consecutively in accordance with the same inclusion criteria as the case. Age and sex of the case- and control-groups are provided in Table 3.

Table 3. Characteristics, age and sex, for the study population in study I.

	Case (n = 53)	Control (n = 49)	P-value
Age, median (range)	83 (48–94)	79 (43–93)	0.048
Male/Female (%)	43/57	49/51	n.s.

The interviews that formed the basis for *Studies II and III* included 22 nurses distributed among all three EDs, two stroke units, and EMS nurses located at several stations. To provide a sample representing the demographics of the region, such as age, sex, education level and work experience, the participants were selected strategically (Polit & Beck, 2021). Their nursing experience ranged from 3 to 32 years (mean = 14), and 12 had a specialist education; some had two. Within the EMS, five from a total of six nurses were specialist educated. Seven participants were male. In the study population, the mean age was 41 (median = 42.5). The range for females was 26–60 and for males, it was 26–54. Only women represented the stroke units. Six nurses were interviewed at EMS, out of which 5 were men (Table 4).

Table 4. Characteristics of participants—Studies II and III

Sex	Age	Current work unit	Education level	Specialist education	Nursing experience	Year at current work unit
Male	48	ED Sahlgrenska hospital	Clinical Nurse Specialist education	Internal medicine	19	19
Female	43	ED Sahlgrenska hospital	Clinical Nurse Specialist education	Midwife ED	22	17
Male	46	EMS	Clinical Nurse Specialist education	EMS	20	15
Female	38	EMS	Clinical Nurse Specialist education	Midwife EMS	13	3
Male	47	EMS	Clinical Nurse Specialist education	EMS	18	Un-known
Male	34	EMS	Clinical Nurse Specialist education	EMS	6	5
Male	42	EMS	Clinical Nurse Specialist education	EMS	7	7
Male	38	EMS	RN		8	5
Male	27	ED Sahlgrenska hospital	RN		4	4
Female	54	ED Mölndal hospital	Clinical Nurse Specialist education	Anaesthesia	32	1
Female	54	ED Mölndal hospital	Clinical Nurse Specialist education	Anaesthesia	29	23
Female	26	ED Mölndal hospital	RN		4	3
Female	29	ED Mölndal hospital	RN		3	3
Female	60	ED Mölndal hospital	RN		20	18
Female	52	Stroke unit Sahlgrenska hospital	RN		19	8
Female	44	Stroke unit Sahlgrenska hospital	RN		21	18
Female	27	ED Östra hospital	RN		4	4
Female	27	ED Östra hospital	RN		3	3
Female	34	ED Östra hospital	RN		5	5
Female	49	Stroke unit Östra hospital	Clinical Nurse Specialist education	unknown	12	12
Female	44	Stroke unit Östra hospital	Clinical Nurse Specialist education	unknown	16	16
Female	41	Stroke unit Östra hospital	Clinical Nurse Specialist education	unknown	15	14

Study IV was based on a local register (Strokecentrum väst, 2022) established in 2013 and closed in 2019. The register provides data throughout the entire care pathway, including prehospital care, for all stroke/TIA patients who were hospitalised at stroke units at SU. The register complements the National Swedish Stroke Register (Riksstroke, 2022) with further details covering the care pathway among patients suffering a stroke/TIA that are not reported in Riksstroke. In *Study IV*, some valuable information was not available in the Väststroke register; therefore, additional data was obtained from the hospitals and the pre-hospital patient administrative data systems, as well as the National Swedish Stroke Register (Riksstroke, 2022). A total of 1,066 patients were identified to be included in the study population, with 557 of them being in the case group (direct admission, Fast Track) and 509 in the control group (transport via ED, before admission to the stroke unit). In the study population, 50% of the participants were females. In the case group, the mean age was 79.9, and the median was 81.4 (range = 45–104). In the control group, the mean age was 78.9, and the median was 80.4 (range = 27–99).

MEASUREMENT PROCEDURE AND TIME POINTS

The four studies were conducted over a period of approximately 10 years (Figure 4).

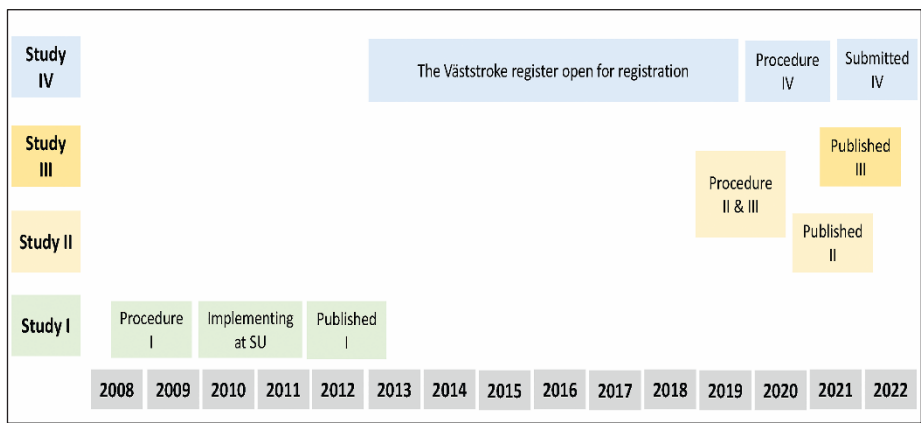


Figure 4. Time window of Studies I–IV.

Study I: Before the project started, a physician working in the stroke unit at the suburb hospital, who was going to test the Fast Track concept, educated the EMS nurses in a 3 h course on stroke and stroke symptoms. At the start of the project, only two ambulances were involved. To ensure that the project was run according to the criteria (Appendix 1, (in Swedish)), a limited group of EMS nurses and hospital stroke coordinators were involved. In 2009, the project gradually expanded, and by November 2009, most of the 19 ambulances in the area were taking part in the project. According to the pre-defined criteria, the EMS nurses identified patients. If the EMS nurse considered Fast Track possible, the hospital stroke coordinator was contacted. The patients' condition was evaluated, and the coordinator had a full mandate to accept or deny Fast Track to the patients, both for medical reasons, but also for other reasons such as a lack of beds. All consecutive patients who were accepted for a Fast Track between 15 Sept 2008 and 2 Nov 2009 were included and formed the case group ($n = 53$). To create a control group, data were retrospectively and manually collected from the hospital medical and EMS charts. Consecutive patients who were transported by the EMS to the ED between the same period, on weekdays between 7 AM and 6 PM (the time was extended by 1 h AM and two hours PM to increase the sample size), who met the same criteria, and where the physician on duty suspected stroke, as well as patients who were admitted to the same stroke unit were included. The control group consisted of 49 patients.

The interviews that formed the basis for *Studies II and III* were conducted in the autumn of 2019. CIT is a suitable and effective method for identifying and following up on individual behaviour in terms of experiences and actions (Fridlund et al., 2017). The participants were selected based on the context being studied. Nurses who worked at the EMS, ED and stroke units at the University Hospital were invited to participate. To identify eligible nurses, the researcher contacted the managers in the different departments and informed them about the study. These managers, in turn, notified the nurses about the opportunity to participate, after which the interested nurses were informed about the study orally and in writing by the researcher. The participants chose the venue for the interview, which was normally near their work. The interviews lasted an average of 30 minutes. The interviews were started by the researcher asking the participant to describe his or her experiences. The first description included "a golden case", where the Fast Track concept had worked without problem, which had resulted in short lead times in the care

pathway and how the nurses had acted in the situation. Additionally, the participants were asked to describe the “worst Fast Track case” carefully, including every detail and what actions were undertaken. It was important to catch the nurses’ experienced cases. All interviews were recorded and then carefully transcribed by persons who were used to doing this work.

Study IV was a register study with a retrospective case-control design of stroke patients transported to the University Hospital by EMS between 2013 and 2019. Due to the long study period, the pre-defined checklist had been corrected several times. No major changes had been made, but there were clarifications. The checklist was based on RETTS, and patients who were triaged at the levels red and orange were excluded from the Fast Track (Appendix 1-5, (in Swedish)).

Data were collected from both local and national quality registers and local hospital databases. All data were gathered into one document, and the identification of the study population was done in this document.

Fast Track-transported stroke patients (excluding TIA), to any of the hospitals’ stroke units, not eligible for stroke alert, constituted the cases. The control group included stroke patients whom the EMS nurse considered as eligible for Fast Track but who, for some reason, were not accepted and instead were transported to the ED and from there, later to a stroke unit.

Only patients who spent their entire hospital stay at a stroke unit were included, and each patient was included only once in the study; thus, recurrent stroke events during the study period were excluded. The study population comprised 1,066 patients. In all, 557 patients were included in the case, and the controls consisted of 509.

ANALYSIS

Studies I and IV Quantitative data were collected. The results were processed by using SAS software. In both studies, statistical support was used both regarding advice about appropriate statistical methods and to carry out the analyses. All tests were handled two-sided. P-values of less than 0.05 were considered significant.

Study I: Differences in proportions between the direct admission group and control group were analysed with Fisher's exact test. For continuous variables, the Mann-Whitney U test was used. Frequencies, percentages and range were presented.

Study IV: For categorical variables, frequencies and percentage were presented, while mean, standard deviation (SD), median, minimum and maximum values were used to express continuous variables. For unadjusted comparisons between the two groups, Fisher's exact test was used for dichotomous variables. For analyses of dichotomous outcome variables, univariate and multivariate logistic regressions were performed.

Studies II and III were conducted according to a qualitative methodology, using critical incident technique (Flanagan, 1954). The interviews revealed a large number of experiences and actions taken. Therefore, Study II explored experiences in the stroke care pathway, and Study III explored the actions taken that affected the lead times.

The researcher read through all the transcribed interviews to get an overall picture of the content of the described experiences and actions taken. All experiences and actions taken related to the aim were identified and highlighted in the text. A comparison was made to find similarities and differences. The experiences and actions taken were categorised into sub-categories such that each sub-category contained similar kinds of described experiences and actions. Following the same structural and systematic analysis procedure, the sub-categories were abstracted into categories and, finally, main areas. This analytical procedure was discussed together with the other researchers until consensus was reached (Jones & Hunter, 1995).

ETHICAL CONSIDERATIONS

The thesis follows the ethical principles of the World Medical Association's Declaration of Helsinki in protecting, respecting and ensuring the health and rights of the human subjects who are involved in the research, which should contribute to improved health and prevent harm (World Medical Association, 2013).

To ensure the confidentiality of the participants (Studies I–III) and the participants' register information (Study IV), data were presented on a group level. Data were coded (Studies I–III) and de-identified (Study IV) before the analysis phase. Individuals could not be identified in the data. Regarding Studies II and III, it was important that the confidentiality of the participants was ensured, as they were interviewed individually, where sensitive information about the organisation, colleagues, other departments than their own and leaders were described.

The nurses received information about the handling of the interview material so that they could feel safe to freely describe their experiences. An ethical dilemma was that the researcher had worked as an RN at one of the EDs (20 years ago) and had been a leader within the EMS at the University Hospital; thus, she was familiar with the other leaders at the different levels and the hospital care processes. This could affect the interview technique, the participant's freedom to describe his or her experiences and the validity of the results. The researcher was aware of this and paid close attention to it. The preunderstanding also provided opportunities to obtain rich data material, which is an important issue within the CIT (Flanagan, 1954).

Another ethical dilemma was that the process of identifying participants in Studies II and III was mediated through managers, which could affect the selection. The researcher decided this was a correct decision since the clinical work was ongoing, and all the participants were interviewed close to their workplace and often during their work time; therefore, the managers had to be involved.

Regarding the data extraction in Study IV, the researcher was careful to only request data that was relevant for the aim of the study. This was out of respect for patients whose medical records may contain sensitive information.

The present thesis was evaluated and approved by the Ethical Review Board Committee in Studies II–IV. By the time Study I was performed, quality and improvement projects did not need approval from the Ethical Review Board Committee.

Study I: The study was conducted in 2008–2009 within the medical department at Östra hospital. Moreover, the first researcher worked as a quality assurance developer at the EMS unit and the last researcher as a physician at the medical department at Östra hospital. Although ethical approval was not required, the ethical principles were followed. Department managers at the EMS unit and the medical department approved the data collection. The patients, as well as their relatives, were given information about the study by the EMS nurse. All patients gave their orally informed consent to be transported by the ambulance directly to the stroke unit, instead of being transported via the ED.

Studies II–III (D.nr: 374-18): The ethical approval comprised several other studies and included Studies II and III in the present thesis. These two studies used the critical incident technique to collect data and were analysed and presented separately. To identify eligible nurses, the researcher contacted the managers in the different departments of the care pathways and informed them about the study. The managers, in turn, notified the nurses and invited them to participate. All nurses were informed about the study orally and in writing by the researcher. All participants were invited to participate in individual interviews on a voluntary basis and could withdraw at any time during the interview as well as during the study period without any consequences. Written informed consent was given by all participants.

Study IV: The project design was evaluated and approved by the Ethics Review Authority (D.nr: 2021-05163), which was supplementary approval to a previously approved application (D.nr: 284-17). The supplementary approval consisted of data from ambulance and hospital patient data systems. Study IV was a register study, and informed consent was therefore not applicable. However, approval was required from all register and system holders.

RESULTS

STUDY I

The aim was to evaluate the feasibility of an ambulance nurse correctly diagnosing an acute stroke patient and, if so, transporting the patient directly to a stroke unit without passing through the ED, and to estimate the delay from the emergency call to admission to a stroke unit.

This study was conducted in 2008–2009 (Figure 4). It was analysed retrospectively and quantitatively. Moreover, it was a comparative and descriptive case-control study that used a deductive approach. Fifty-three patients were consecutively admitted from EMS to the stroke unit (direct admission group -DAG); 49 patients were retrospectively matched and formed the control group, that is, they were transported via the ED (control-group -CG) (Table 1).

The baseline characteristics differed significantly regarding age, prior stroke and a diagnosis of ischaemic heart disease (IHD). The median age was 83 years in the DAG and 79 years in the CG ($p = 0.048$). A higher proportion of patients in the DAG had had a prior stroke compared with the CG (51% vs 31%, $p = 0.045$). In the CG, there was a higher percentage of patients with a diagnosis of IHD (35% vs 15%, $p = 0.037$).

The results showed that the delay from calling an ambulance until arrival at the stroke unit was significantly shorter in the DAG than in the CG (median time, 54 vs 289 min, $p \leq 0.001$). Further, the mean time from when the ambulance started driving to the scene until arrival at the hospital was 7 min longer in the DAG compared with the CG (48 vs 41 min). With regard to discharge diagnosis, there was no significant difference between DAG and CG; 55% of patients in the DAG versus 70% in the CG had a final diagnosis of stroke (TIA excluded). A summary of stroke, TIA and sequelae of prior stroke was found in 85% of the DAG and 90% of the CG.

The result of Study I concluded that the concept of a prehospital diagnosis by an EMS nurse was associated with relative diagnostic accuracy in terms of stroke-related diagnoses and a considerably shortened lead time from calling ambulance to arrival at the stroke unit.

STUDY II

The aim was to explore favourable and unfavourable CIs affecting lead times in the care chain from the alerted ambulance to the stroke unit, as experienced by nurses, for low-priority patients suffering a conceivable acute stroke.

This study was conducted in 2018–2019, and constituted data material both for Studies II and III (Figure 4). The design was inductive and explorative, where data collection and analysis were carried out using the critical incident technique according to its qualitative analytical approach. CIT aims to create descriptions of experiences and actions taken that have influenced a phenomenon; in this context, the care pathway-LOS, and due to their retrospective perspective, they can only be considered critical in hindsight. The experiences were presented in Study II, and the actions taken were included in Study III. In total, 22 strategically selected nurses from the entire care pathway (i.e. EMS, ED and stroke unit) were interviewed individually (Table 1, Table 4).

The interviewed nurses described how the experienced CIs affected the lead time in the entire care pathway for patient's not eligible for stroke alert. In total, 363 experiences that affected the care pathway-LOS favourably or unfavourably were identified. Two main areas were formulated: "human interactions" and "healthcare structures". Of the nine sub-categories sorted under "human interactions", five had the most hindering experiences (in the figure below red colouring). All sub-categories sorted under "healthcare structures" showed the most hindering experiences affecting the care pathway-LOS (Figure 5).

Main area	Human interactions (n=246)			Healthcare structures (n=117)	
Category (n; favourable/ hindering)	Co-created context (112; 36/76)	Patient issues (94; 33/61)	Employee abilities (40; 32/8)	Process functionalities (77; 15/62)	Organisational prerequisites (40; 12/28)
Subcategory (n; favourable/ hindering) (%/%)	activities (53; 6/47) 11%/89%	assessment of symtoms (49; 13/36) (27%/73%)	know-how (29; 21/8) (72%/28%)	workflow (40; 9/31) (22%/78%)	available beds (19; 9/10) (47%/53%)
	atmosphere (24; 5/19) (21%/79%)	involvement and participation (31; 18/13) (58%/42%)	professional relations (11; 11/0) (100%/0%)	organisational silos (22; 3/19) (14%/86%)	crowding (15; 3/12) (20%/80%)
	cross-sectional collaboration (23; 21/2) (91%/9%)	abandonment (14; 2/12) (14%/86%)		division of labour (15; 3/12) (20%/80%)	accessible work tools (6; 0/6) (0%/100%)
	communication (12; 4/8) (33%/67%)				

Figure 5. Experienced CIs influencing care pathway-LOS from EMS to stroke unit.
Red colouring; most of the CIs in the sub-category had a hindering influence. Green
colouring; most of the CIs in the sub-category had a favourable influence

Most of the experienced CIs had a hindering impact, but some were favourable for the care pathway-LOS. There were 15 sub-categories found, and a variety of the experienced CIs within the different departments were highlighted. "Activities" was the largest sub-category (n = 53 or 15%). This sub-category was dominated by hindering factors and referred to how other parts of the care pathway and other professionals than their own worked. Within EMS, "assessments of symptoms" was highlighted as a hindering influence and "involvements and participation" as favourable for the care pathway-LOS. The ED and stroke unit mostly emphasised "workflow", and "involvement and participation" were rarely mentioned in the interviews (Figure 6).

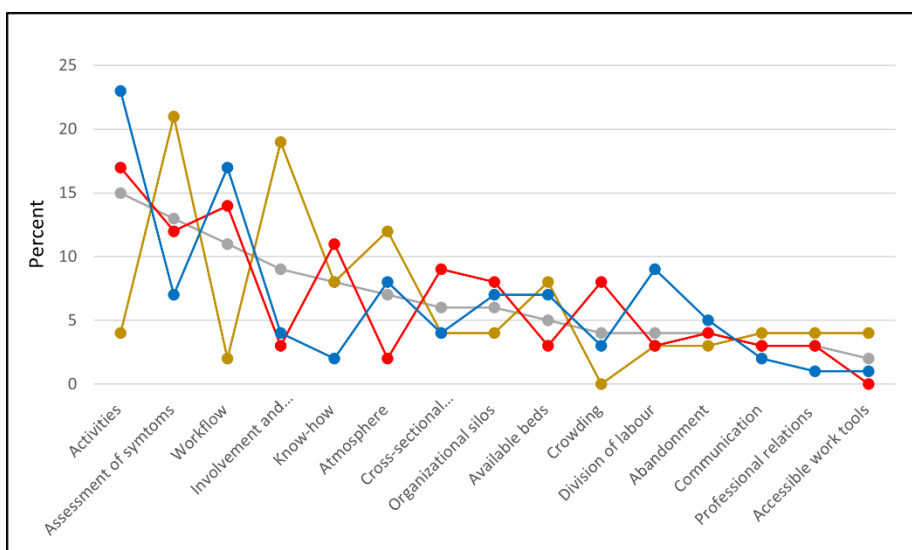


Figure 6. Distribution of experienced CIs in the sub-categories (%); overall and for each department. In total (CI n = 363, grey line), EMS (CI n = 114, orange line), ED (CI n = 157, red line), stroke unit (CI n = 92, blue line).

The result of Study II concluded that both experiences occurring early in the care pathway as well as later seemed to influence the care pathway process. The EMS, ED and stroke unit appeared to be closely linked to each other; however, the results also highlighted that gaps among them probably had an impact on lead time.

STUDY III

The aim was to explore the actions taken by nurses that affect lead time in the care pathway from the alerted ambulance to the stroke unit for low-priority patients suffering a suspected stroke.

The data were collected according to the description in Study II. In Study III, the second part of CIT was analysed and the result summarised, that is, the actions taken that affected the care pathway-LOS from the alerted ambulance to the stroke unit for patients not eligible for stroke alert. The interviews resulted in 344 actions that were taken by the participants. The actions taken were distributed as follows: EMS (39%), ED (33%) and stroke unit (28%). The analysis resulted in the identification of two main areas: a) promoting the care pathway progress (n = 195) and b) taking control of the situation (n = 149).

“Promoting the care pathway progress” referred to procedures aimed at “improving clarity”, “contributing towards precautionary measures” and “enabling agility.” The nurses focused on actions such as observing the condition of the patients, handling situations to promote patient safety and shortening the care pathway-LOS by working in a flexible manner and getting an overview of the care pathway process.

Main area **b** related to actions “dealing with different opinions” and frustrations, i.e. maintaining a balance between arguing, confronting others and choosing to keep one’s ideas and disappointment inside. “Taking control of the situation” was also associated with actions regarding “letting off steam.” This meant reflecting on the complex organisational and care processes together with colleagues, either in an organised setting or during coffee breaks. The actions were divided into 15 sub-categories where the most described actions taken are visualised below (Figure 7).

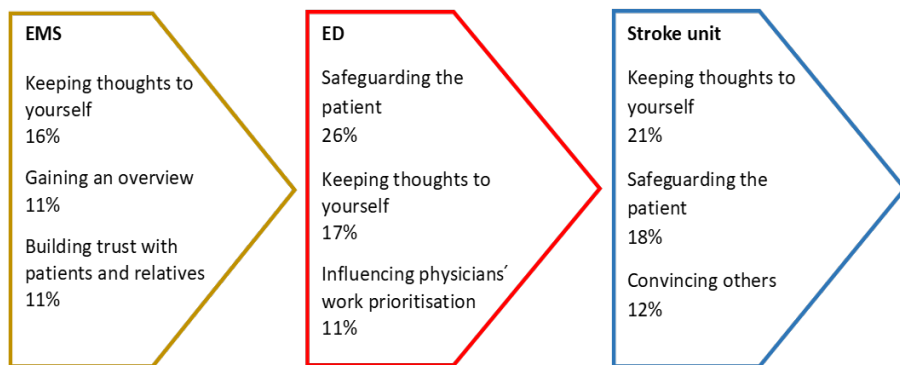


Figure 7. The most commonly described actions taken (%) affecting the lead time within each department (EMS, ED, stroke unit) in the care pathway for patients not eligible for stroke alert.

The conclusion of Study III highlights the differences and similarities in the actions taken to shorten the care pathway-LOS by staff working in the different departments. Staff at all stages in the care pathway prioritised patient safety and safeguarding the patient, but they managed this through different actions.

STUDY IV

The aim was to describe outcomes related to patient safety for stroke patients who were not considered eligible for acute intervention but still transported via Fast Track directly to the stroke unit and to compare these patients' outcomes with the outcomes of patients considered but not accepted for Fast Track.

This study was conducted during 2013–2019 (Figure 4) and used retrospective data from quality registers, both local and national, and from hospital databases. The design was a comparative, descriptive case-control study with a deductive approach. A total of 1,066 patients were identified by the EMS nurse as potential patients for a Fast Track direct from the EMS to the stroke unit. Of these patients, 557 were finally accepted (cases), and 509 were not accepted (controls) for Fast Track (Table 1). The median age was 81 years, and 50% were males. The baseline characteristics differed significantly regarding a) current smokers (cases 19.7% vs controls 13% $p = 0.018$); b) atrial fibrillation (AF) (cases 13.6% vs controls 23%, $p = 0.0001$) and c) on anticoagulation (2.2% of cases vs 11.6% controls, $p < 0.0001$), and slightly more direct admissions were accepted after 4 PM. There was no difference in median NIHSS value. (National Institutes of Health Stroke Scale).

The primary outcome event was death within 90 days after admission, and the secondary outcomes were death within 28 days after admission, death during hospitalisation, pneumonia, fall and PUs during the hospitalisation. Moreover, the patient reported outcome measurement (PROM) 3 months after admission was also a secondary outcome.

Although the result did not show any significant differences between the two groups regarding complications in the acute phase or PROMs 3 months after admission, other patterns related to patient safety were seen. Below, three of these are presented.

a) Pre-defined criteria managing the Fast Track process were based on the triage system RETTS. According to these, only patients assigned green or yellow were qualified for direct admission. Despite this, sometimes the EMS nurse contacted the stroke coordinator when patients were assigned Level red or orange. A higher proportion of controls were assigned this level of severity. Moreover, a percentage of patients assigned red or orange were directly admitted (cases) (Table 5).

Table 5. The EMS nurse's assessment of the severity level according to RETTS (number and percentage).

In total 1066	Cases 557	Controls 509
By the EMS nurse proposed Fast Track (n=911) missing=(n=155)	Accepted Fast Track (n=469) missing (n=88)	Unaccepted Fast Track (n=442) missing (n=67)
18 (2.0%)	12 (2.6%)	6 (1.4%)
638 (70.0%)	392 (83.6%)	246 (55.7%)
230 (25.2%)	53 (11.3%)	177 (40.0%)
25 (2.7%)	12 (2.6%)	13 (2.9%)
Green + Yellow 656 (72%)	Green + Yellow 404 (86%)	Green + Yellow 252 (57%)
Orange + Red 255 (28%)	Orange + Red 65 (14%)	Orange + Red 190 (43%)

b) Over time, there was a yearly decreasing trend regarding the number of contacts from the EMS nurse to the hospital stroke coordinator. The data were pre-hospital data, that is, it included patients suspected of stroke. This data was validated by comparing it with the present study population, that is, in-hospital discharge diagnosis, where a similar trend was observed. Additionally, pre-hospital systems showed an increasing trend of denied Fast Track cases. The major cause of this phenomenon was non-available hospital beds (Figure 8).

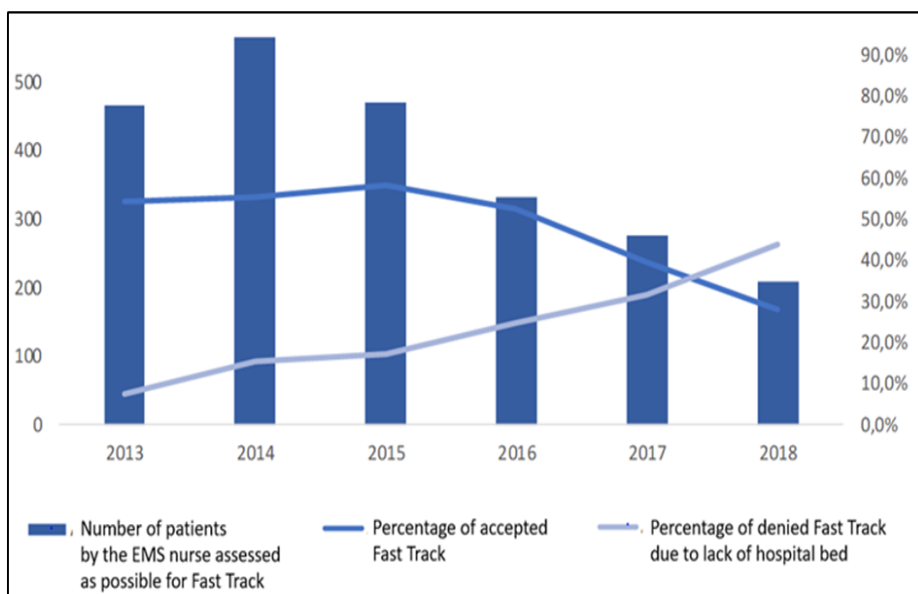


Figure 8. Percentages of patients accepted for Fast Track and denied due to the lack of hospital beds for the number of patients assessed as being qualified for Fast Track by the EMS nurse. March 2013–December 2018. Conducted from a prehospital database.

c) Patients denied for Fast Track directly to the stroke unit had a considerably long LOS in the ED before being admitted to the stroke unit—a mean time of 237 min or almost 4 h when including the three EDs at the University Hospital (marked grey). When the EDs were separately analysed, a large difference was observed in terms of LOS in the ED between the city centre hospital (marked black) including a wide range of specialist competences and units compared to the two suburban EDs (marked brown and orange) (Figure 9).

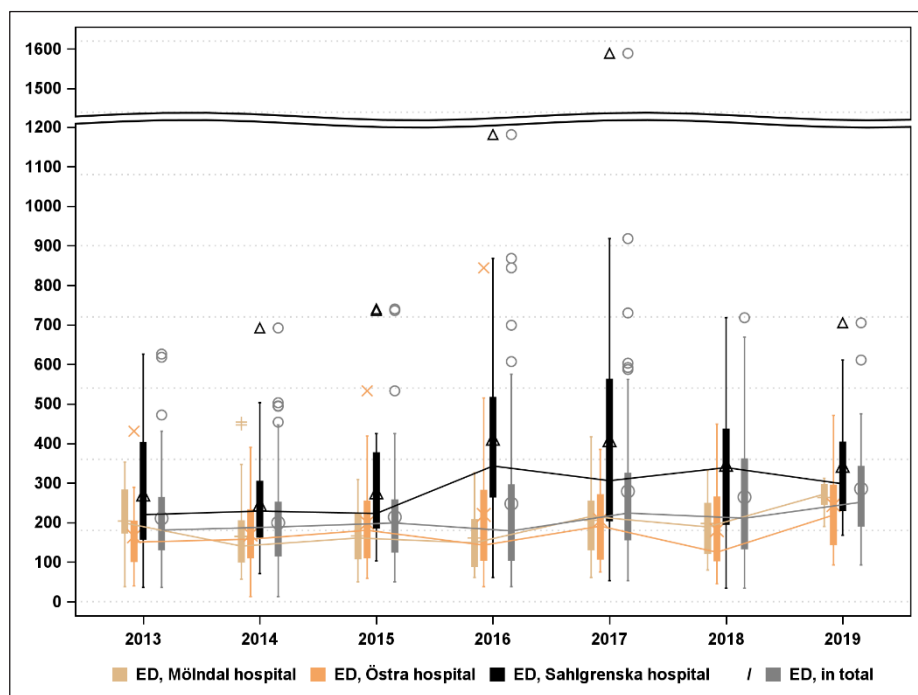


Figure 9. LOS in ED (TVT) (minutes) for patients not transported according to Fast Track directly to the stroke unit (controls, Study IV), divided at the University Hospital three EDs and presented as a total unit. The box refers to Q1 or 25th percentile, median, and Q3 or 75th percentile.

The conclusion of Study IV revealed no difference in the pre-defined patient safety outcomes between stroke patients who spent a mean time of almost 4 h in the ED before being referred to the stroke unit and patients who were admitted directly to the stroke unit. The Fast Track process has the potential to decrease the strain on ED resources and long LOS in ED for patients.

SUMMARY OF THE RESULTS

The overall aim was to describe and explore a changed organisational care pathway process from EMS to the stroke unit for patients not eligible for stroke alerts, focusing on both patient and organisational perspectives in terms of safety outcomes and factors affecting LOS in the care pathway.

The four studies were variously designed in different ways to answer the overall aim. By using both qualitative and quantitative methods and inductive and deductive approaches, this research area was investigated through different lenses. In this thesis, two perspectives were highlighted: the patient and the organisation. The thesis showed that it was possible to change a traditional care pathway process, that is, transport via the ED to a changed process, i.e. bypassing the ED for stroke patients not eligible for acute intervention. The studies II, III and IV showed in different ways that there were several challenges to maintain the conditions for Fast Track over time and that the staff in all parts of the care pathway protected the patient from suffering health-associated harms because the care pathway LOS was often long in the traditional process.

The patient safety condition of this changed process was investigated in several ways: a) in terms of the feasibility of an EMS nurse correctly diagnosing a suspected stroke, which was associated with relative diagnostic accuracy (Study I); b) in terms of describing and comparing care pathway-LOS, which was considerably shortened in the changed care pathway (Studies I and IV); c) in terms of describing and comparing complications in the acute phase and PROMs 3 months after admission, which did not differ between the groups (Study IV); d) in terms of exploring and describing experiences affecting the care pathway LOS in relation to human interactions and healthcare structures (Study II); and e) in terms of exploring and describing actions taken, which showed that staff in the entire care pathway protected the patients by promoting the process and taking control in different ways (Study III).

Factors affecting LOS were shown through all the studies in the thesis. LOS was linked to human interactions and healthcare structures (Study II). The changed process worked well in the beginning (Study I) and showed that Fast Track resulted in significantly shortened lead times (Studies I and IV). The results suggested that over time, organisational conditions did not exist for the

process to work smoothly. Staff descriptions about experienced incidents and actions taken indicated that this was a major problem (Studies II and III). The organisational transition in terms of both changing to a new process and perpetuating prerequisites over time at all organisational levels (micro-, meso- and macro) appeared to be a considerable challenge. This organisational transition from one process to another involving the entire care pathway affected staff members, in terms of lack of obedience to the routine (Studies II, III, IV) and negative feelings they kept to themselves and internalised (Studies II and III).

These summarised results provide knowledge about the possibilities and challenges regarding changing an ingrained traditional process that was used over an entire care pathway. The result emphasized that patients, staff and the organisation has undergone transitions, which take different expressions over time. Each person's transition affects the others, affecting the care pathway LOS.

Further, the thesis provides an understanding that the entire care pathway (horizontally) and the health organisation at all levels (vertically) are involved in different ways, at micro-, meso- and macro-level. Moreover, when changing processes involving whole care pathways, the structures in all the departments are important and need to be robust in order to support the staff and managers at all levels to be able to work in the same direction. The results showed that it is a particularly critical issue when it comes to maintaining implemented routines over time.

DISCUSSION

In Meleis' transition theory, she describes different types of transitions addressing patients, staff and organisation (Meleis, 2010). Transition has been defined in various ways, a common definition is *'It is a passage from one fairly stable state to another fairly stable state, and it is a process triggered by a change'* (Meleis, 2010). A prominent feature of a transition is that it is usually a triggering event that initiates a change in how individuals view themselves and their life situation. Transfer involves a physical event, e.g. change in level of care, and encompasses challenges and vulnerability with increased risk of ill health. From the patient's perspective, transfer to a new care provider can cause anxiety and uncertainty, but where trust and security can be facilitated, for example, by an established relationship. Organisations can also experience transitions that affect the lives of people who work within them and their patients (Meleis, 2010).

When a changed traditional care pathway is studied, (in this case Fast Track), which involves many departments, several transitions in different forms become visible. Patients, staff and organisation are all in their own transitions and also influence each other through this. In this thesis, the transitions of patients, staff and the organisation have been the focus.

TRANSITION FROM A PATIENT PERSPECTIVE

Meleis et al. (2000) stated that healthy transitions are characterised by the patient developing relationships and integrating with the environment in a way that is as constructive as possible for the situation. For patients who suddenly suffer a stroke, this condition entails a transition process that makes them vulnerable and often threatens their identities, which is related to how the person understands and handles the transition and how it can potentially be harmful or delay the patient's control of the situation (Willman, 2022). Studies have shown that calling for help is a big thing for patients. The decision has often been preceded by patients maintaining their independence and autonomy (Ahl et al., 2006; Ahlenius et al., 2017; Vicente et al., 2013), but when the EMS staff arrive at the scene, it is a change from being vulnerable, anxious, afraid and alone to being cared for (Holmberg et al., 2014). Findings in this

thesis showed that EMS staff seemed to understand patients' situation, that they are responsive in different ways, and address the patient's vulnerability. They facilitated the patient's transfer and contributed to a good start in the patient's transition. Results in studies II and III showed that patients' relatives took an important role by developing relationships with staff. Especially within EMS, relatives were given this opportunity by the EMS staff involving them and making them participate (Figure 6). (Meleis et al., 2000; Willman, 2022) describes that different conditions (transitions condition) affect the promotion or hindrance of a healthy transition. It can be about the involvement of close relatives, how the person perceives healthcare, attitudes and socio-economic status. Several different conditions in the transition are interrelated, which means that they affect each other.

However, there were probably other reasons as well for why the involvement of close relatives was particularly common within EMS. Study II showed that "assessment of symptoms" was one of the most experienced CI within EMS (Figure 6). To determine a suspect diagnosis, especially when the patient's symptoms were diffuse, often based on scant stories, was described as difficult. It is known to be a challenge to assess patients at the scene (Andersson et al., 2018; Hansson et al., 2019; Magnusson, 2021). This time point has significance for the direction of the entire care pathway, continued activities, decision-making and priorities. Arocha et al. (2005) asserted that both logical reasoning and clinical knowledge are required to determine a suspect diagnosis. Other studies have highlighted the issue that these difficulties and challenges can pose to patient safety (Magnusson et al., 2022; Magnusson et al., 2020). The participants' descriptions showed that by involving relatives, who could clarify the sequence of events and describe the patient's "usual self", it facilitated the assessment of the patient's symptoms, decision-making for the EMS nurses and thus led to a transfer with higher patient safety. However, research shows that appropriate competence and decision support related to today's assignment is an issue that is real (Ebben et al., 2017; Kepplinger et al., 2016; Zhai et al., 2015).

Many previous studies have shown that crowding in ED is associated with risks to patient safety (Af Ugglas et al., 2020b; Morley et al., 2018; Pines et al., 2011), and long LOS can entail bodily as well as psychological harm (Han et al., 2017; Rantala et al., 2021). Studies I and IV found that patients transported according to the traditional care pathway spent a long time in the ED before

admission to the stroke unit (Figure 9). This delay in the patient's transfer from the EMS to the stroke unit meant that staff in all parts of the care pathway acted to protect the patients (Studies II and III) by, e.g. cross-sectional collaboration, convincing others and building a consensus. This is in line with Meleis who argued for the importance of relationship, interaction and communication in care and its transitions (Dahlberg, 2010). Milton (2022) also showed that communication skills and information delivery affected the interprofessional teamwork in the ED. In study II, it could be seen that the staff acted with safety measures when they noticed the patient's despair or when they ascertained that the environment entailed risks. The staff cared for the patient extra carefully, spent more time than usual, tried in various ways to speed up the process in the care pathway and took patient safety measures that were flexible, creative or out of the ordinary to reduce delay and promote a transfer further in the care pathway. Sparud Lundin and Bratt (2021) believe that smooth transfers in care are connected to a functioning care pathway and are a decisive factor in providing good and safe care.

Although the changed care pathway did not show any differences in outcomes between patients who were transported according to Fast Track and patients who were transported via the ED, the results also did not show that patients who were first cared for in the ED fared better. The results in study IV indicated that Fast Track was safe for selected patients and meant that many hours of waiting at the ED could be eliminated. This should be reflected on in the light of occurrence of Health associated harms – 'suffering, bodily or psychological or illness, and deaths that could have been avoided if sufficient measures had been taken in the patient's contact with the healthcare system' (The Swedish Patients Safety Act, (HSL, 2010).

TRANSITION FROM A STAFF PERSPECTIVE

Transitions in clinical practice roles occur throughout the career. Examples are changes in practice setting, in function and scope of practice and role transitions required of nurses who at the same time care for patients with different needs (Meleis, 2010). The adoption of new policies, procedures and methods has also been described as a transition. Fast Track was a new method that required new procedures and increased knowledge about stroke where especially the staff within EMS were given increased responsibility. Meleis (2010) describes that the level of skill and knowledge relevant to the transition

is a condition that influences healthcare when meeting the demands of the new situation. In the Fast Track system, therefore, the staff had been specially trained to be ready to face a new way of working. Initially, there was a significant focus on the project and ongoing follow-ups from managers at several levels. The staff received significant attention from the hospital. The patients and their close relatives expressed satisfaction, and for all, it was easy to understand that the intervention was closely linked to a benefit for the patient. It was evident that the new role for EMS nurses, including increased responsibility, was not a heavy burden. Initially, the organisation was equipped to respond to direct admissions, and a large proportion of patients received a hospital bed when the criteria were met. Therefore, patients, staff and the organisation were in a “positive transition”. Meleis emphasises that the conditions for the transition are important as well as the properties of transitions e.g. attention and commitment (Willman, 2022).

Studies highlight the importance of resources within the environment during a transition (Meleis, 2010). Figure 8 shows an increasing trend over the years of Fast Track being denied because of a lack of available beds. After frequently receiving the message “no available hospital bed”, the staff described a feeling of reluctance and of giving up. Staff working in the stroke units (suburb hospitals) were affected by this and tried to act so that the burden of unit overcrowding was distributed equally between the hospitals by arguing for patient safety (Studies II and III). There were insufficient resources to complete Fast Track. The decreasing trend of contacts from the EMS to the stroke coordinator can probably also be explained by increased treatment possibilities of acute intervention (Albers et al., 2018; Emberson et al., 2014; Goyal et al., 2016; Hankey, 2017; Jovin et al., 2015; Nogueira et al., 2018; Rodrigues et al., 2016).

Meleis (2010) describes that transitions are accompanied by a wide range of emotions and expectations. Meleis refers to a number of writers who have noted that stress and emotional distress occur during a transition. Study III showed exactly this, when participants in the entire care pathway experienced that the unpleasant feelings, discouragement and frustration, which they kept to themselves, because the situation in the care pathway meant obstacles, the lead times were long, and the patients were suffered in different ways.

The results in study IV showed another pattern, namely that the guidelines were not followed as intended. In Table 5, it was noted that patients assessed according to triage level red or orange were sometimes accepted for Fast Track. There are several reflections about why staff failed to follow pre-defined criteria. One reason is that since more and more patients were included in the stroke alert, it led to the physician on call also being contacted. Local data show that this phoning trend has increased (Strokecentrum väst, 2022). This contact for assessment may have resulted in a denied stroke alert, and sometimes the physician on call assessed that it was safe to use this Fast Track concept. Another reason is that previous studies have indicated that obedience to guidelines in EMS and ED settings varies (Ebben et al., 2013) and that compliance is sometimes low (Hagiwara et al., 2013). (Atack & Maher, 2010) found that pre-hospital protocols are not always sufficient, and (Magnusson, 2021) points out that nurses must rely on their professional judgement when some protocols for assessment or treatment are less suitable, especially in patients presenting with diffuse symptoms. Furthermore, due to the exclusion of context knowledge in the development process, “the format” is an obstacle (Hagiwara et al., 2013). Another reflection is that the lack of obedience is perhaps driven by different aims, either to make things better for the patients or sometimes to improve their own working situations. In this theme, the Study IV enrolment process flowchart, (not investigated in this thesis), showed a pattern that raised questions. The EMS nurses assessed 1,096 patients as Fast Track-eligible and contacted the stroke coordinator to suggest Fast Track, compared to 3,442 patients for whom the EMS nurses did not contact the stroke coordinator. One of the questions raised is why 43% of these patients, who were triaged green or yellow, were not contacted for Fast Track.

However, staff in the entire care pathway tried to protect the patient, and their descriptions testify to the fact that they are negatively affected when the care processes do not flow as planned and the conditions are lacking.

TRANSITION FROM AN ORGANISATIONAL PERSPECTIVE

Organisational transitions are about changes in the environment. They can be triggered by changes in a broader sense, such as changes within the social, political or economic environment or by intra-organisational changes regarding structure or dynamics (Meleis, 2010). In this study, how an

organisational, traditional care pathway was changed was studied. Study I showed that at the start, in 2008, the organisation was rigged to meet the new process, all the conditions were in place, and it was possible to work with the new process in all steps of the care pathway. Follow-up data from 2013–2018 also showed that in the first years, the new Fast Track worked well; however, over the years, a declining trend was observed regarding the number of proposed direct admissions and the percentage of Fast Track accepted. The data also showed an increasing trend in terms of the reason for denied Fast Track was a lack of available hospital beds (Figure 8).

Meleis (2010) believes that transitions are complex processes, and multiple transitions may occur simultaneously during a given period of time. At the University Hospital, several organisational changes had taken place over time. For example, the number of employees and the number of available beds had changed (Table 2). That this was the case could be an explanation for the fact that fewer patients were accepted for a Fast Track from 8 a.m. to 4 p.m., and this probably points to organisational causes because free hospital beds are more often available later in the day after discharges.

Over the 10-year period, many leaders and managers in all parts of the care pathway had been replaced. Changes in senior managers have been described as transitional periods in the life of organisations with far-reaching effects, as have changes in the qualitative dimensions of leadership roles (Meleis, 2010). An example that shows changes in the management functions is that the guidelines/checklists that govern the Fast Track processes have been upgraded into five versions (Appendix 1-5, (in Swedish)). However, minor changes were made, but the new managers' signatures testified to new eras in the organisation, both personnel and changed structures in healthcare. The qualitative interviews also testified that time has passed, as nurses who joined the healthcare later on described that they did not really know how Fast Track was structured from the beginning. Other examples are external influencing factors, where national focus areas pointed to reorienting healthcare to working more towards "Close Care", which means care close to the patient, in the home, or steering to other levels of care than hospitals (Sveriges Kommuner och Regioner, 2022). New focus areas can shift attention and power from ongoing routines and controls. On the other hand, e.g. the stroke unit could work in line with "close care" in different settings. All of these are examples of how the

organisation had undergone several different transitions over time, one after another, but also in parallel.

In Study IV, it was shown that patients transported to the ED waited for an average of 237 minutes before being admitted to the stroke unit when all three EDs were merged; separately, the data showed variations between the hospitals. At the centre hospital, TWT in the ED was the longest, while the two suburban EDs showed approximately the same TWT (Figure 9). Previous research has shown that larger hospitals grow their infrastructure organically and may therefore experience greater challenges regarding delays in the processes in the ED compared to the smaller hospitals (Collins, 2017). The findings shown in Figure 9 should be able to reflect this, which could mean that smaller hospitals that are not so complex, clinical processes are easy to streamline and may consequently be more suitable for Fast Track processes for patients who are not in need of acute interventions, while larger hospitals, containing more sub-specialties and treatment options, are more suitable for handling stroke alerts and acute interventions (Fu et al., 2022).

Thus, the healthcare organisation is complex and is influenced by both external and internal forces. Symbolic interactionism is a concept that describes this. G. Herbert described it as a society being the sum of all ongoing interactions and events, and that it is a process of constant change. For Meleis, the symbolic interactionism has influenced her way of thinking (Willman, 2022).

The healthcare organisation can be seen as a society and is therefore the sum of all ongoing interactions and events, including the external and internal influencing forces, all personnel and patients, and the healthcare organisation is therefore in a constant process.

METHODOLOGICAL CONSIDERATIONS

In order to describe patient outcomes as well as the human experiences of a changed organisational pathway, an inductive (creating new knowledge) and deductive (based on previous theories) approach was adopted using both quantitative and qualitative methods. The quantitative approach in studies I and IV was based on the researcher's attempt to measure, calculate and describe safety outcomes and factors affecting LOS in the care pathway. The qualitative approach adopted in studies II and III was based on the researcher's endeavour to capture and obtain a deeper understanding of the nurses' experiences of the changed organisational care pathway. These two methodologies often complement each other and allow the researcher to generate different kinds of assumptions about key phenomena (Polit & Beck, 2021).

Quantitative research Quantitative research investigates a phenomenon that is possible to quantify with precise measurements (Polit & Beck, 2021). In this type of research, validity is a quality criterion. Validity is related to the level of inference that can be drawn from the research. Additionally, whether the research conducted truly assesses the intended objective of the study. Reliability measures the accuracy of an instrument, i.e. in the case of repeated measurements, the measurement result is approximately the same (Heale & Twycross, 2015; Polit & Beck, 2021). In studies I and IV, two groups were described and compared in a case-control design. This design is a form of an observational study (i.e. it collects information about one or more groups but does nothing to affect them). These studies can be prospective, in which data are collected forwards in time from the start of the study, or retrospective, in which data refer to past events and may be acquired from existing sources, such as hospital records or quality registers (Altman, 1991). Retrospective studies are usually easier to carry out but have a lower level of evidence as they cannot be carried out randomised. There are also risks that data are missing as these must be searched for afterwards (Polit & Beck, 2021).

In study I, data were collected both prospectively and retrospectively. Patients transported according to Fast Track were consecutively included (i.e. data were collected prospectively). Data regarding the group transported via the ED were collected retrospectively using hospital records. There was a concern that the study population was not randomised, which can have caused the selection to

be biased. Another concern involved the retrospective design, since the groups' baseline characteristics must be as equal as possible in order to compare them (Altman, 1991), accordingly, the baseline characteristics of the two groups were compared.

Study IV was based on data from national and local quality registers as well as from hospital databases (Riksstroke, 2022; Strokecentrum väst, 2022), which made it possible to collect both medical and PROM data. The Väststroke register covers data from the whole care pathway for all patients discharged with a TIA or stroke diagnosis from the University Hospital, reflecting the patients' journey from EMS to the stroke unit. The Swedish hospitals maintain a high registration rate in the national stroke register, which favours internal such as external validity (RIKSSTROKE - The Swedish Stroke Register, 2021). Data from the registers provide a large sample size and the possibility of conducting sub-analysis. However, it was found that some variables contained a significant amount of missing data. For example, data from the EQ-5D-5L, an instrument regarding patient-reported quality of life (Burström et al., 2014; EuroQol Group, 2021; Feng et al., 2021), with good reliability and sensitivity (Zhou et al., 2021), was made up of a large amount of missing data. This meant that the results must be interpreted with caution; thus, this affects both internal and external validity. Another example is data that measures several aspects of brain function (NIHSS) (Kasner, 2006), where ambulance registered data had to be replaced by NIHSS registration at the stroke unit to achieve higher internal validity.

Qualitative research is about the meaning and the understanding of peoples' lived experiences (Polit & Beck, 2021). The qualitative approach adopted in studies II and III was based on the researcher's endeavour to capture the nurses' experiences of the changed organisational care pathway in order to gain a deeper understanding of factors affecting the pathway. This endeavour was achieved in studies II and III by listening to the nurses' experiences of managing the changed care pathway, using the critical incident approach in the analysis. This is a qualitative method, where the level of analysis is descriptive, meaning not explained, understood or interpreted (Fridlund & Mårtensson, 2017). The CIT has, in its development, become an appropriate qualitative method when the purpose of its use is to identify and follow-up on human behaviours in terms of experiences and actions taken (Fridlund & Mårtensson, 2017).

In this thesis, the experiences were reported in study II, and the actions taken were reported in study III. To ensure adequate transparency and trustworthiness, the checklist COREQ was used in both studies (Tong et al., 2007).

The trustworthiness of qualitative research is described in terms of credibility, dependability, confirmability and transferability (Polit & Beck, 2021). *Credibility* is about the truth of the findings and the data on which they are based. *Dependability* relates to the stability of the data. *Confirmability* refers to the confidence in the result being based on data and not on interpretations of data, and *transferability* measures whether the result may be applied to other contexts.

The data in studies II and III were collected from 22 interviews with nurses that lasted for about 30 minutes and included 363 experiences and 344 actions taken of CIs, which is considered a sufficient amount of data (Flanagan, 1954).

The *credibility* was strengthened by data saturation, which refers to the point in the research process at which no new information is being discovered (Polit & Beck, 2021). In recent years, the term "information power" has been used, which means that the more relevant information each participant provides, the lower the number of participants needed (Malterud et al., 2016). Studies II and III were strengthened by the fact that most participants were experienced nurses and could describe a large number of perceived experiences and actions taken that affected the care pathway LOS. Decisions regarding data saturation and information strength were continually discussed in the research group. The *dependability* of the studies was strengthened by the research team's discussions and critical reflections on the outcomes of abstraction levels (Jones & Hunter, 1995). The researcher's work experience at different levels of the acute care pathway was considered an asset in the CI analysis process (Flanagan, 1954) by using her own experiences to elicit the participants' experiences. *Confirmability* was strived for with the use of an open interview technique and active listening (Polit & Beck, 2021), especially concerning the participants' experiences being accurate (i.e. the event they described was something they actually had experienced), which is an important issue in CIT (Kemppainen, 2000; Sharoff, 2007). In addition, confirmability was strengthened by the researcher's awareness of her own pre-understanding of the acute care pathway, which was critically reflected upon (Nyström & Dahlberg, 2001). Qualitative research does not aim for representativeness or

generalisability (Polit & Beck, 2021). For stroke patients not eligible for stroke alert, it was indicated this Fast Track was feasible and safe for selected patients. Regarding the *transferability*, qualitative research does not aim for representativeness or generalisability (Polit & Beck, 2021). In studies II and III, the context of the studies, characteristics about the participants, and severity of illness of patients not eligible for stroke alert have been described. This should be the basis for considering whether to transfer the Fast Track concept to similar environments and patient groups with a lower severity of illness.

CONCLUSIONS

Related to specific aims of each study

- Prehospital diagnosis of stroke by an EMS nurse was associated with relatively high diagnostic accuracy in terms of stroke-related diagnoses (Study I).
- The Fast Track for patients not eligible for stroke alert (eventual acute intervention) showed a significantly shortened delay in the care pathway from calling for EMS until arrival at the stroke unit (Study I).
- The nurses' experiences of favourable and unfavourable CIs, affecting lead times in the care pathway, were related to "human interactions" and "healthcare structures" (Study II).
- The nurses' actions, affecting lead times in the care pathway, were related to "promoting progress in the care pathway" and "taking control of the situation" (Study III.)
- Complications and health-related outcomes did not differ significantly between patients who were transported according to Fast Track and those who were transported to the ED, spent a mean time of 237 minutes, before admission (Study IV).
- The proportion denied Fast Track because of the lack of available hospital beds increased over the years. The compliance with the Fast Track within the EMS decreased (Study IV).

Related to the overall aim

- The Fast Track, from the EMS to the stroke unit, indicated to be safe for selected stroke patients, and avoided long waiting time in the ED before admission.
- Personnel in the entire care pathway protected the patient from suffering both bodily and psychological harms by trying to speed up the processes and by taking mitigating measures, especially when delays occurred in the care pathway.
- TWT in EDs has generally increased, which is why crowding threatens all patient processes in the ED and risks prolonging them.

Related to the transition theory

- *The patients'* journey through the care pathway benefited when several transition conditions worked together, such as the fact that the Fast Track was initially carefully planned, the staff's level of knowledge

and skills relevant to the transition and the involvement/support of relatives.

- *The staff's* obedience to initiating Fast Track decreased in relation to the increased number of those who were denied Fast Track because of the lack of available hospital beds. This could be reflected through the theory, which states that transition conditions are linked to the degree of resources, and transitions are accompanied by a wide range of emotions, where many of which pertain to the difficulties encountered during transition.
- *The organisation's* structures and conditions in several areas changed over time, which meant that the organisation was in an ongoing transition. This could explain the organisation's reduced ability to maintain the number of Fast Track and focus on this type of care pathway concept.

FUTURE PERSPECTIVES

Future studies related to the overall aim

Patient perspective

- Describe and explore patients' and relatives' experiences of being cared for in a Fast Track that runs through several departments and different personnel.
- The Fast Track care pathway should be studied using an RCT design with regard to suffering both bodily and psychological harms.

Staff perspective

- The reasons for why many patients who were triaged by the EMS nurses according to the yellow/green severity of their condition were never in contact with the stroke coordinator should be examined.
- Describe and explore reasons why obedience to the guideline decreased based on the transition theory.

Organisational perspective

- Studies should be undertaken to investigate the consequences of fewer Fast Track measures and its impact on the ED and waiting times versus the stroke ward's ability to receive Fast Track patients.
- Describe and explore leaders' experiences of managing a Fast Track when the organisation's conditions change over time.

Future clinician implications related to the overall aim

Patient and staff perspectives

- There is a need for greater understanding within each interrelated department in the care pathway about how CIs at one part of the care pathway have an impact on another. Therefore, it is suggested that concerned parties (leaders and employees) have constructive conversations with the aim of reaching mutually agreed upon solutions how the processes for patients who are not eligible for stroke alert can be improved.
- Planning for how the patient and relatives can participate in this work.

Organisational perspective

- Based on the lessons that this thesis and the transition theory have shown, the aim is to identify transition conditions and indicators for appropriate and productive transitions related to this Fast Track in order to control it and act on obstacles that arise as well as stimulate factors that favour the care pathway.

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APPENDIX

Appendix 1 – version 17 October 2008

Appendix 2 – version 12 May 2009

Appendix 3 – version 28 October 2009

Appendix 4 – version 16 January 2014

Appendix 5 – version 1 April 2018

CHECKLISTA / REGISTRERING, PATIENTER MED SYMTOM SOM VID MISSTÄNKT STROKE ELLER TIA, SOM KAN BLI AKTUELLA FÖR DIREKTINLÄGGNING på Strokeenheten 352A – SU/ÖSTRA

Telefonkontakt med Strokeenheten för eventuell direktinläggning kan tas vardagar 8.00-16.00

OBS!! Telefonsamtal skall ske på ALLA strokepat. även om nedanstående kriterier ej är uppfyllda. (Gäller ej pat.som inkluderar i vårdkedjan Rädda Hjärnan). **Detta pga av registrering, utvärdering och uppföljning. Vid direktinläggning lämnas checklisten på avdelningen. I övriga fall kasseras checklisten. Registrering i Ambulink enl. nedan instruktion är av yttersta vikt!!**

Telefon 3435313.

1. Är patienten aktuell för strokealarm på SU/S? ☐ NEJ ☐ JA

Rädda Hjärnan?
Se separat PM!

2. Kontaktsak Stroke eller TIA?

- T.ex. nyttillkommen ensidig förlamning eller afasi med kvarstående eller övergående symtom (TIA)

3. Insjuknandetid: Dat: _____ Kl: _____ ☐ Osäker tidpunkt

4. Kontrollera:

- P-glukos, POX, blodtryck, puls, andningsfrekvens, temp, EKG.

5. Exklusionskriterier:

- Kramper i samband med insjuknandet
- EKG talande för myocardiischemi (tolkn.av amb.-SSK)
- P-glucos >22 mmol/L
- Temp >39°
- POX <90%
- Systoliskt Bltr <100 mmHg
- Puls <50 eller >110 slag/min
- Andningsfrekvens >25 andetag/min
- RLS 2-8, GCS 3-14

☐ NEJ ☐ JA
☐ NEJ ☐ JA
☐ NEJ ☐ JA
☐ NEJ ☐ JA
☐ NEJ ☐ JA
☐ NEJ ☐ JA
☐ NEJ ☐ JA
☐ NEJ ☐ JA
☐ NEJ ☐ JA

Om någon av ovanstående variabler besvarats med JA är pat. ej aktuell för direktintag.
Kontakt med strokeenheten för registrering vard. 8-16 skall ändå göras.

6. Ring Strokeenheten: 3435313

7. Om beslut om direktintag:

- Sätt PVK + 1000 ml Ringer-Acetat långsamt
- ID-märk pat.
- Patientskjorta om pat. är våt.

VIKTIGT!!!

Registrering i Ambulink

Bed 1.
N02,
N04

Bed 1. Fast Track, Stroke/Tia

Bed 2. N02, N04



Ambulansens checklista

Hjärnvägen – ett snabbspår från ambulans till strokeenhet

Patienter med symptom som vid misstänkt stroke eller TIA

Avd 354 SU/Östra. Avd 239 SU/Mölndal.

OBS! Telefonsamtal ska ske på ALLA strokepat. Även om nedanstående kriterier ej är uppfyllda. (Gäller ej pat. som inkluderas i vårdkedjan Rädda Hjärnan). Detta pga registrering, utvärdering och uppföljning. Vid direktinläggning lämnas checklistan på avdelningen. I övriga fall kasseras checklistan. Registrering i Ambulink enl. nedan instruktion är av yttersta vikt!

1. Är patienten aktuell för strolalarm till SU/S **Nej** **Ja**  Se separat PM
- 
2. Kontaktorsak Stroke eller TIA? (Nyttillkommen ensidig förlamning el. afasi med kvarstående o/e övergående symptom (TIA)
3. Insjuknandetid Dat. och kl. _____ Osäker tidpunkt? m-NIHSS _____
4. Kontrollera; P-glc, POX, Bltr, puls, andningsfrekvens, temp, EKG

5. Exklusionskriterier;

- Kramper i samband med insjuknandet
- Brsm el. EKG-förändringar enligt METTS-Pre RÖD
- P-glucos >22 mmol/L
- Temp >39 grader
- POX <90% utan syrgas
- Systoliskt Bltr <100 mmHg
- Puls <40 eller >120 slag/min.
- Andningsfrekvens >25 andetag/min
- Vakenhetssänkt någon gång under förloppet
- Sårskada som sannolikt behöver sutureras
- m-NIHSS _____
- Bedömning enl. Triagemodell METTS-Pre _____ (Färg)

Om någon av ovanstående kriterier besvarats med JA är pat. ej aktuell för direktintag eller om patienten bedömts RÖD, Orange eller Blå enligt METTS.

Kontakt med strokeenheten för registrering vard. 8-16 skall ändå göras.

6. Om direktintag:

Sätt PVK, + 1000 ml Ringer-Acetat långsamt

ID-märk

Pat.skjorta om patienten är våt.  Registrering i Ambulink; *Till Akuten:* Bed 1 N02 el. N04

Till stroke-enheten: Bed 1.

Fast Track, Stroke/TIA

Hjärnvägen - ett snabbspår till strokeenhet på SU

Patienter med tydliga symtom som vid misstänkt stroke eller TIA

Datum	Personnummer: Namn;	Hämtadress; Sjukhus enl. gällande fördelningsnyckel;	Har pat. nyligen varit inlagd för stroke el. TIA? I så fall var?
För patienter som inkluderar i Fast-Track Hjärnvägen tas telefonkontakt med SU-gemensam koordinator Gäller årets alla dagar, dygnet runt			Telefon 342 94 99
Vid direktinläggning enl. Hjärnvägen lämnas checklistan + ambulinkjournalen + METTS - Pre journalen på avdelningen. Då akutmottagningen är mottagare lämnas underlagen på akuten			

1. Är patienten aktuell för strokelarm på SU/S? ☐ NEJ ☐ JA



Rädda Hjärnan?

Se separat PM!

2. **Kontaktsak Stroke eller TIA?**

- Nyttillkommen ensidig förlamning eller afasi med kvarstående o/e övergående symtom (TIA)

3. **Insjuknandetid:** Dat: _____ Kl: _____ ☐ Osäker tidpunkt

4. **Undersökning:**

- METTS-Pre, P-glukos samt EKG.
- NIHSS (noteras i fritext i AmbuLink) Värde; _____

5. **Exklusionskriterier:**

- METTS-Pre **RÖD** eller **ORANGE** ☐ NEJ ☐ JA
- Kramper i samband med insjuknandet ☐ NEJ ☐ JA
- Brsm el. EKG-förändringar enligt METTS-Pre Röd ☐ NEJ ☐ JA
- P-glucos >22 mmol/L ☐ NEJ ☐ JA
- Vakenhetssänkt någon gång under förloppet ☐ NEJ ☐ JA
- Sårskada som sannolikt behöver sutureras ☐ NEJ ☐ JA

Om någon av ovanstående parametrar besvarats med **JA** är pat. ej aktuell för direktinläggning på strokeenhet.

6. Om beslut om direktintag:

- Sätt PVK
- ID-märk pat.
- Patientskjorta om pat. är våt.
- Om patienten visar tecken till dehydrering koppla 1000 ml Ringer-Acetat långsamt

Föreligger risk för gastroenterit? Informera koordinator

Registrering i Ambulink

Till Akuten

Till Strokeenheten

Bed 1.

Bed 1.

N02 el.N04

Fast Track, Stroke/TIA

2009-10-28 Sahlgrenska Universitetssjukhuset

Putte Abrahamsson VC Med.kliniken SU/Östra, Karin Fröjd Projektledare med VC-ansvar Strokeenheten SU/Sahlgrenska,
Helena Gustafsson VC Med.kliniken SU/Mölndal, Per Örninge Ambulans ÖL SU

Checklista för direktinläggning Hjärnvägen

(Reviderad av delprocessgruppen Hjärnvägen 140116)

Ärendenummer:	Ambulans ID: Sign Amb ssk:
---------------	-------------------------------

1.1	Datum:	
1.2	Pnr:	
1.3	Patient med plötsligt påkomna stroke/TIA symtom	
1.4	Trombolys möjlig	Nej Ja (Stroke Alert)
1.5	mNIHSS	Värde:
1.6	Sjukhustillhöghet	MS SS ÖS

2.1	Gastroenterit eller annan tarminfektion	Nej Ja
2.2	On anticoagulantia (t.ex. Wara, Pradaxa, Xarelto, Eliquis)	
2.3	Kramper i samband med insjuknandet	
2.4	Misstanke om akut kardiell ischemi	
2.5	P-glucos > 22 mmol/L	
2.6	Temp > 38.5 grader	
2.7	POX <90% utan syrgas	
2.8	Systoliskt Bltr <100 mmHg eller >200 mmHg	
2.9	Puls <50 eller >110 slag/minut	
2.10	Andningsfrekvens >25 andetag/minut	
2.11	Vakenhetssänkt någon gång under förloppet	
2.12	Sårskada som sannolikt behöver sutureras	

Om alla NEJ ovan ring strokekoordinator som tilldelar sjukhus/avdelning
Om något JA ovan ring strokekoordinator som hänvisar till akutmottagning på
det sjukhus som har ledig strokeplats

3.1	Beslut direktintag	MS (Vard 8-20) .SS (07-07) ÖS (07-07)
3.2	Är patienten 50 år eller yngre skall patienten till AKOM Sahlgrenska	
3.3	Om Nej orsak till nekat direktintag	Platsbrist Ja Nej
3.4	Nekad Rädda Hjärnan- Över till Hjärnvägen	Ja Nej
Övriga anteckningar:		

Hjärnvägen

Patient med **PLÖTSLIGT** påkomna symtom med sensoriska och/eller motoriska unilaterala bortfall de senaste två veckorna
TIA/STROKE

ÄR TROMBOLYS/TROMBEKTOMI MÖJLIG?

JÄ

Rädda Hjärnan

Se vårdkedja

NEJ

- ♦ Genomför mNIHSS
- ♦ EKG
- ♦ Var noga med debut tid
- ♦ Patientens sjukhustillhörighet

- ♦ RETTS **RÖD** eller **ORANGE**
- ♦ Är patienten under 50 år
- ♦ Gastroenterit el annan tarminfektion
- ♦ Antikoagulantia behandling tex waran, Pradaxa, Eliquis, Xarelto mfl
- ♦ Vakenhetssänkt någon gång under förloppet
- ♦ Kramper i samband med insjuknandet
- ♦ Misstanke om akut cardiell ischemi
- ♦ Särskada som sannolikt behöver sutureras
- ♦ P-Glucos > 22 mmol
- ♦ Temp > 38,5
- ♦ Puls < 50 eller > 100 slag/min
- ♦ POX < 90% utan syrgas
- ♦ SBT < 100 mmHg el > 200 mmHg
- ♦ Andningsfrekvens > 25 andetag/min

**OM NÅGOT
JÄ**

Till akutmottagning
utifrån patientens
sjukhustillhörighet

Dokumentera i Ambulink under vårdkedja
"exkluderad Hjärnvägen"

**OM ALLA
NEJ**

Kontakta strokekoordinator som anvisar sjukhus och avdelning

Tele: 031-3429499

- ♦ Sätt PVK
- ♦ ID-märk
- ♦ Ring och rapportera till avisad avdelning

- ♦ Akutjournal med följer patienten.

- ♦ Dokumentera i Ambulink och använd vårdkedja "Hjärnvägen"